Daphne Utilities

Environmental Information Document (EID)

Clean Water State Revolving Fund Application
for the Daphne Utilities Board

April 2020

VOLKERT

TABLE OF CONTENTS

A. EXISTING ENVIRONMENT

The Utilities Board of the City of Daphne, Alabama, herein referred to as Daphne Utilities (DU) owns, operates, and maintains water, sewer and natural gas facilities in the City of Daphne and adjacent communities. Approximately 12,480 residential and commercial customers currently receive sewer services from DU. The City of Daphne is located in Baldwin County in the State of Alabama and has a population of approximately 26,500, according to the US Census Bureau. Baldwin County is the eastern most county in the state of Alabama and is adjacent to the State of Florida on the east. The western border of Baldwin County is Mobile County. The metropolitan statistical area (MSA) for Daphne is Daphne-Fairhope-Foley per the Office of Management & Budget (OMB) Bulletin No. 20-01. DU services areas outside of Daphne including the neighboring areas of Spanish Fort, Malbis and Belforest.

The projects included in this application are modifications to the existing wastewater treatment facility and rehabilitation and upgrades to the collection system.

Enclosed in Exhibit 1 are project maps. Exhibit 2 includes a map of DU's sewer system. United States Geological Survey (USGS) quadrangle maps showing the location of the various project areas are enclosed in Appendix A.

B. EXISTING FACILITIES

DU owns and operates the Daphne Water Reclamation Facility (WRF), located at 29280 North Main Street. All the sewage collected in the DU sanitary sewer collection system is treated at the Daphne WRF. This facility is currently permitted under NPDES Permit AL0027561 to treat 4.17 MGD of wastewater and discharge treated effluent into the Blakeley River. DU receives wastewater from approximately 12,480 residential and commercial customers. The service area includes Daphne Spanish Fort, Malbis, and Belforest. Currently, no industrial users, which are registered through ADEM, discharge to the Daphne WRF.

In November 2019, DU entered into an Order of Settlement Agreement with ADEM. DU submitted certification of compliance letters to ADEM in March, 2020 for their review stating that DU is in compliance with all requirements of said Order.

Daphne Water Reclamation Facility

In 2019, the annual average monthly flow at the Daphne WRF was 2.59 million gallons per day (MGD). The WRF is equipped with a laboratory to perform in house testing and Supervisory Control and Data Acquisition (SCADA) controls and alarms to assist with daily operation. Flow entering the WRF is through gravity lines and is first treated at the headworks system. The system includes a perforated plate mechanical screen and then to two belt filters which act as primary clarifiers. The system also includes an odor control system and manual bar screen to accommodate planned and unplanned outages of the perforated plate mechanical screen. Flow is then pumped from the filters to the secondary treatment process. The WRF contains two treatment trains, the Lake Forest train and the D'Olive train. Each train has an intermediate pump station to lift the primary filter effluent up to the elevated aeration tanks. The D'Olive treatment train contains a 100-foot diameter annular ring aeration basin (0.69 MG) with a 52-foot diameter center clarifier inside. Overflow from the D'Olive center clarifier (#1) flows to a 100-foot diameter tertiary clarifier (#2). The Lake Forest treatment train employs a 1.9 MG Schreiber circular aeration tank with a rotating aeration bridge. Lake Forest flow is then sent to a 100-foot diameter circular clarifier and/or the D'Olive 100-foot diameter center clarifier. Flow from both trains is then conveyed to an ultraviolet (UV) disinfection system, as well as the secondary chlorine disinfection system. Lastly, an effluent pump station sends the treated wastewater to the outfall on the Blakeley River.

Sewer System

The collection is comprised of 82 lift stations and approximately 33 miles of force mains, 160 miles of gravity mains, 17 miles of low-pressure force mains, and 3,900 manholes. The collection system piping is comprised of various materials including vitrified clay (VC), ductile iron, and PVC. Based on current GIS and record drawing data, approximately 60% of the DU collection system has been constructed during or after

1980. Approximately 30% of the collection system was constructed in the 1970s. Less than 1% of the system was constructed in the 1960s. Approximately 9% of the collection system installation dates are unidentified. Attached in EXHIBIT 2 is a map showing DU's sewer collection system.

Supervisory Control and Data Acquisition (SCADA) is currently provided on all 82 lift stations sites utilizing the Mission equipment. The SCADA system provides real time monitoring of the sites along with daily reports that are reviewed that indicate alarms along with run time variances. The Mission system continuously monitors lift station conditions and systematically notifies staff of alarm conditions using a cellular network that is programmed to include specific personnel.

The SCADA equipment utilized for the lift stations has also been expanded into the collection system. Manhole monitors have been installed at two key locations where previous SSOs occurred. These monitors assist staff in monitoring the wastewater flow levels to assist with determining the collection system performance. These monitors provide alarms for high level conditions. Also, DU standard specifications updated in January 2019 require all new subdivisions to install a minimum of one manhole monitor.

Ten lift stations are equipped with either portable generators or bypass pumps to maintain continuous system operations should an unanticipated system failure occur. DU also owns six 4-inch bypass pumps and two 6-inch bypass pumps that are available for use during unanticipated emergency situations.

C. NEED FOR PROPOSED FACILITY

Projects have been identified as improvement needs in the DU sewer system/treatment facility necessary to continue to provide sewer service in an efficient manner that protects the environment.

Various improvements to the water reclamation facility are needed to replace aging infrastructure, add new infrastructure to provide a higher quality effluent, and provide additional process capabilities and redundancy. Daphne Utilities is committed to providing a high-quality effluent at the WRF and these identified projects will assist with this commitment and overall operation of the facility.

The manual bar screen will be replaced with a redundant mechanical bar screen. A parallel UV system and additional filtration equipment will be installed parallel to the existing system. A new vortex grit removal system will also be installed.

Another project proposes to rehabilitate and/or upgrade aging infrastructure within the existing sanitary sewer collection system to assist with reducing inflow/infiltration (I/I) and potentially related sanitary sewer overflows (SSOs) and improve overall operation and efficiency of the system including improvements at existing lift stations.

All proposed projects will utilize Daphne Utilities current Standard Specifications along with industry acceptable standards. Equipment and rehabilitation methods proposed to be utilized will represent current advancing technologies in the wastewater industry.

D. PROPOSED FACILITY AND PROPOSED FUNDING &
E. ALTERNATIVE ANALYSIS

The following are the identified projects with an estimated cost per project. The total current estimated cost for these improvements/designs is approximately $4,800,000. Funding is currently primarily anticipated to be supported by the SRF program with the remainder being provided through customer user fees.

Project No.	Project Name	Estimated Cost
1	Replacement of Manual Bar Screen	$300,000
2	UV Disinfection Upgrades	$700,000
3	New Filtration Equipment	$1,800,000
4	Vortex Grit System	$1,000,000
5	Collection System Rehabilitation/Upgrades	$1,000,000

Project Numbers 1-4 – Improvements to the Existing WRF

Replacement of the manual bar screen with a redundant mechanical bar screen will help ensure that screening at the headworks continues to perform at a high level during planned and unplanned outages of the existing mechanical bar screen. A consistent high level of initial screening allows for improved downstream treatment and maintenance.

In order to improve the effluent quality, DU proposes to install a parallel UV system and add filtration equipment. DU is currently utilizing a Trojan 4000 series UV system but are also having to utilize chlorination/ dechlorination. By installing a parallel UV system, DU will be able to eliminate the need for daily use of the chemicals for chlorination/dechlorination and just use in an emergency situation. The existing structure will be renovated to accommodate the new parallel UV system; thereby, eliminating the need to build a new structure. The new UV system will be designed with probes and monitoring equipment to adjust UV output based on current needs of the system saving power and lamp life.

Immediately upstream of this process, a new filtration system will be installed providing tertiary filtration allowing for improved effluent quality for nutrients and TSS removal. The filter will also allow the UV system to operate at a higher efficiency and effectiveness by reducing solids in the water. The UV light transmission is improved resulted in improved target bacteria kill.

While DU NPDES permit does not currently require a need for tertiary treatment, DU desires to improve the water quality by installing the filter and improving the performance of the UV system with the filter installation.

A new vortex grit removal system is planned to help provide additional removal of fine grit and sand that interferes with the treatment processes downstream and/or causes undue mechanical wear and increased maintenance on equipment.

Alternative Analysis

1. Operational Changes - The operational staff continues to perform routine maintenance and adjust operational parameters based on laboratory analysis in order for the facility to treat at their peak performance. Changes in operations will not improve efficiencies of existing equipment, provide redundancies or significantly address effluent quality. Therefore, with the desire to produce a high-quality effluent and the need for redundancy, concerns need to be addressed by other means**.**

2. New WRF - While this facility and its infrastructure is aging and does not have full redundancy or desired treatment capabilities, it is more economically feasible to make improvements to the existing facilities in lieu of building new treatment facilities.

3. No Action - This is not an option for the facility as continued consistence compliance with effluent quality will be assisted by addressing redundancy and improved treatment capabilities to consistently meet current permit limits and anticipated future limits.

4. Selected Alternative - Improvements to this facility will allow for the continued permit compliance at the facility while providing needed redundancy, reduction of chemical usage, improved effluent water quality and efficiencies.

Project Numbers 5 – Collection System Rehabilitation/Upgrades

DU collection system is located in an environmental sensitive area with multiple waterways including the D'Olive Creek, Mobile Bay, and Tiawasee Creek. Reductions in sanitary sewer overflows by eliminating inflow/infiltration will improve water quality, reduce pumping requirements for DU lift stations and treatment facility. This project proposes to rehabilitate and/or upgrade aging infrastructure within the existing sanitary sewer collection system will reduce inflow/infiltration (I/I) and potentially related sanitary sewer overflows (SSOs) and improve overall operation and efficiency of the system.

Since 2014, DU has been evaluating their system through closed circuit television (CCTV) and cleaning and manhole inspections. Supervisory Control and Data Acquisition (SCADA) is provided on all 82 lift stations. Data collected from SCADA has also been used to identify areas with higher inflow and infiltration experienced during rain events

along with data collected from flow meters installed along gravity mains. DU has identified and continues to priority areas to rehabilitate based on this information.

DU plans to use multiple rehabilitate methods to the system based on findings from CCTV work. Rehabilitation methods planned will be performed from within the mains to minimize disturbance of the surrounding areas several of which are located within wooded areas. Methods include cured in place piping (CIPP) lining of sewers, sewer joint grouting and manhole lining. Point repairs will be performed as needed in order for the other methods to be performed. Also, DU will improve existing lift stations by replacing aging equipment to improve operational efficiencies.

Alternative Analysis

1. Alternative 1 – Replace the existing sewer mains and build new lift stations. Development and lack of adequate space makes it very difficult to replace failing sewer mains. Therefore, this is not an effective solution. Also, replacement of lift stations is not as efficiency when the existing station can be rehabilitated.

2. Alternative 2 - Increase the size of the treatment facility to accommodate the additional I/I. This is not a cost-effective alternative and also does not address the structural deficiencies.

3. No Action - This is not an acceptable alternative as it does not address aging infrastructure that is utilized to safely transport sewage to the treatment facility for proper treatment.

4. Selected Alternative - Rehabilitation of aging infrastructure through internal means allows for minimal disturbance of existing developed areas while reducing I/I and restoring capacity and structural integrity. The selected alternative is the most cost-effective method to restore the sewer mains to function as originally designed.

F. PHYSICAL DATA

1. Topography - Daphne, Alabama is located on a high bluff with elevations ranging from sea level to 120 feet.

2. Geology - Refer to attached Hydrogeology and Vulnerability to Contamination of Major Aquifers in Alabama: Area 13.

3. Hydrology - Refer to attached Hydrogeology and Vulnerability to Contamination of Major Aquifers in Alabama: Area 13.

4. Climate & Precipitation – Per the City of Daphne website, Daphne, Alabama has an average annual temperature of 65°F. Monthly average temperatures range from 41° F in January to 80° F in July. The average annual rainfall is 66 to 68 inches.

5. Floodplains, Floodways, and Wetland Impact (FIRM) - Refer to attached maps.

6. Description of Sewer Mains to Be Constructed/Rehabilitated - All sewer lines proposed to be installed will be constructed in accordance with DU's Standard Specifications which are located at www.daphneutilities.com. These standards comply with or exceed recommendations detailed in the Ten State Standards for Wastewater Facilities.

G. ENVIRONMENTAL CONSEQUENCES AND MITIGATIVE MEASURES

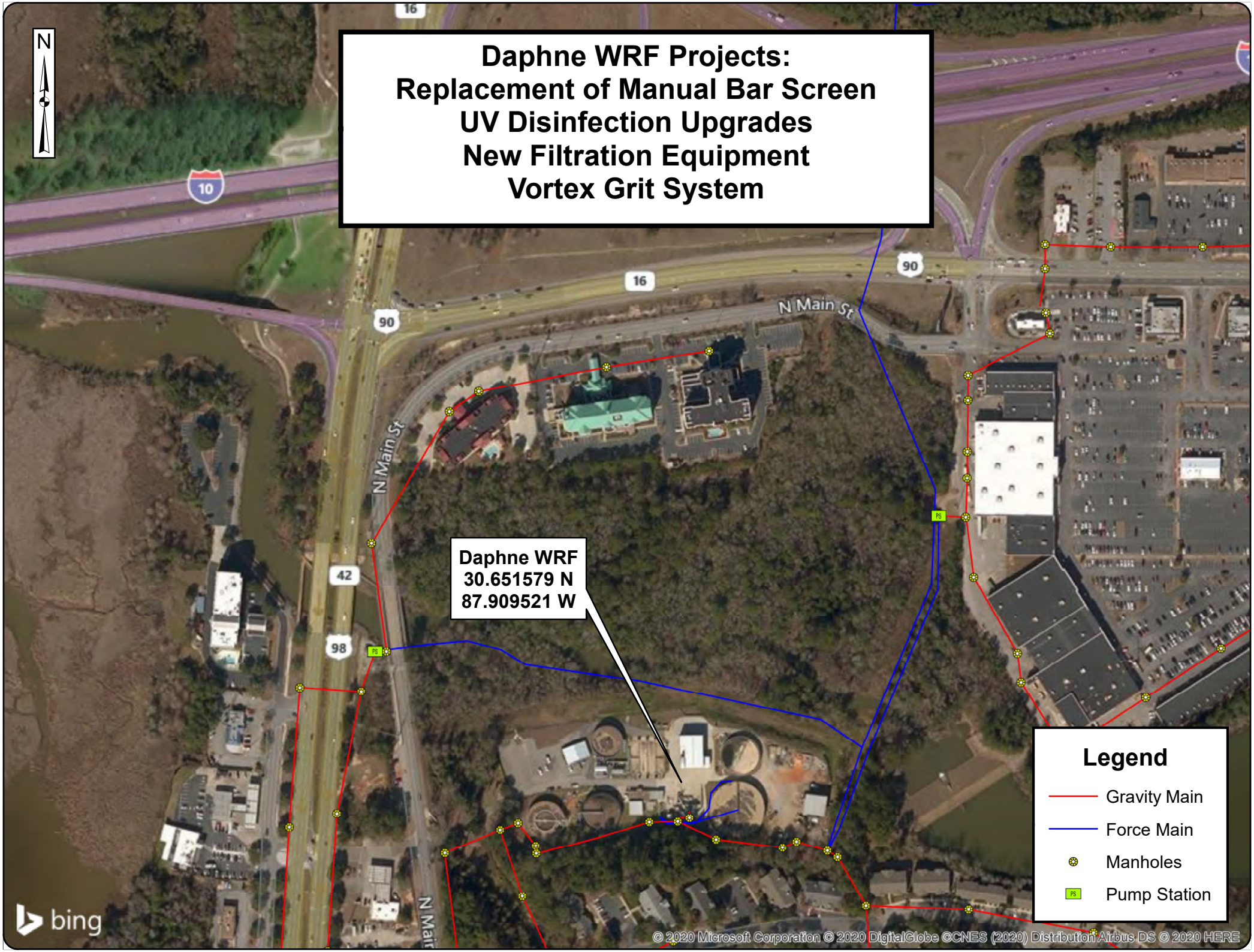
Letters have been sent to the following agencies for their concurrence on the proposed projects: Historical and Archeological Features - AHC; U.S. Fish and Wildlife Service; U.S. Army, Corps of Engineers; and Regional Planning Agency. These projects are currently not anticipated to impact Alabama Power Company or the Tennessee Valley Authority.

The identified projects are beneficial to these areas because it will improve the water quality in the surrounding areas and continue to provide for the safe transmission and treatment of sewer.

Construction activities will utilize current practices to minimize the impact to the environment. This will include utilizing Best Management Practices including silt fence and wattles at the construction site. Also, the Contractor shall be responsible for complying with OSHA standards and ADEM permits for the proposed construction activities. Contract durations will be established by the Engineer to allow for the delivery of equipment and construction of the proposed improvements. During the design, consideration will be given to the surrounding structures while meeting the project objectives.

EXHIBIT 1

PROJECT MAPS


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
10
16
90
42
98
N Main St
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Manholes
Pump Station
bing
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE

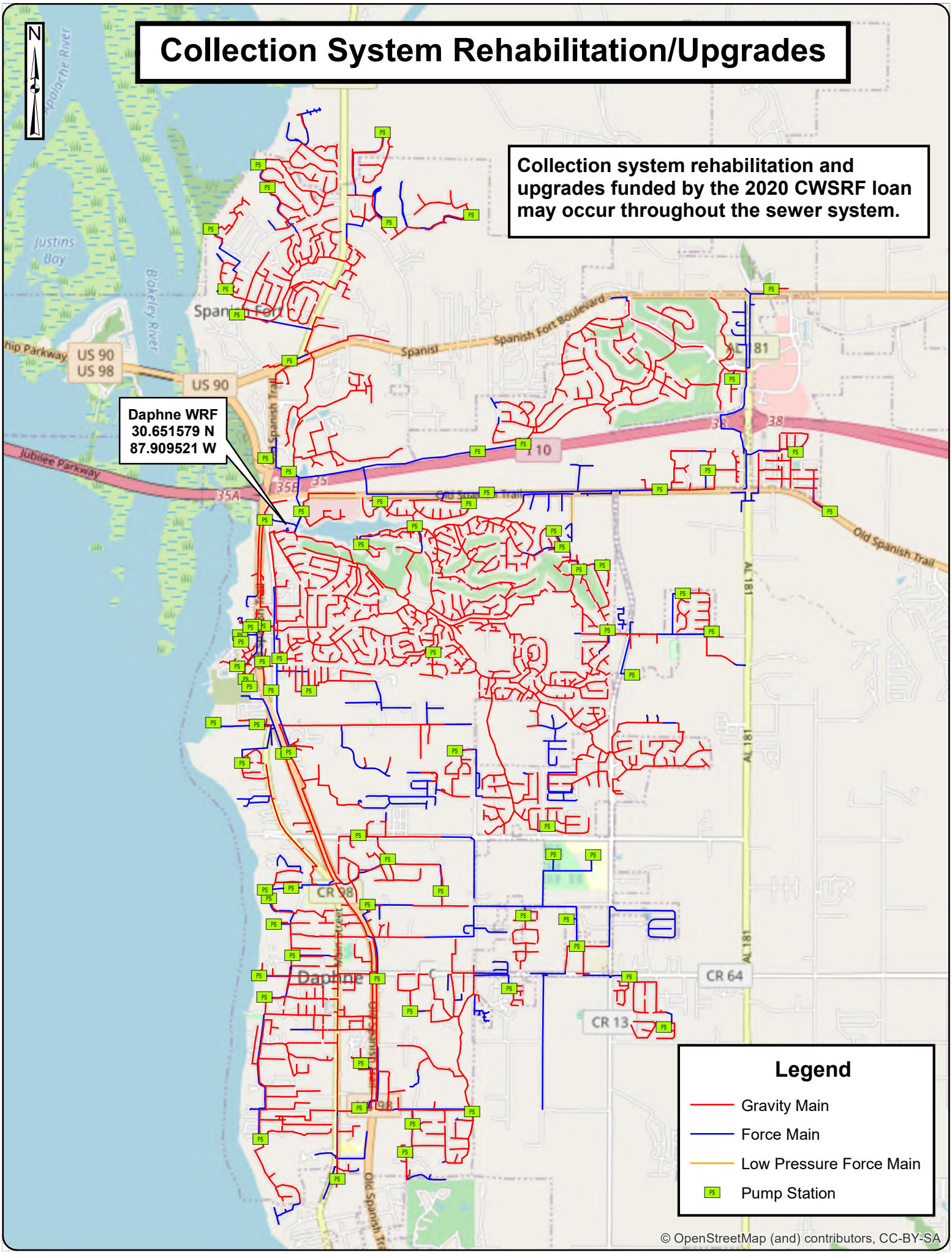
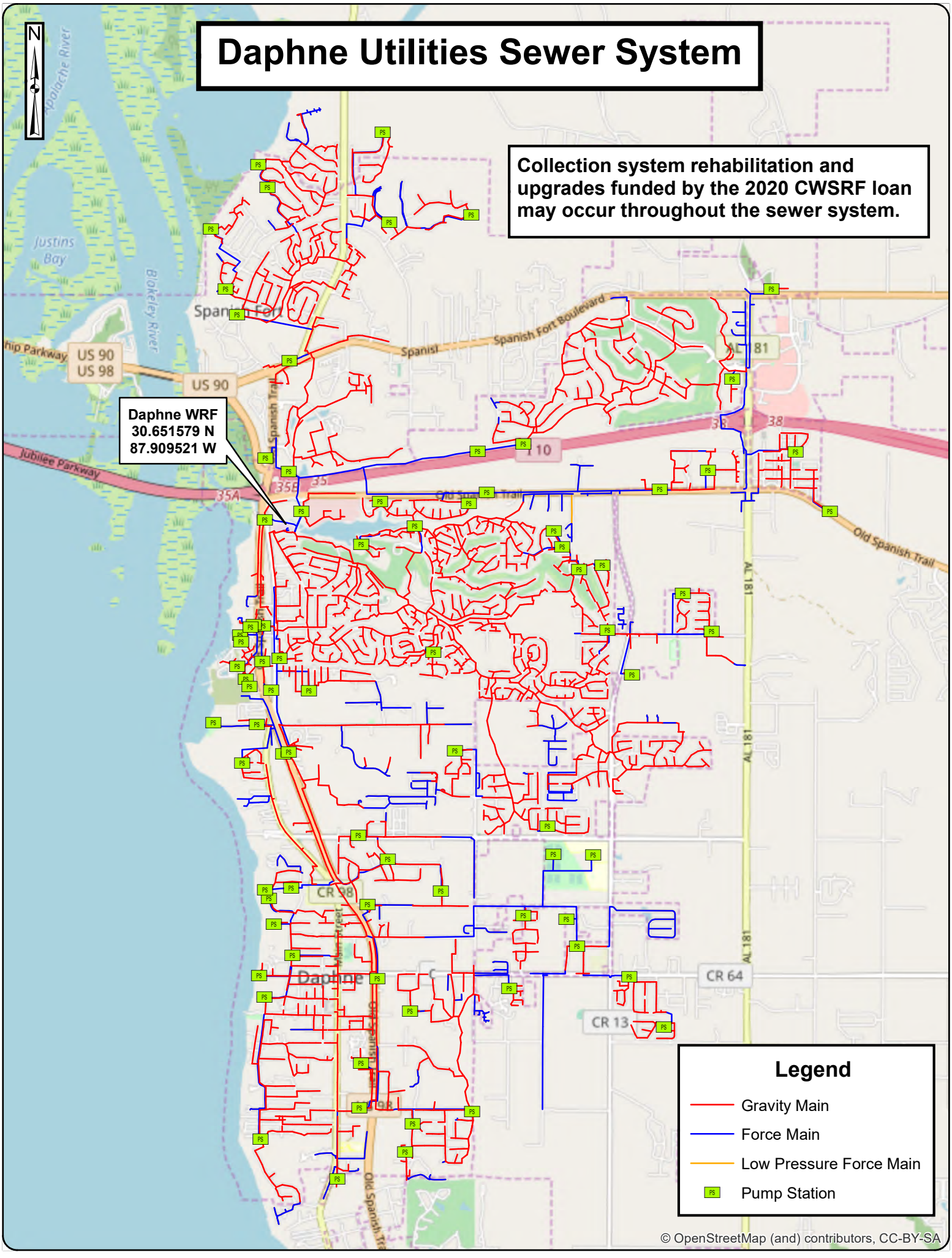

Collection System Rehabilitation/Upgrades
Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Low Pressure Force Main
Pump Station
© OpenStreetMap (and) contributors, CC-BY-SA

EXHIBIT 2

SEWER COLLECTION SYSTEM


Daphne Utilities Sewer System
Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.
Daphne WRF
30.651579 N
87.909521 W
N
Legend
Gravity Main
Force Main
Low Pressure Force Main
Pump Station
US 90
US 98
I 10
CR 98
CR 64
CR 13
AL 181
Spanish Fort Boulevard
Old Spanish Trail
Jubilee Parkway
Daphne
Spanish Fort
Justins Bay
Blakeley River
© OpenStreetMap (and) contributors, CC-BY-SA

APPENDIX A

USGS QUAD MAPS


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
Daphne WRF
30.651579 N
87.909521 W
PS
PS
Legend
Gravity Main
Force Main
Manholes
Pump Station
Copyright © 2013 National Geographic Society, i-cubed

Daphne Utilities Sewer System

Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.

Daphne WRF
30.651579 N
87.909521 W

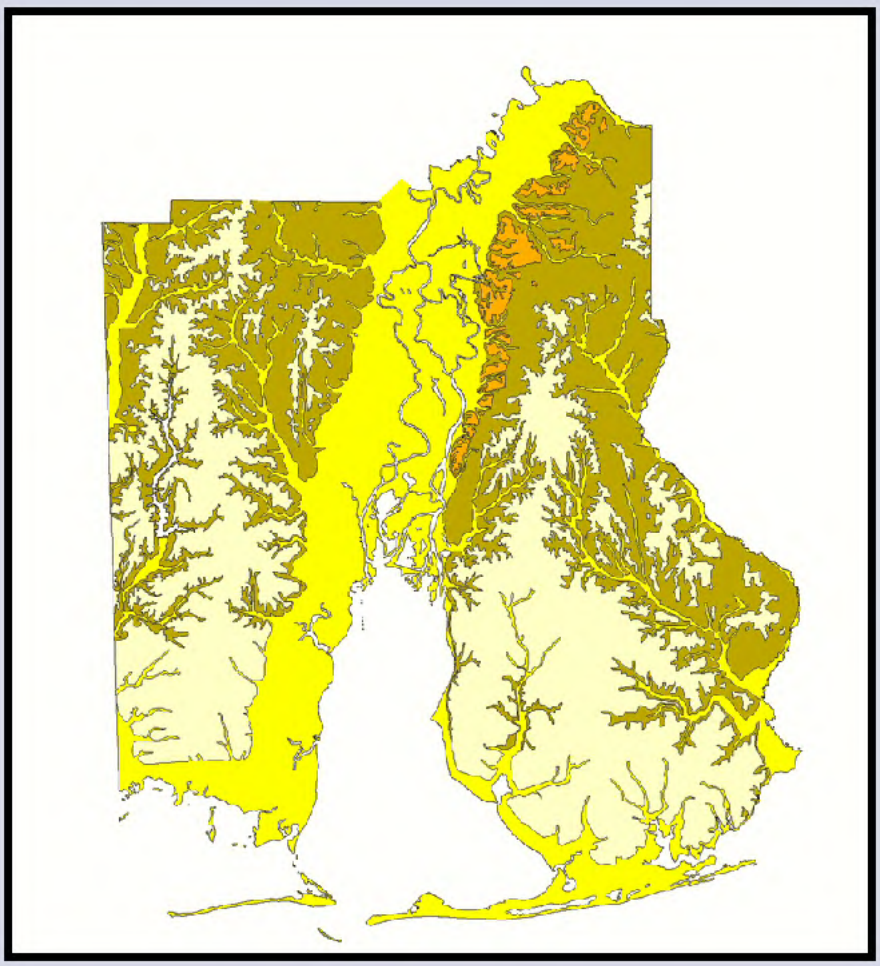
Legend

- Gravity Main
- Force Main
- Low Pressure Force Main
- PS Pump Station

APPENDIX B

HYDROGEOLOGY AND VULNERABILITY TO CONTAMINATION OF MAJOR AQUIFERS IN ALABAMA: AREA 13

HYDROGEOLOGY AND VULNERABILITY TO CONTAMINATION OF MAJOR AQUIFERS IN ALABAMA: AREA 13



STATE OF ALABAMA
GEOLOGICAL SURVEY

ADEM

GEOLOGICAL SURVEY OF ALABAMA
COMPACT DISC 1

GEOLOGICAL SURVEY OF ALABAMA

Donald F. Oltz
State Geologist

HYDROGEOLOGY DIVISION

COMPACT DISC 1

HYDROGEOLOGY AND VULNERABILITY TO CONTAMINATION OF MAJOR AQUIFERS IN ALABAMA: AREA 13

By

Blakeney Gillett, Dorothy E. Raymond,
James D. Moore, and Berry H. Tew

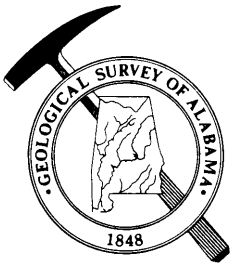
Prepared by the Geological Survey of Alabama in cooperation with
the Alabama Department of Environmental Management

Tuscaloosa, Alabama
2000

GEOLOGICAL SURVEY OF ALABAMA

DONALD F. OLTZ
State Geologist

420 Hackberry Lane
P.O. Box O
Tuscaloosa, Alabama 35486-9780
(205)349-2852
FAX (205)349-2861
gsa@ogb.gsa.tuscaloosa.al.us



February 15, 2000

The Honorable Don Siegelman
Governor of Alabama
Montgomery, Alabama

Dear Governor Siegelman:

It is with pleasure that I make available to you and the citizens of Alabama the publication "Hydrogeology and Vulnerability to Contamination of Major Aquifers in Alabama: Area 13," by Blakeney Gillett, Dorothy E. Raymond, James D. Moore, and Berry H. Tew. It is published as Compact Disc 1 of the Geological Survey of Alabama and is the result of a cooperative effort between the Survey and the Alabama Department of Environmental Management.

The publication contains information on the geology, the characteristics of the major aquifers, and public supply wells in Baldwin and Mobile Counties. This report is the first in a 13-part series which will ultimately cover the entire state and is the first publication that the Survey has released on compact disc. The information should be vital to engineers, resource managers, city planners, and others needing information on the ground water resources of Alabama.

Respectfully,

Donald F. Oltz
State Geologist

Table of Contents

ILLUSTRATIONS

ILLUSTRATIONS—Continued

FIGURES

TABLES

HYDROGEOLOGY AND VULNERABILITY TO CONTAMINATION OF MAJOR AQUIFERS IN ALABAMA : AREA 13

By

Blakeney Gillett, Dorothy E. Raymond,
James D. Moore, and Berry H. Tew

ABSTRACT

The Geological Survey of Alabama (GSA), in cooperation with the Alabama Department of Environmental Management (ADEM), is revising and expanding a series of reports that delineates the major aquifers in Alabama and characterizes their vulnerability to contamination. The original reports were prepared by the U.S. Geological Survey in cooperation with ADEM. The state is divided into 13 areas that are addressed in separate reports. The hydrogeology and vulnerability to contamination of the major aquifers in Area 13, which includes Baldwin and Mobile Counties, are described in this report, which currently is available only in digital format.

The major aquifers in the study area are the Miocene-Pliocene aquifer and the watercourse aquifer (alluvial-coastal aquifer of Mooty, 1988). The Miocene-Pliocene aquifer consists of the Citronelle Formation and the undifferentiated deposits of the Miocene Series. No continuous confining unit exists between the Citronelle Formation and the shallow part of the Miocene Series undifferentiated, and as a result, the two units generally act as a single aquifer. The Miocene Series undifferentiated, however, does not appear to be a single aquifer. New deep well data available from central Mobile County and southern Baldwin County suggest that the Miocene deposits in both counties may be subdivided into at least two separate aquifers.

The recharge areas for these aquifers include all of Mobile and Baldwin Counties and parts of Washington County. The soils throughout most of the study area are highly permeable and allow rapid infiltration of surface water. Consequently, the shallow unconfined aquifers in the study area are considered highly vulnerable to surface sources of contamination. Aquifers become less vulnerable to contamination from the surface with an increasing degree of confinement by clay layers. However, even deep aquifers can be vulnerable to natural sources of contamination such as salt water from the Gulf of Mexico and mineralized ground water.

Pumping of public water supply wells and irrigation wells can increase the potential for contamination of aquifers if not properly planned, managed, and monitored. Pumping of large quantities of ground water creates cones of depression, increases

flow gradients, and draws ground water and any associated contamination toward pumping wells.

INTRODUCTION

The U.S. Geological Survey, in cooperation with the ADEM, conducted a series of hydrogeologic studies in Alabama to delineate the major aquifers and their recharge areas and to define areas susceptible to contamination from the surface. Each of the 13 areas of the state was studied by different authors. Mooty (1988) summarized the characteristics of the alluvial-coastal aquifer (the watercourse aquifer) and the Pliocene-Miocene aquifer in Area 13, which includes Baldwin and Mobile Counties. The present study is a cooperative effort between GSA and ADEM to update and supplement the results of the previous studies and to provide the hydrogeologic information in a digital format that can be easily accessed by computer.

ACKNOWLEDGMENTS

The authors thank the well drillers and managers and operators of water supply systems in Mobile and Baldwin Counties for information they provided about their wells. In addition, Sonja Massey, Fred Mason, and Enid Bittner of ADEM provided assistance and suggestions in the preparation of this report. Geographic Information Systems (GIS) support was provided by Ruth T. Collier and Douglas R. Taylor of the GSA. Lewis S. Dean and Ginger R. Blakney, also of the GSA, provided assistance with the manuscript. Their efforts are greatly appreciated.

PURPOSE AND SCOPE

The purposes of this report are to (1) describe the hydrogeology of the study area; (2) delineate, redefine, and describe the major aquifers and their recharge areas; (3) delineate areas that are vulnerable to contamination; (4) compile the Source Water Assessment Areas or Wellhead Protection Areas as defined under §335-7-5 and §335-7-12 of the ADEM's administrative code and as currently identified in the study area; (5) identify the locations of public supply wells in the study area; and (6) provide all hydrogeologic data in a digital geographic information systems (GIS) format that can be readily accessed by scientists and the public.

The Geologic Map of Alabama (Szabo and Copeland, 1988) at a scale of 1:250,000 provided geologic data used to update the previous aquifer susceptibility map by Mooty (1988). In the study by Mooty (1988), all wells used for municipal and rural public water supplies were inventoried. For the present study, water-level data from the GSA's regular monitoring program and historical water-level data were used to prepare a generalized potentiometric surface map of the uppermost aquifer. Areas vulnerable to surface contamination were delineated from topographic maps and geologic maps.

Delineations of Wellhead Protection Areas were derived from maps submitted to the ADEM by public water systems that have completed wellhead protection projects.

LOCATION AND EXTENT OF THE STUDY AREA

Area 13 is in southwestern Alabama on the northern coast of the Gulf of Mexico and comprises Mobile and Baldwin Counties (plate 1). The combined land area is about 2,828 square miles (Alabama Department of Economic and Community Affairs, 1984). The area includes the major cities of Mobile, Prichard, Bay Minette, and Gulf Shores and many smaller towns and communities. The total population of the area was about 476,923 in 1990. Much of the land in Baldwin and Mobile Counties is used for agricultural purposes. Large areas along the Mobile and Tensaw Rivers and along the coast are characterized by low-lying, swampy terrain and brackish water. In recent years, the city of Gulf Shores and most of coastal Baldwin County have become highly developed resort areas, whereas the Mobile area has experienced substantial industrial growth.

The city of Mobile and the town of Prichard use surface water as a source of public supply. Mobile's water system withdraws water from an impoundment on Big Creek. In 1995 the average withdrawal rate from Big Creek was 131.4 million gallons per day (Mgal/d). The town of Prichard uses surface water from Eight Mile Creek at a rate of about 4.0 Mgal/d. The remaining cities and towns in the study area use ground water for their public supply.

PREVIOUS INVESTIGATIONS

Numerous reports describe the geology and hydrology of the study area. A detailed description of the geology of Alabama and a geologic map were published by the Geological Survey of Alabama in 1926 (Adams and others, 1926). In 1988, the Geological Survey of Alabama published a new geologic map for the state which provides the most up-to-date mapping of the geology of Mobile and Baldwin Counties (Szabo and Copeland, 1988) (plate 2).

Reports that contain information on the geology and ground water resources of the area are *Ground-Water Investigations in the Mobile Area, Alabama* (Peterson, 1947); *Water Availability of Baldwin County, Alabama* (Reed and McCain, 1971); *Geology of Mobile County, Alabama* (Reed, 1971a); *Geology of Baldwin County, Alabama* (Reed, 1971b); *Water Availability in Mobile County, Alabama* (Reed and McCain, 1972); *Water Content and Potential Yield of Significant Aquifers in Alabama* (Barksdale and others, 1976); *Map of Fresh and Slightly Saline Ground-Water Resources in the Coastal Plain of Alabama* (Ellard, 1977); *Depositional Sequences in the Pensacola Clay (Miocene) of Southwest Alabama* (Raymond, 1985); *Ground-Water Chemistry and Salt-Water Encroachment, Southern Baldwin County, Alabama* (Chandler and others, 1985);

Configuration of the Base of the Miocene Series (Moore and Raymond, 1985); *Watercourse Aquifers in Alabama* (Moore and Hunter, 1991); *Post-Miocene Sediments of the Shallow Subsurface of Coastal Alabama* (Raymond and others, 1993); *Hydrologic and Water-Use Data for Southern Baldwin County, Alabama* (Chandler and others, 1996); and *Aquifers in Alabama* (Moore, 1998).

PHYSICAL FEATURES

Study Area 13 lies entirely within the East Gulf Coastal Plain section of the Coastal Plain physiographic province (fig. 1). Most of the land area of Mobile and Baldwin Counties lies in the Southern Pine Hills physiographic district (Sapp and Emplaincourt, 1975). This upland area is underlain by Pliocene-Pleistocene terrigenous sediments, whereas younger terrace deposits occur along major streams in the area. The terrain of the Southern Pine Hills District slopes gradually from 350 feet above mean sea level (msl) southward to about 30 feet above msl at the southern limit of the area.

Parts of the study area along the Mobile and Tensaw Rivers are in the Alluvial-Deltaic Plain physiographic district of the East Gulf Coastal Plain, which consists of alluvial and terrace deposits along the larger rivers. These areas have very little relief and range in elevation from sea level to about 100 feet above msl.

Coastal areas of Area 13 are in the Coastal Lowlands physiographic district of the East Gulf Coastal Plain. These areas are characterized by flat to gently undulating, locally swampy plains underlain by terrigenous deposits of Holocene and late Pleistocene age. They include the mainland plain indented by many tidal streams and fringed by tidal marshes and barrier islands. The landward edge of the district is defined by the base of the Pamlico marine scarp at 25 to 30 feet elevation. The barrier islands and tidal marshes in the area are continually being modified by erosion and deposition.

STRATIGRAPHY

Geologic units that crop out in the study area range in age from Tertiary to Quaternary (table 1; fig. 2; plate 2). The Tertiary sedimentary deposits are generally unconsolidated. Alluvial and terrace deposits of Quaternary age overlie Tertiary deposits in and adjacent to the flood plains of the larger streams and rivers, and along the coastal areas of Mobile Bay and the Gulf of Mexico. The geologic map provided on plate 2 was compiled at a scale of 1:250,000 by Szabo and Copeland (1988) and is the most accurate geologic mapping currently available for the area of study.

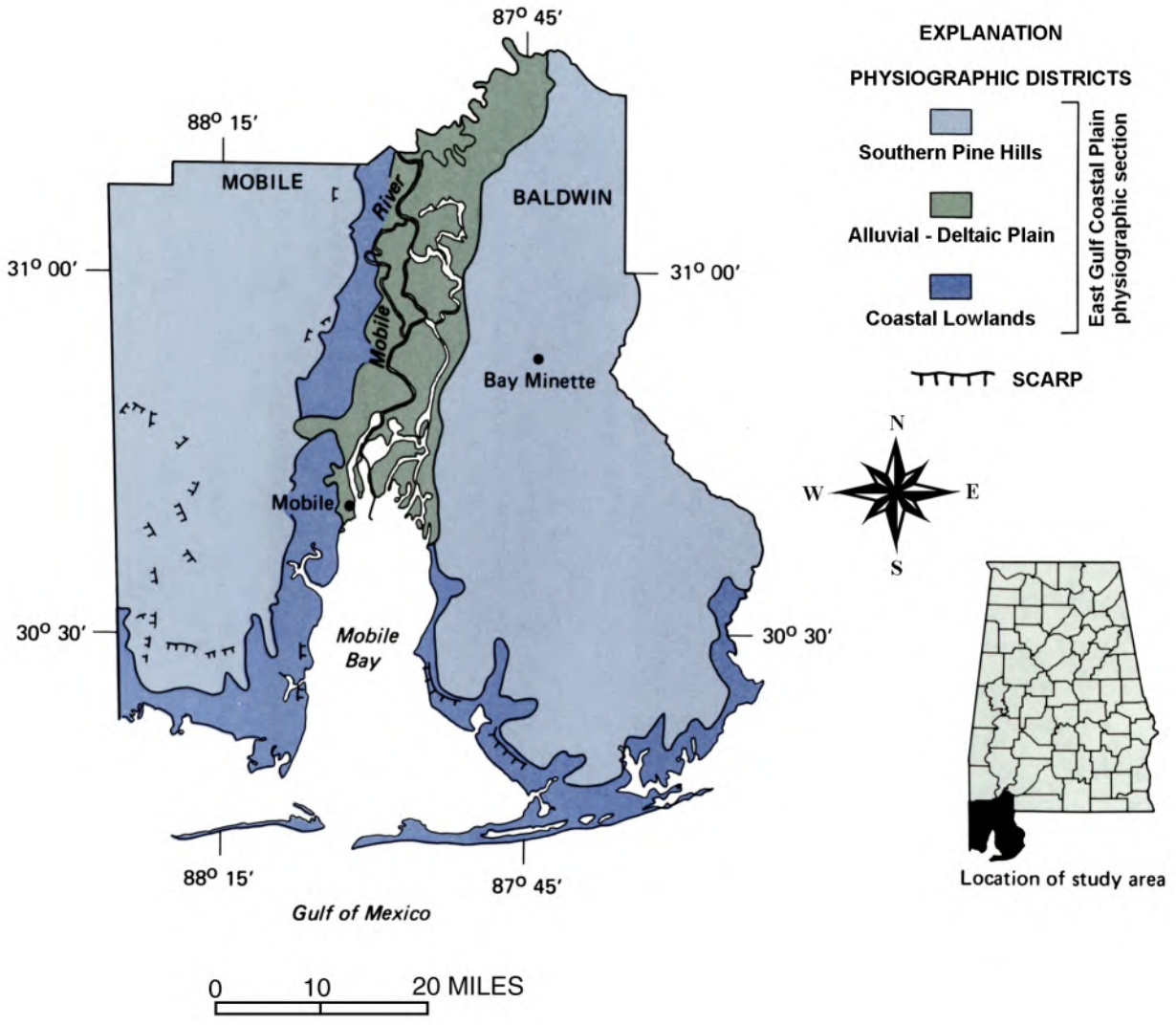


Figure 1.—Physiographic regions of Area 13 (modified from Sapp and Emplaincourt, 1975).

Table 1.—Geologic units and their water-bearing properties (modified from Reed and McCain, 1972)

System	Series	Geologic unit	Thickness (feet)	Lithology	Aquifer	Yield	Quality of water
Quaternary	Holocene and Pleistocene	Alluvium, low-terrace and coastal deposits	0-200	Sand, white, gray, orange, and red, very fine to coarse-grained, contains gravel in places; gray and orange sandy clay.	Watercourse	Will yield 10 gpm where saturated sands are of sufficient thickness. Potential source of 0.5 Mgal/d per well in the Mobile River basin.	Water generally suitable for most uses but commonly contains iron in excess of 0.3 mg/L and may be sufficiently acidic to be corrosive. Locally, in areas close to Mobile Bay and Mississippi Sound, water is very hard, has high chloride and dissolved solids contents, and contains iron in excess of 0.3 mg/L.
		High-terrace deposits				Will yield 10 gpm or more where saturated sands are of sufficient thickness.	Probably soft and low in dissolved solids. May contain iron in excess of 0.3 mg/L.
Tertiary	Pliocene	Citronelle Formation	0-200	Sand, brown, red, and orange, fine- to coarse-grained, gravelly in places, contains clay balls and partings; gray, orange, and brown lenticular sandy clay, ferruginous cemented sandstone.	Miocene/Pliocene	Will yield 2 Mgal/d or more per well	Water generally is soft and low in dissolved solids but may contain iron in excess of 0.3 mg/L and may be corrosive. In areas adjacent to Mobile River, Mobile Bay, and Mississippi Sound, water may have a dissolved solids content that exceeds 1,000 mg/L, a sulfurous odor, and a chloride content that exceeds 500 mg/L.
		?					
	Miocene	Miocene Series undifferentiated	100-3,400	Sand, gray, orange, and red very fine to coarse-grained, contains gravel in places; gray thin-bedded to massive sandy silty clay.			

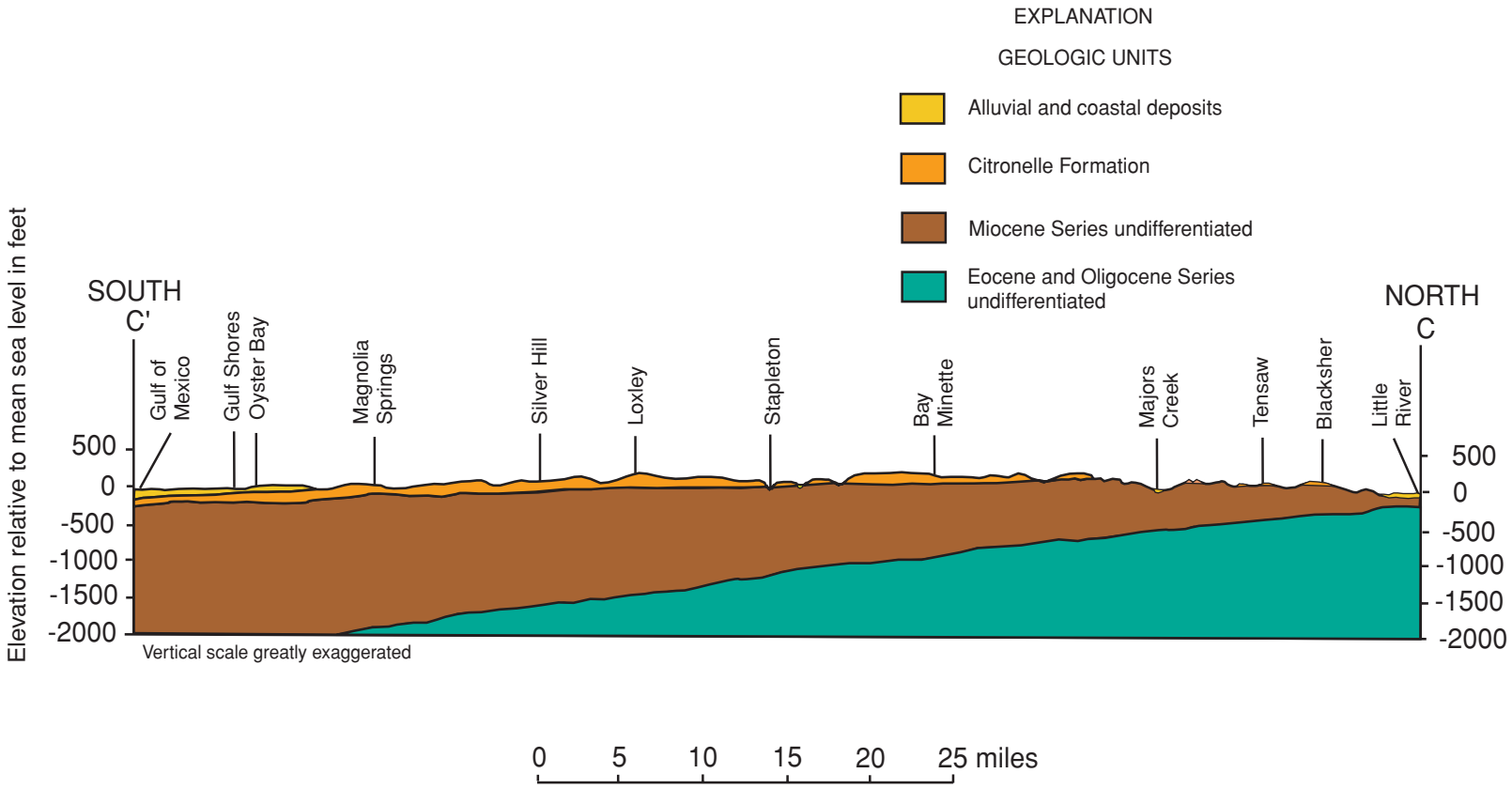


Figure 2.—Generalized geologic cross section from south to north in Baldwin County, Alabama (modified from Mooty, 1988). See plate 2 for line of cross section.

TERTIARY DEPOSITS

A thick sequence of Tertiary sediments underlies the study area. The geologic units currently used as sources of potable ground water are the Miocene Series undifferentiated and the Citronelle Formation. North-south hydrogeologic cross sections (plate 3) illustrate lithofacies in the Miocene and younger units in Mobile and Baldwin Counties.

EOCENE SERIES UNDIFFERENTIATED

In Alabama, the Eocene Series comprises the Hatchetigbee Formation, the Claiborne Group, and the Jackson Group. The Eocene Series, present only in the subsurface in the study area (fig. 2), includes interbedded sand, silt, clay, and some limestone. The Eocene sediments are not currently used as a source of water in the study area.

OLIGOCENE SERIES UNDIFFERENTIATED

The Oligocene Series is present only in the subsurface in the study area (fig. 2). The Oligocene is comprised of the Red Bluff Clay, Forest Hill Sand, Marianna Limestone, Byram Formation, and Chickasawhay Limestone. The Oligocene sediments are not currently used as sources of water in the study area.

The Red Bluff Clay consists of interbedded greenish-gray clay, limestone, and sand. The Forest Hill Sand is a thin carbonaceous clay with lenses of sand. The Marianna Limestone is white, soft fossiliferous limestone. The Byram Formation consists of interbedded marl, limestone, and clay. The Chickasawhay Limestone is sandy marl and limestone.

MIOCENE SERIES UNDIFFERENTIATED

Sediments of the Miocene Series crop out in central and northern Mobile and Baldwin Counties (plate 2) (Szabo and Copeland, 1988; Raymond and others, 1993). The unit ranges in thickness from 100 feet in northern Baldwin County to 3,400 feet in the subsurface in southern Mobile County (Reed, 1971a). Sediments of the Miocene Series undifferentiated are somewhat wedge-shaped, thickening and dipping southwestward toward the Gulf of Mexico (figs. 2, 3, 4). The dip of the sediments ranges from about 40 to 50 feet per mile (ft/mi) at the base of the series (fig. 4) to about 15 ft/mi at the contact with the Citronelle Formation (plate 3).

The Miocene Series undifferentiated consists of clastic sedimentary deposits of marine and estuarine origin. These Miocene sediments represent a transition from calcareous platform facies of Florida to the more fluvial siliciclastic facies of Mississippi and the subsiding Gulf basin. The sediments are primarily laminated to thinly bedded

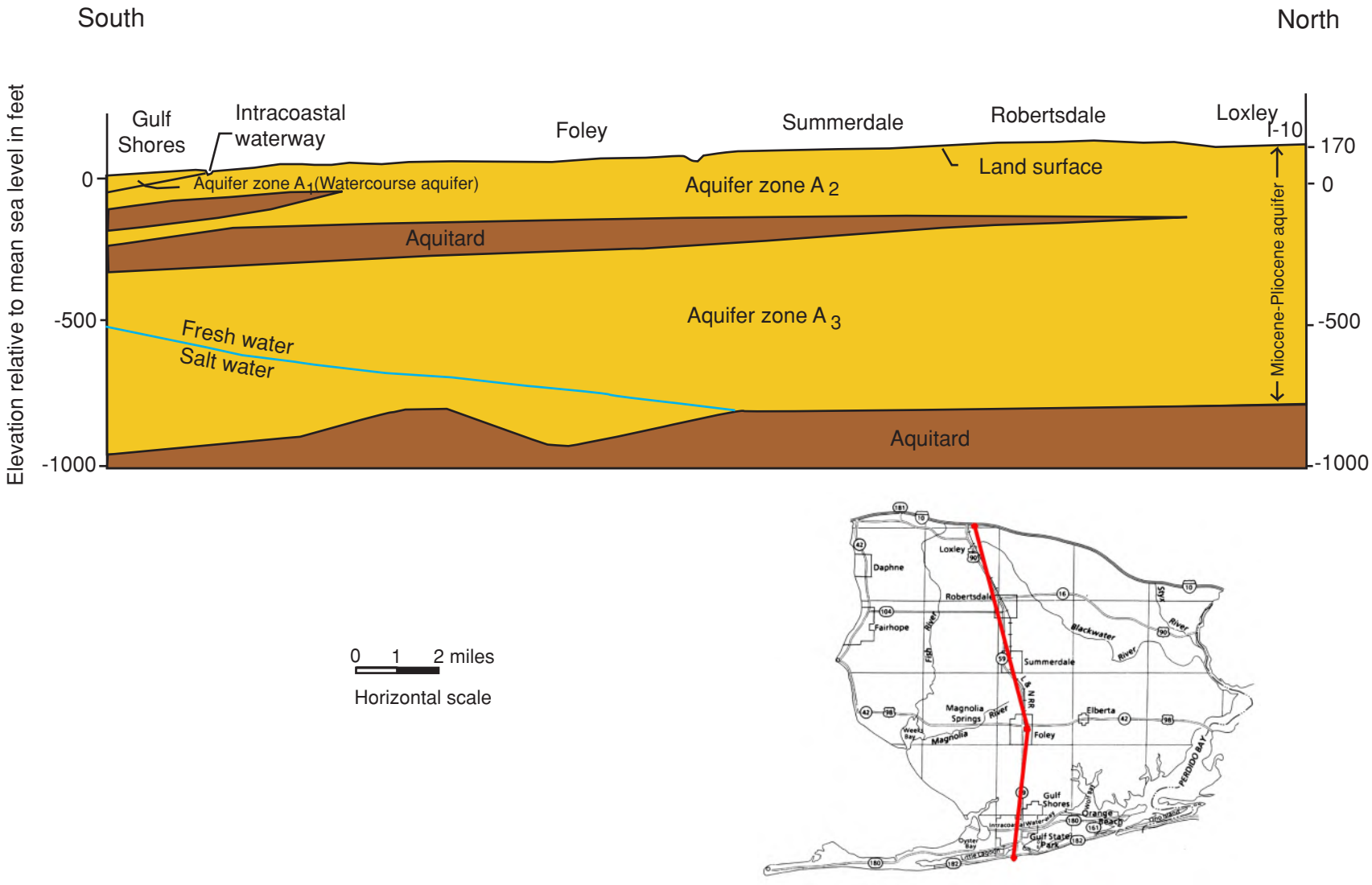


Figure 3.—Hydrogeologic cross section of southern Baldwin County, Alabama (modified from Chandler and others, 1985).

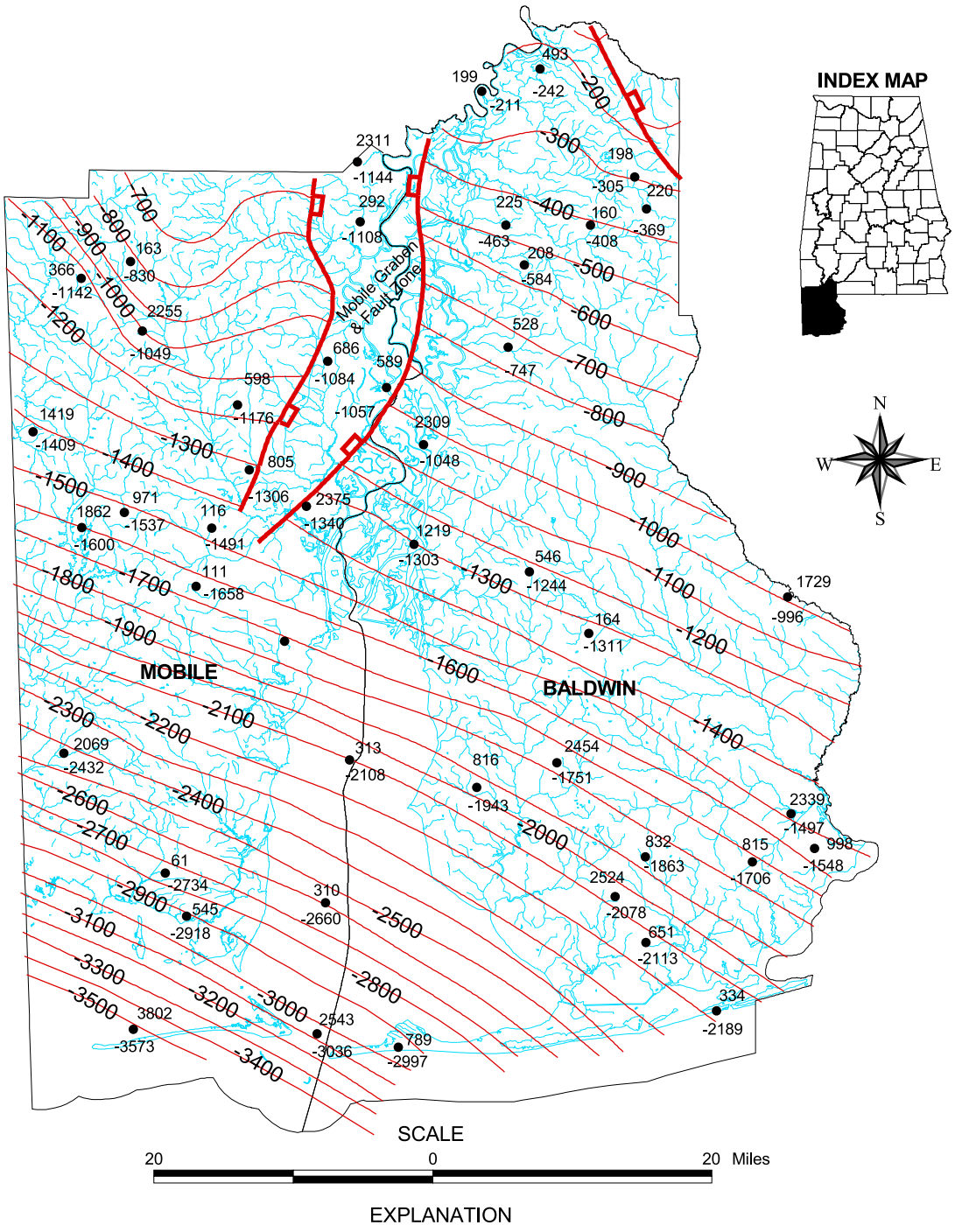


Figure 4.–Structure map of base of Miocene Series in Area 13 (modified from Moore and Raymond, 1985).

clays, sands, and sandy clays. Sands range from fine to coarse grained and are locally cross bedded. In outcrop, the sands weather to a variety of colors, some distinctly mottled. At some exposures, beds of sand contain gravel and plant fossils, and clays contain carbonized leaf remains. In the subsurface the Miocene sediments are divisible into two units, the lower Pensacola Clay (Marsh, 1966; Raymond, 1985) and the overlying coarse clastic unit informally referred to as the "Miocene coarse clastics" (Marsh, 1966; Raymond, 1985; Smith, 1991). The Miocene coarse clastics contain the deeper freshwater aquifers in Mobile and Baldwin Counties. The Pensacola Clay serves as a lower confining unit. Offshore, in the Gulf of Mexico, the coarse clastics of the Miocene interfinger with finer grained Miocene clays that serve as confining beds separating the interbedded sands.

PLIOCENE SERIES

CITRONELLE FORMATION

The Citronelle Formation of Pliocene age overlies the Miocene Series undifferentiated and crops out in the central and southern parts of the study area (plate 2). The formation is confined to the higher elevations in both Mobile and Baldwin Counties, having been eroded away along streams and the edges of Mobile Bay so that the Miocene undifferentiated is exposed along the bay and in stream channels. The Citronelle, which is relatively thin in northern parts of the study area, is about 200 feet thick in the subsurface in the southern part of the study area (plates 2, 3).

Citronelle sediments consist of nonfossiliferous moderate-reddish-brown fine to very coarse quartz sand; light-gray, orange, and brown sandy clay; and clayey gravel of nonmarine origin (Reed, 1971a, b; Szabo and Copeland, 1988). In many areas, lenses of sandy clay and clayey sand, which range in thickness from 5 to 15 feet, are interbedded with gravelly sand. Sediment type often changes abruptly over short distances. Sediments near the base of the Citronelle Formation have a high clay content, indicating that they were deposited in an estuarine environment, whereas overlying sediments were deposited by sediment-laden streams (Isphording and Lamb, 1971). Isphording (1977) reports the gravels of the Citronelle generally consist of quartzite and chert. Abundant highly polished limonite pebbles and granules from the underlying Miocene undifferentiated may also be present. Isphording and Lamb (1971) report that the Citronelle probably ranges from middle Pliocene to pre-Nebraskan Pleistocene in age.

QUATERNARY DEPOSITS

PLEISTOCENE SERIES

HIGH TERRACE DEPOSITS

High terrace deposits unconformably overlie Miocene sediments in the northeastern part of Mobile County and in many parts of Baldwin County that are adjacent to the Mobile River flood plain. The terrace deposits range in thickness from 0 to 50 feet with an average thickness of 15 to 30 feet. The altitude of the base of the terrace deposits ranges from 130 to 180 feet above msl in Mobile County, and from 60 to 210 feet above msl in Baldwin County. The deposits consist primarily of sandy clay, fine to coarse sand, and sand containing gravel in some places. These terrace deposits are considered part of the watercourse aquifer.

PLEISTOCENE AND HOLOCENE SERIES

ALLUVIAL, LOW TERRACE, AND COASTAL DEPOSITS

Alluvial, low terrace, and coastal deposits overlie Miocene and Pliocene sediments in many parts of Baldwin and Mobile Counties (plate 2). These deposits represent complex beach, dune, lagoonal, estuarine, and deltaic depositional environments. The deposits consist of very fine to coarse sand that is gravelly in many exposures. Clay and sandy clay are interbedded with the sand locally. Chandler and Moore (1983) estimated the thickness of the alluvial, low terrace, and coastal deposits to range from 0 to 200 feet, based on the first occurrence of coarse siliciclastic sediments.

The Quaternary sand and gravel beds represent buried channel deposits. Their widths and depths are similar to those of present river bed sediments. The length of individual sand and gravel beds probably ranges from a few hundred to a few thousand feet. These buried channel deposits are surrounded by silt and clay sediments similar to those being deposited on the present flood plain of the river.

Pleistocene sediments occur at a shallow depth; elevation is about -100 feet msl just off the east end of Dauphin Island (Raymond and others, 1993). Smith in Raymond and others (1993) reported a latest Pleistocene nannofossil flora from clay from well Permit No. 2543 in the mouth of Mobile Bay at a depth of 90 to 120 feet. The alluvial, low terrace, and coastal deposits are part of the watercourse aquifer.

HYDROGEOLOGY

Sediments cropping out at the surface have been divided into two major aquifers: the watercourse aquifer and the Miocene-Pliocene aquifer (plate 1), which are discussed in detail below.

MIOCENE-PLIOCENE AQUIFER

The Miocene-Pliocene succession, consisting of the Miocene Series undifferentiated and the Citronelle Formation, is about 3,400 feet thick in the coastal areas of southern Baldwin and Mobile Counties. In extreme northern Baldwin County, the unit is about 100 feet thick. The Miocene-Pliocene succession consists of beds of sand, gravel and clay (plate 3). Ground water flows through sand and gravel beds that are irregular in thickness and of limited lateral extent. The clay intervals between the sand units should be considered aquitards, not aquicludes, because the clays are not laterally extensive enough to prevent downward movement of ground water, but they do provide semi-confinement to many of the deeper sand and gravel intervals. Because of the discontinuous nature of these deposits, it is difficult to correlate one sand interval to another with confidence on the basis of available well data. In the northern part of the area, the principal water-bearing sands in the aquifer are at the base of the Miocene-Pliocene sequence. These sands interfinger or merge with relatively impermeable clays in central parts of the counties where the base of the aquifer appears to be in the middle of the Miocene-Pliocene strata (Reed and McCain, 1971). Individual beds of sand in the unit are 50 to 100 feet thick in many places, reaching 230 feet in thickness near Loxley. Lenticular clays separating the sands reach 80 feet in thickness. Sands in the lower part of the formation have yet to be extensively developed because good supplies of water are available at shallower depths.

Several different authors have developed schemes for subdividing the water-bearing sequence of sediments in Baldwin County (table 2). Walter and Kidd (1979) used clay units, which are more easily correlated than sand units, to divide the deposits in southern Baldwin County. Walter and Kidd (1979) identified four different aquifers: the Beach Sand aquifer, the Gulf Shores aquifer, the 350-foot aquifer, and the 500-foot aquifer (table 2). The Beach Sand aquifer in their study corresponds in part to the watercourse aquifer in this report. The wells used to construct the fence diagram of figure 5 are test wells drilled for Walter and Kidd's research and do not correspond to wells listed in this report. Chandler and others (1985) subdivided the same sequence of sediments in southern Baldwin County into aquifers A_1, A_2, and A_3 (fig. 3). Table 2 and plate 3 show how these various divisions correspond with each other and give the lithologic and hydrologic characteristics of the sedimentary sequence.

The cross sections shown on plate 3 demonstrate the difficulty in correlating individual sand units in Mobile and Baldwin Counties. However, relatively thick, predominantly clay sequences appear to be correlative from north to south in both counties, and possibly from east to west between counties. These clay sequences divide the shallow subsurface into several intervals dominated by beds of sand. The relationships between these aquifers and those named by Walter and Kidd (1979) and Chandler and others (1985) are indicated on cross section B-B' of plate 3.

Table 2.—Correlation and descriptions of previously recognized aquifers in Area 13

Hydrogeologic unit	Unit character		Aquifers		
	Lithologic	Hydrologic	Walter & Kidd, 1979	Chandler & others, 1985	This report
Pleistocene (?)-Holocene	Sand, white to pale-orange, fine- to coarse-grained; silt; clay; and sea-shell hash. Finer grained sediments predominant in lower part of unit as discontinuous layers.	Predominantly medium-grained sands in upper 20 to 60 feet of unit comprise principal aquifer. The aquifer is a water-table aquifer and is a potential source of more than 100 gpm of water per well.	Beach sand aquifer	A_1	Watercourse aquifer
Pleistocene-shallow Miocene	Sand, white to light-gray, fine- to very coarse-grained, gravelly and carbonaceous in places, interbedded with sandy silty clay.	Sand and gravel in unit comprise major aquifers. The lower aquifers are generally semiconfined. Potential source of 100 to more than 100 gpm of water per well.	Gulf Shores aquifer	A_2	Miocene-Pliocene aquifer
Deep Miocene	Same as A2, except sediments form more persistent and traceable layers in the subsurface. The siliciclastics immediately overlie the Pensacola Clay.	Major aquifers are semi-confined or confined and yield water to wells under low-head artesian pressure. Potential source of more than 1,500 gpm of water per well.	350- and 500-foot aquifers	A_3	

In central Mobile County the Miocene-Pliocene aquifer (plate 3) appears to be at least two distinct aquifers. These aquifers have been identified on the cross section A-A' as the "middle sand" and "lower sand." The lower sand has been further subdivided into the "A" and "B" sands. Whereas about 75 feet of clay separates the A and B sands in northern Mobile County, the clay thins to the south. Without additional aquifer test information the hydraulic relationship between these two sand sequences cannot be determined. Wells completed in lower sand intervals within the formation have significantly lower water levels than wells completed in the middle sand. The presence of two potentiometric surfaces suggests that in this area, the middle sand and the lower sand of the Miocene-Pliocene aquifer are hydraulically separate. In addition, electric and drillers' logs of these deeper wells indicate a clay interval about 130 feet thick overlying the lower aquifer in north and central Mobile County. This 130-foot clay interval not only separates the aquifers, but also provides the lower sand a greater degree of protection from contamination from the surface. However, one should not assume that the protective clay layer extends laterally for a significant distance. The potentiometric surface shown on plate 1 corresponds to the middle sand aquifer in which the majority of the public supply wells are completed. Only 10 public supply wells are completed in the lower sand aquifer. These wells include 5 of Mobile County Water Authority's wells, 1 of Kushla's wells, 2 of Fairview's wells, and 2 of South Alabama Water System's wells. The depths of these wells range from 426 to 570 feet. Water levels in this unit are about 50 feet lower than water levels in the overlying unit. The deeper Eocene and Oligocene Series in the northeast corner of Baldwin County are potential sources of water supply that are not currently used by public water systems in the county (Reed and McCain, 1971).

Except in northernmost and easternmost parts of the outcrop area, properly constructed wells in the Miocene-Pliocene aquifer yield from 0.5 to 2.5 Mgal/d. Results of pump tests on individual wells are listed in the well data table (table 3). In this aquifer, the town of Robertsdale has completed one well which was tested at 1,823 gpm in 1987.

WATERCOURSE AQUIFER

Quaternary alluvial, coastal, and terrace deposits consisting of interbedded sand, gravel, and clay comprise the watercourse aquifer (figs. 3, 5). Properly constructed wells in the watercourse aquifer have the potential to yield from 0.5 to 1.0 Mgal/d where sand is sufficiently thick. Most high-yield wells are completed in sand and gravel coastal deposits and buried river sediments. These buried sand and gravel channels are surrounded by silty and clayey sediments that do not yield significant amounts of water, but do allow slow infiltration of water to recharge the sand and gravel beds. Individual buried channels may be directly connected to the present channels of the Mobile River. The watercourse aquifer is hydraulically connected to the underlying

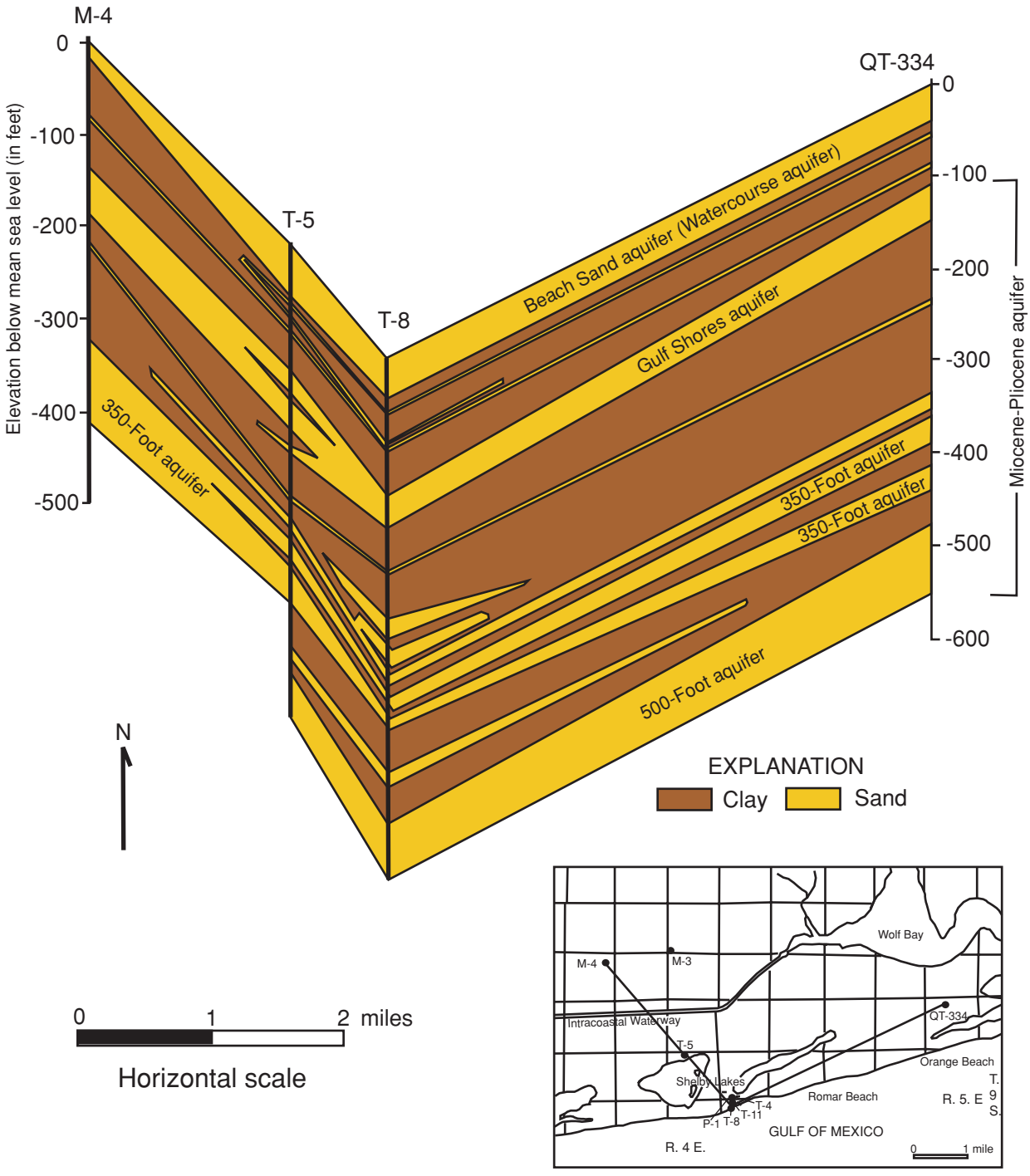


Figure 5.—Generalized fence diagram of the local named aquifer units comprising the watercourse and Miocene-Pliocene aquifers in southern Baldwin County, Alabama (modified from Walter and Kidd, 1979).

Miocene-Pliocene aquifer (fig. 3). In southern Baldwin County, the watercourse aquifer has been referred to as the "Beach Sand aquifer" (Walter and Kidd, 1979) (table 2).

The sand and gravel beds in the watercourse aquifer and those at shallow depths in the Miocene-Pliocene aquifer are hydraulically connected to the land surface; therefore, these aquifers are considered unconfined. Discontinuous lenses of clay retard the vertical movement of water but do not completely separate the sand units; therefore, the watercourse aquifer locally provides recharge for the underlying Miocene-Pliocene aquifer.

While the watercourse aquifer can provide large yields to wells, few public supply wells are completed in this aquifer because of its vulnerability to contamination from the land surface. Systems with wells completed in the watercourse aquifer include Mt. Vernon, Saraland, Satsuma, and Dauphin Island.

Dauphin Island's hydrologic situation is unique in the state. Because it is an island, isolated from the rest of Mobile County by the brackish water of the Mississippi Sound, its primary source of fresh water is a freshwater lens which "floats" on top of more dense saline water (fig. 6). As with all shallow aquifers in the coastal regions, these sands are subject to contamination by storm tides and surges. The deeper sands underlying the watercourse aquifer also tend to be high in salt. Figure 7 shows logs of a test well, UU-25, drilled on Dauphin Island indicating that saline water was found in the shallow sands occurring from land surface to a depth of approximately 30 feet (630 mg/L Cl) and in the deeper sand between 260 and 350 feet (320 mg/L Cl). The level of chlorides in the shallow upper sands can be expected to vary significantly as rainfall flushes out the salty water resulting from overwash of storm surges. Dauphin Island uses a reverse-osmosis treatment system to reduce chloride levels in water from wells completed in the watercourse aquifer and from two deeper wells.

RECHARGE AND MOVEMENT OF GROUND WATER

The source of recharge to the aquifers is rainfall, which averages 64.0 inches per year (in/yr) in the study area (NOAA-CIRES/Climate Diagnostics Center, period 1961-1990). About 28 in/yr of rainfall runs off during and immediately after storms (Reed and McCain, 1971); a small percentage of rainfall infiltrates the subsurface as recharge to the aquifers and the remainder is returned to the atmosphere by evaporation and transpiration from trees and other plants.

The amount of water that infiltrates the soil depends on the hydraulic conductivity and permeability of the soil, the amount of water present in the soil during rainfall, and the slope of the land surface. Infiltration is greater in an area that is flat and underlain by gravel and coarse sand sediments rather than in an area with a sloping land surface that is underlain by dense clay.

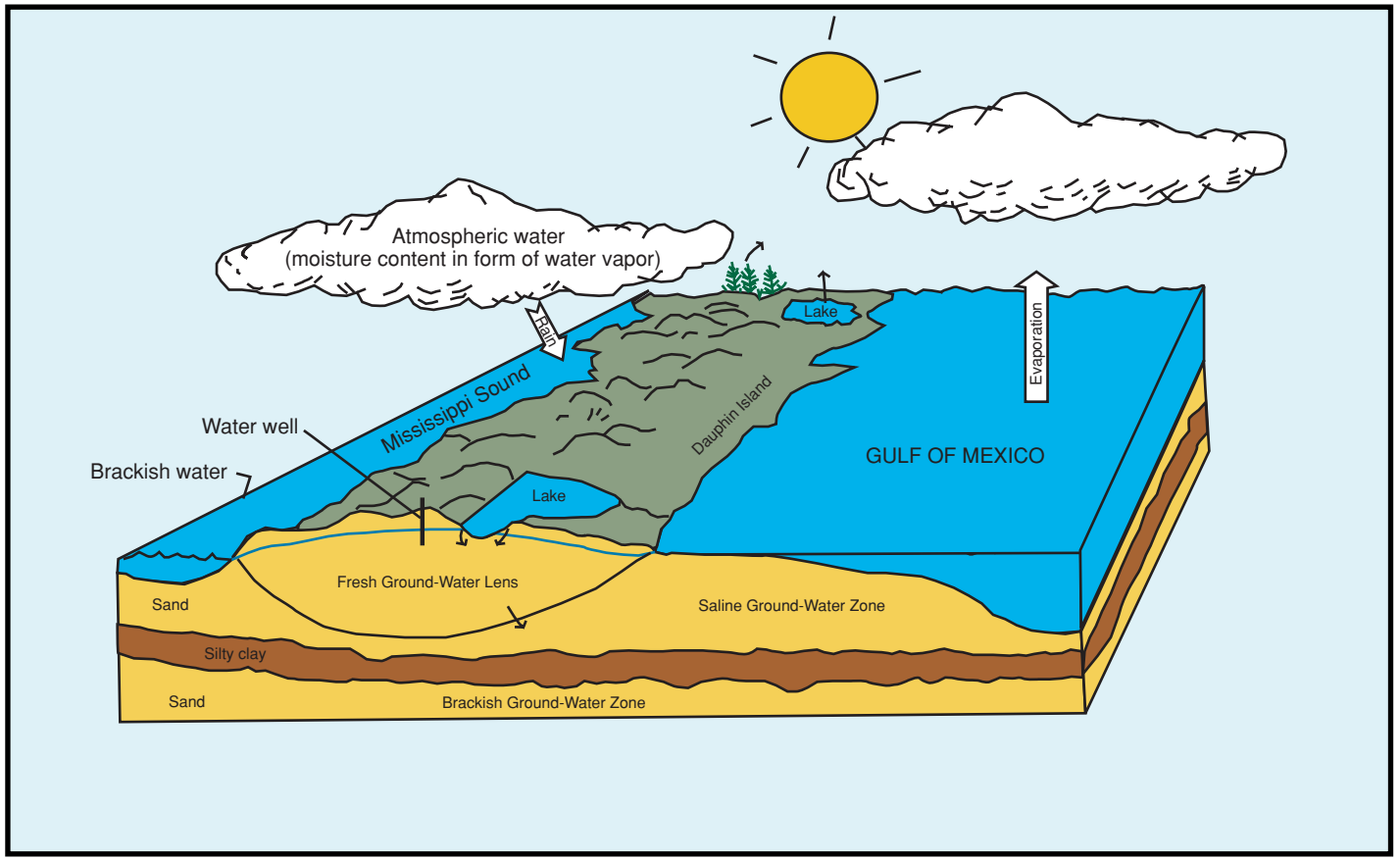


Figure 6.—Block diagram illustrating the hydrologic cycle at Dauphin Island, Alabama (modified from Chandler and Moore, 1983).

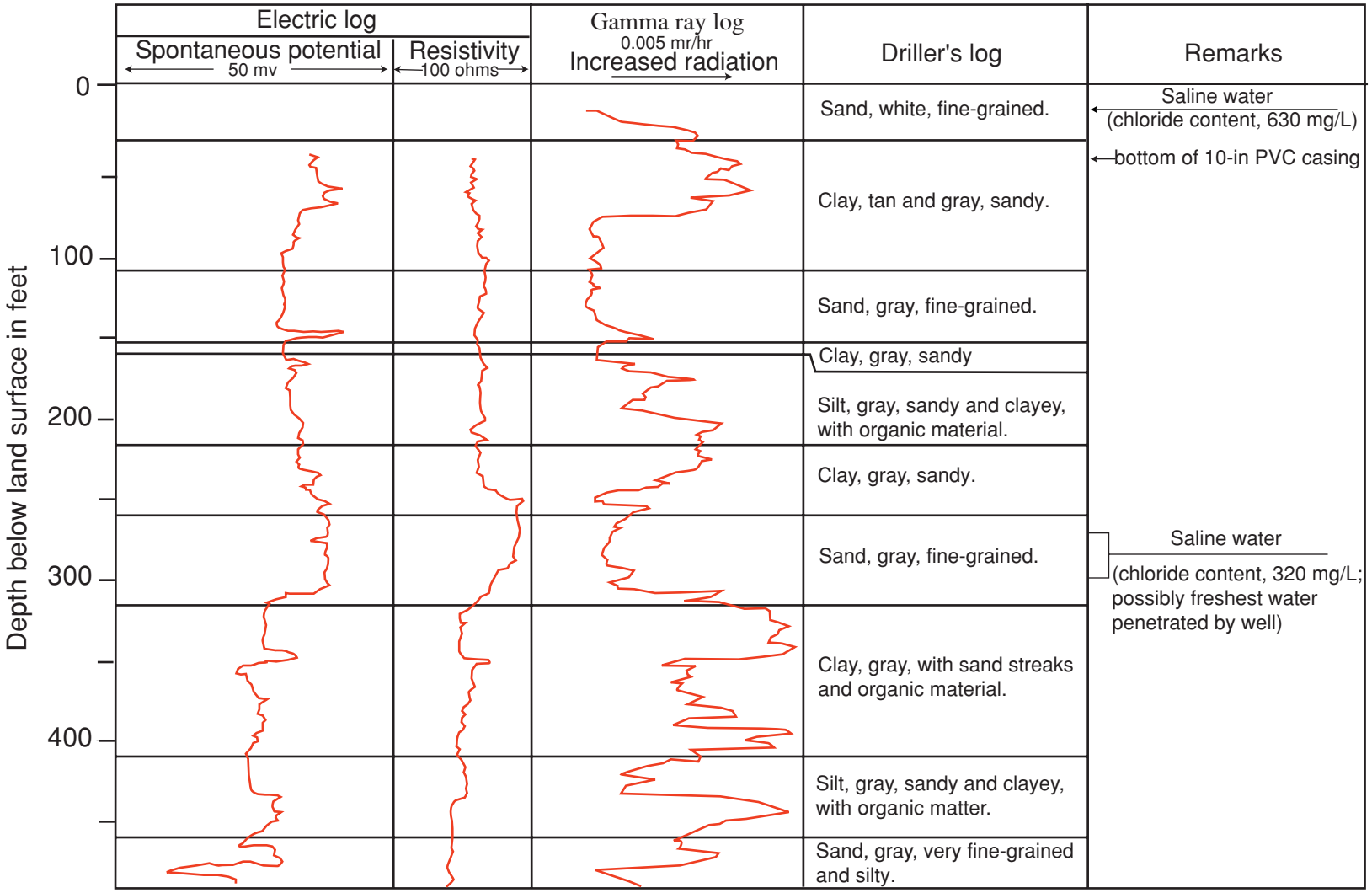


Figure 7.—Electric, gamma ray, and driller's logs for test well UU-25, mid-Dauphin Island, Alabama (modified from Chandler and Moore, 1983).

Most recharge to the major aquifers in Mobile and Baldwin Counties occurs within the boundaries of the study area (plate 1), and a small amount is contributed from Miocene outcrops to the north. The amount of recharge to aquifers may be estimated from the base (dry-weather) flow of streams, which is ground water discharge. The average baseflow (7-day Q_2) for streams in Area 13 is about 0.601 cubic feet per second per square mile of drainage area or about 8.1 in/yr (Walter, 1976; Bingham, 1982).

Water moves from areas of recharge to areas of natural discharge and areas of ground water withdrawal, along pathways generally perpendicular to the potentiometric contour lines shown on plate 1. Areas of artesian flow are present along major stream valleys and along the coast.

NATURAL DISCHARGE AND GROUND WATER WITHDRAWALS

Ground water discharges primarily into streams, water bodies, and wells. Some of the larger ground water pumping centers in the study area include the cities of Foley, Robertsdale, Bay Minette, Orange Beach, Gulf Shores, Fairhope, Daphne, Loxley, Silverhill, Perdido Bay, and Spanish Fort in Baldwin County; and Grand Bay, Fairview, Dauphin Island, Theodore, Turnerville, Kushla, LeMoyne, Citronelle, Mt. Vernon, Bayou LaBatre, Saraland, Satsuma, Semmes, and St. Elmo in Mobile County (table 3).

In addition to water withdrawn for public water supply, substantial quantities of ground water are used for irrigation in Baldwin and Mobile Counties. Mobile County has several chemical and paper factories and other industries that use large quantities of ground water. In 1995 average daily withdrawal of ground water in the study area was about 66 Mgal/d (Mooty and Richardson, 1998).

EFFECTS OF WITHDRAWALS FROM THE AQUIFERS

Large withdrawals of water from an aquifer cause a depression in the potentiometric surface of the aquifer. The extent of the depression depends on the amount of water withdrawn and the water-bearing characteristics of the sediments. Depressions occur in the vicinity of some industries along the Mobile River in northern Mobile County as well as around public supply wells. The effects of the depressions along the Mobile River in northern Mobile County are localized because of their proximity to the Mobile River, which is hydraulically connected to the aquifers in the area. The Mobile River has an average annual discharge of about 70,000 cubic feet per second (ft^3/s), which is adequate to recharge the aquifer in that area as withdrawals occur. However, in tidal reaches of the Mobile River, the induced recharge could draw salt water into the aquifer (fig. 8).

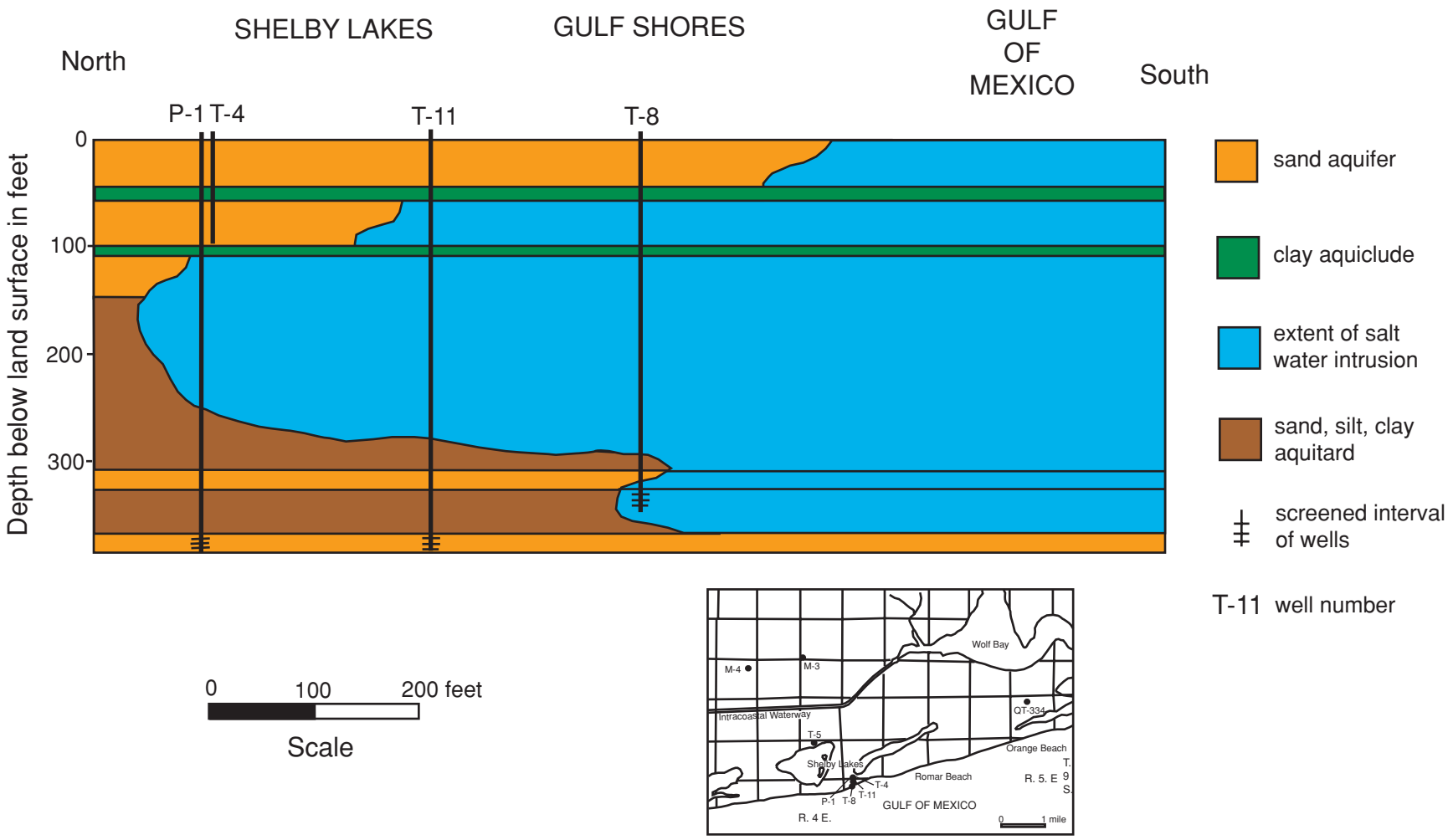


Figure 8.—Generalized cross section showing the extent of salt-water intrusion in the Miocene-Pliocene aquifer, southern Baldwin County, Alabama (modified from Walter and Kidd, 1979).

Declines in the potentiometric surface may eventually result in increased pumping costs due to the decline in the water levels in wells. In extreme cases, pump intake pipes may need to be lowered or wells deepened to maintain adequate supply. A depression in the potentiometric surface also creates a steepened hydraulic gradient in the vicinity of a pumping center and increases the rate of movement of water and any potential contaminant to points of ground water withdrawal.

GROUND WATER QUALITY

Wells in the Miocene-Pliocene aquifer, except those in areas adjacent to the Mobile River basin, Mobile Bay, the Gulf of Mexico, and Mississippi Sound, generally yield soft water that has a dissolved solids content of less than 250 mg/L. Objectionable amounts of iron are present locally but occur most commonly in areas adjacent to major waterways. Some wells also yield water that is sufficiently acidic to be corrosive. Acidity increases southward toward the Gulf of Mexico. At Dauphin Island and in areas adjacent to the major waterways, some sands in the aquifer contain water with a dissolved solids content that exceeds 1,000 mg/L, a sulfurous odor, and a chloride content that exceeds 500 mg/L. The depth at which ground water has total dissolved solids in excess of 10,000 mg/L in Area 13 is shown in figure 9. Generally, beneath this depth, water in aquifers is unsuitable for most uses.

Salt-water encroachment is a significant problem along the coast in the watercourse and Miocene-Pliocene aquifers (Reed and McCain, 1972; Chandler and others, 1985). Because of the rapid population growth in the Gulf Shores area, pumpage from municipal wells has also increased. The rapid withdrawal of water from coastal aquifers may pull salt water northward into freshwater aquifers (fig. 8).

Water in alluvium and low terrace deposits generally is soft and has a dissolved solids content less than 100 mg/L, but commonly contains iron in excess of 0.3 mg/L and may be sufficiently acidic to be corrosive. Water in areas close to Mississippi Sound, the Gulf of Mexico, the Mobile River basin, and Mobile Bay commonly contains iron in excess of 0.3 mg/L; locally the water is very hard, the chloride content exceeds 250 mg/L, and the dissolved solids exceed 1,000 mg/L.

Ground water in high terrace deposits is soft and locally contains iron in excess of 0.3 mg/L.

VULNERABILITY OF AQUIFERS TO CONTAMINATION

Aquifer vulnerability is a difficult concept to evaluate owing to the complexity and variability of the geology and aquifers involved. Aquifers are vulnerable to contaminants from both surface and subsurface sources.

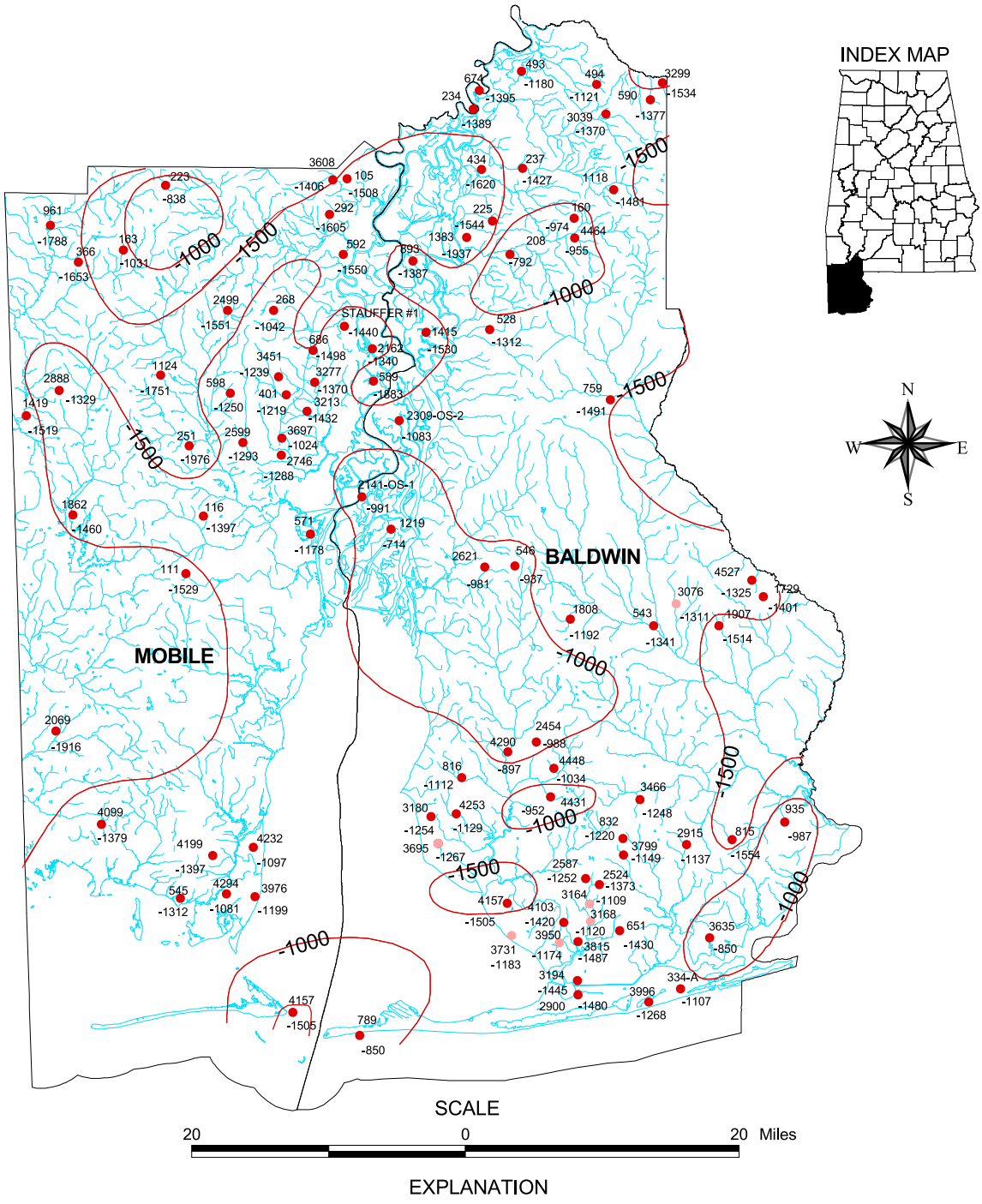


Figure 9.–Mean sea level elevations of ground water containing more than 10,000 mg/L of total dissolved solids in Area 13 (modified from Hinkle and Sexton, 1988).

Numerous surface sources of potential contamination include point sources such as gasoline tanks, chemical spills, pipeline and sewer leaks, treatment lagoons, and industrial sites. Potential nonpoint sources of pollution include chemicals applied to agricultural fields, on-site sewage system discharges, chemicals applied to lawns and gardens, and urban run-off.

Some types of contaminants such as petroleum products are lighter than water and float on the water table. These are referred to as light nonaqueous phased liquids (LNAPL's). Other chemicals such as chlorinated hydrocarbons are denser than water and can sink through the aquifer and accumulate and migrate on subsurface confining units. These chemical contaminants are referred to as dense nonaqueous phased liquids (DNAPL's). Some contaminants dissolve in or mix with water and neither float nor sink but move with the ground water. Also, naturally occurring contamination such as saline ground water may encroach into freshwater aquifers from downdip or from other water-bearing units.

Outcrops of all aquifers in Alabama are vulnerable to contamination from surface sources of pollution. The extent to which an aquifer can become contaminated is determined by the nature of the contaminant and the hydrogeologic characteristics of the aquifer. Hydrogeologic characteristics vary from aquifer to aquifer and even within individual aquifers and are largely controlled by the permeabilities of the units comprising an aquifer. Unconfined aquifers with high permeabilities have high recharge rates (typically more than 6 inches per year) and contaminants from the surface may not be filtered adequately as water moves towards the water table. The most vulnerable aquifers in Alabama are either unconsolidated sand and gravel or carbonate rocks that contain numerous solutionally enlarged joints and fractures. Aquifers least vulnerable to contamination are typically overlain by thick relatively impermeable units such as clay or chalk. These impermeable units are either aquicludes or aquitards.

Vulnerability may also vary within aquifers. Aquifers are most vulnerable in their outcrops where water-table conditions exist. Where aquifers become confined downdip, their vulnerability to surface contamination decreases as they are protected by aquicludes or aquitards that retard the vertical downward movement of contaminants (fig. 10). Although this confinement affords some protection to the aquifer, no aquifer is immune to contamination from poorly constructed wells and bad management practices. Pumping of large quantities of ground water by public supply wells, industrial supply wells, or irrigation wells creates cones of depression, increases flow gradients, and draws ground water and any associated contamination, where present, toward the pumping wells. In south Alabama and coastal areas some aquifers are especially vulnerable to natural sources of contamination such as salt water from the Gulf of Mexico and mineralized ground water in other parts of the aquifers (fig. 10).

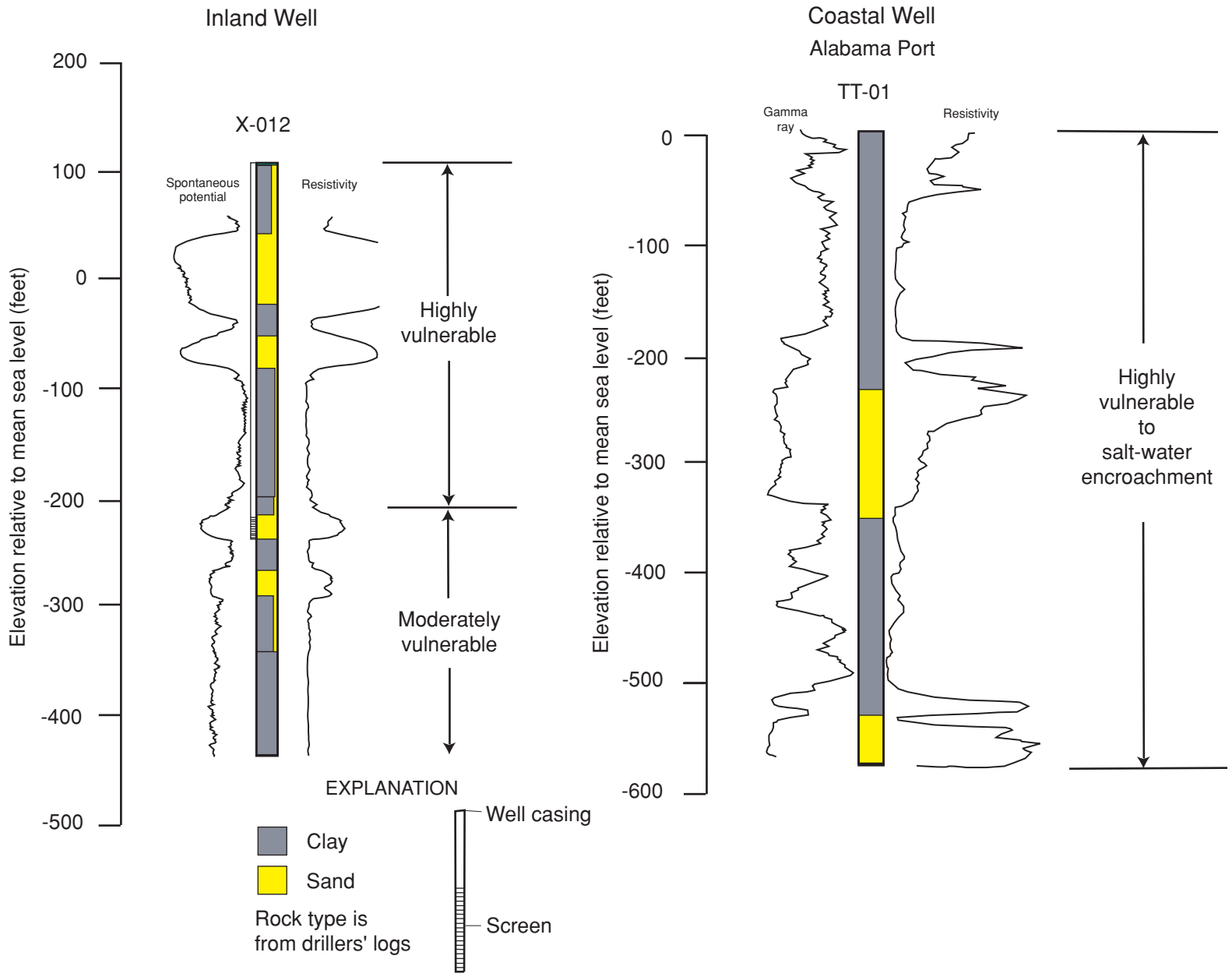


Figure 10.—Representative wells showing vulnerability to contamination with depth in Area 13.

General guidelines (shown below) have been established to assist in identifying aquifers as having either high, moderate, or low vulnerability to contamination. Most of the factors listed below apply particularly to the vulnerability of the aquifer in the outcrop area. Not all factors are required for any one aquifer to be assigned to a particular vulnerability category. A few factors pertain only to possible contamination from natural sources of contamination at depth or downdip.

High vulnerability to contamination

- Aquifer is unconfined, unconsolidated, highly permeable, and has high recharge rates (typically greater than 6 inches per year)
- Aquifer is not confined by thick homogeneous impermeable units or is semiconfined
- Aquifer is comprised of rocks that contain solution cavities and/or fractures that allow rapid ground water movement and high recharge rates
- Aquifer has a freshwater/salt-water interface in close proximity to the area of concern
- Aquifer is penetrated by faults that provide an avenue for entrance of contaminated water from the surface or from another aquifer

Moderate vulnerability to contamination

- Aquifer is unconfined, is consolidated rock, has low permeability, and has low to moderate recharge rates (typically 1 to 6 inches per year)
- Aquifer has no solution cavity development
- Aquifer is overlain by thick, cumulatively impermeable, or discontinuous impermeable units sufficient to provide some protection to the aquifer
- Aquifer is comprised of fractured rock, but fractures are of limited extent and connectivity and are not enlarged
- Aquifer is confined by aquitards that transmit water, but not in quantities sufficient for development

Low vulnerability to contamination

- Aquifer is well confined by aquicludes that are laterally continuous, are thick, lack connected fracture networks, have low recharge rates (less than 1 inch per year), and are incapable of transmitting significant quantities of water
- Area of concern is a significant distance from the freshwater/salt-water interface of the aquifer.

Detailed site-specific hydrogeologic investigations should be implemented to accurately determine an aquifer's vulnerability to contamination. Long-term aquifer testing is needed to determine the aquifer's hydrologic characteristics and the hydraulic properties of confining beds.

Outcrops of aquifers in Area 13 are classified as highly vulnerable to contamination from surface sources because of the unconsolidated nature of the aquifers, their exposure at the surface, and absence of continuous protective clay layers (plate 1). Downdip, individual water-bearing units in the Miocene-Pliocene aquifer become more confined by interbedded clay beds that are relatively impermeable when compared to the sands. Therefore, deeper parts of the aquifer may be moderately vulnerable to contamination from surface sources (fig. 10). Some contaminants, however, such as DNAPL's, could eventually migrate around and through discontinuous clay layers. Aquifers in the coastal areas are also subject to salt-water encroachment or salt-water intrusion if pumping rates of wells are excessive.

Much of Area 13 is rural and, particularly in Baldwin County, a large percentage of the land is agricultural. The topography is flat to low rolling hills. This type of terrain minimizes surface runoff and allows more time for water to infiltrate the soil. Areas of relatively flat terrain with very permeable soils are more vulnerable to contamination than areas with greater relief; however, relative to other areas in the state, all of Area 13 is considered highly vulnerable to contamination from the surface (plate 1).

Many of the low areas in Area 13 are used for intensive row-crop farming where pesticides are used extensively. Along the Mobile River in the northern part of Mobile County, chemical industries are potential sources of contamination to the ground water. Some of these industrial sites have been identified on the EPA's National Priorities List (Superfund sites) for cleanup. An industry located in this area, pumps process water from the Miocene-Pliocene aquifer at such a high rate that a significant depression in the potentiometric surface is evident in the area surrounding the plant. Declines in the potentiometric surface caused by such intensive ground water withdrawal can change the direction of ground water flow. In such a case, ground water could reverse flow direction and move away from the rivers and into the adjacent deposits. Since the topography adjacent to the Mobile River in northern Mobile County is relatively flat and is underlain by permeable sediments, this part of the aquifer becomes especially vulnerable to contamination from the surface.

Regions underlain by alluvial and coastal sediments generally discharge ground water to surface water bodies such as the adjacent rivers and streams. This flow direction decreases the likelihood of contamination from the rivers and streams. The shallower alluvial and coastal deposits themselves remain highly vulnerable to contamination from the surface.

Coastal areas are vulnerable to salt-water contamination from storm surges. The occasional hurricanes that strike the Gulf Coast can cause tides to rise 5 to 25 feet above normal. These storm surges allow salt water to infiltrate the shallow ground water system in coastal areas. Generally, storm-related salt-water contamination has

not been a serious problem in the public water supply systems near coastal areas because wells in these systems generally tap deep sands.

Salt-water intrusion caused by excessive pumping of deep wells is a problem on Dauphin Island and a potential problem for southern Baldwin County. Because of salt-water encroachment, Dauphin Island installed a shallow well field on the island to produce water from the shallow unconfined parts of the aquifer. Eight shallow wells ranging from 30 to 40 feet in depth were drilled. Two existing deep wells were left in service; however, water from the northernmost well, MOBUU-2, must be treated by reverse osmosis to remove chlorides. Ground water is the only source of supply for private homes, municipalities, businesses, industries, golf courses, and large-scale agricultural enterprises. Therefore, salt-water intrusion resulting from excessive ground water withdrawals is becoming a threat elsewhere along the coast as the coastal area continues to be developed.

Results from a long-term aquifer test in the Gulf Shores area (Walter and Kidd, 1979) suggest that the clay units in the coastal area at more than 300 feet in depth are discontinuous and do not provide a high degree of confinement for sand aquifers. On the cross section of Mobile County shown on plate 3, well TT-01 at the Alabama Port (fig. 10) has a fairly homogeneous clay unit between 90 and 125 feet that provides some protection for the underlying sand intervals from contamination from the surface. However, well TT-01 is close enough to Mobile Bay that contamination from salt-water encroachment is a potential problem; therefore, the sand interval between 125 and 225 feet in depth may be considered highly vulnerable to contamination.

PUBLIC SUPPLY WELLS

In the study area, 113 public ground water supply wells provide water for 33 water systems (table 3; plate 1). Most of these wells derive water from the Miocene-Pliocene aquifer, although a few wells are completed in Quaternary alluvium of the watercourse aquifer. Maximum depth of wells completed in the watercourse aquifer is 135 feet. Wells completed in the Miocene-Pliocene aquifer vary in depth because there are several different water-bearing sand beds at different depths within the aquifer. The deepest well is 805 feet deep; however, most wells are less than 200 feet in depth.

WELLHEAD PROTECTION AREAS

Public water supply systems that use ground water provide water to about one-third of the population of Alabama (Mooty and Richardson, 1998). Programs that protect ground water sources from potential contamination are known as Wellhead Protection Programs (WHPP's). Alabama's WHPP is the result of 1986 amendments to the Safe Drinking Water Act originally enacted by Congress in 1974. The 1986 amendments directed the states to develop plans and programs to protect areas providing ground

water to public water supply wells and springs. The 1996 amendments established Source Water Assessment requirements for public water supply systems using either ground water or surface water sources. Local wellhead protection plans (LWHPP) are not required. The Source Water Assessment Program (SWAP) requires a Source Water Assessment Area (SWAA) delineation, potential contaminant source inventory within each SWAA, a susceptibility analysis of each potential contaminant source in the inventory, and public notification of the condition of raw water supplies, including their susceptibility to contamination. The SWAA's are identified surface areas where potential contaminants are most likely to migrate into the ground resulting in contamination of public water supply wells or springs and are delineated by using hydrogeologic conditions or time of travel criteria. The revised WHPP is a voluntary program that builds on the SWAP by providing guidance for developing protection strategies in the delineated areas. Protection strategies include building a local team of concerned citizens, developing an educational and outreach program, and developing management and contingency strategies. The terms SWAA and WHPA can be used to identify the same area around a public water supply well or spring and are used synonymously in this report.

Eighteen public water supply systems currently have WHPA's or SWAA's delineated in Area 13 (plate 4). Ground water supply systems in Mobile County that have established WHPA's are Bayou LaBatre, LeMoyne, MCB (Movico, Chastang, and Bucks), Saraland, Satsuma, South Alabama/Citronelle, South Alabama/Semmes, Spanish Fort, Dauphin Island, Mobile County, Kushla, and Turnerville. Systems in Baldwin County with delineated WHPA's are Bay Minette, Fairhope, East Central Baldwin, Gulf Shores, Loxley, Orange Beach, and Perdido Bay. Public supply well locations and boundaries of the WHPA's are shown on plate 4.

SUMMARY AND CONCLUSIONS

The major aquifers in Area 13 are the Miocene-Pliocene aquifer and the watercourse aquifer. The recharge areas for these aquifers are primarily within or just north of the study area. The Miocene Series undifferentiated, the Citronelle Formation, and the alluvial, terrace and coastal deposits of Quaternary age that make up these aquifers are generally hydraulically connected and act as a single hydrologic unit. Discontinuous clay lenses within these deposits retard the vertical movement of ground water, but do not separate the sands completely over large areas; therefore, the study area is considered highly vulnerable to contamination from the surface. The deeper sands in the Miocene Series undifferentiated appear to be separated from the shallower unit by a significant clay interval and are considered moderately vulnerable to contamination.

The entire study area is considered to be highly vulnerable to contamination from the surface owing to the permeability of the underlying sediments. The soils are highly permeable, which allows rapid infiltration of water. Areas around some of the large pumping centers are more vulnerable to contamination, not only because of the permeable nature of the sediments and the slope of the land surface, but because of depressions created in the potentiometric surface by large withdrawals of water from the aquifers. These depressions act as funnels to direct ground water flow toward pumping centers and increase the rate at which a potential contaminant could migrate into the ground water system. Other areas of high vulnerability are regions characterized by flat terrain, which decreases the rate of surface runoff, and highly permeable soils, which increase the rate of infiltration from the surface. Many of these areas are farmed intensively and the potential exists for contamination of ground water by agricultural chemicals.

Public ground water supplies in the area are derived from 113 public supply wells in both aquifers. To date, WHPA's have been delineated for 18 of the public supply systems that rely on ground water as a source of supply.

SELECTED REFERENCES

Adams, G. I., Butts, Charles, Stevenson, L. W., and Cooke, C. W., 1926, Geologic map of Alabama: Alabama Geological Survey Special Map 7, scale 1:500,000, 1 sheet.

Alabama Department of Economic and Community Affairs, 1984, Alabama County Data Book: 92 p.

Baker, R. M., and Mooty, W. S., 1993, Use of water in Alabama, 1990: Alabama Geological Survey Information Series 59E, 49 p.

Barksdale, H. C., Moore, J. D., and contributors, 1976, Water content and potential yield of significant aquifers in Alabama: Alabama Geological Survey Open-File Report, 449 p.

Bingham, R. H., 1982, Low-flow characteristics of Alabama streams: U.S. Geological Survey Water-Supply Paper 2083, 27 p.

Brown, G. F., Foster, V. M., Adams, R. W., Reed, E. W., and Pudgett, H. D., Jr., 1944, Geology and ground-water resources of the coastal area in Mississippi: Mississippi Geological Survey Bulletin 60, 229 p.

Chandler, R. V., and Moore, J. D., 1983, Fresh ground-water resources of the Dauphin Island area, Alabama: Alabama Geological Survey Circular 109, 89 p.

Chandler, R. V., Moore, J. D., and Gillett, Blakeney, 1985, Ground-water chemistry and salt-water encroachment, southern Baldwin County, Alabama: Alabama Geological Survey Bulletin 126, 166 p.

Chandler, R. V., Gillett, Blakeney, and DeJarnette, S. S., 1996, Hydrologic and water-use data for southern Baldwin County, Alabama: Alabama Geological Survey

Circular 188, 124 p.
Davis, M. E., 1987, Stratigraphic and hydrogeologic framework of the Alabama Coastal Plain: U.S. Geological Survey Water-Resources Investigations Report 87-4112, 39 p.
Ellard, J. S., 1977, Map of fresh and slightly saline ground-water resources in the Coastal Plain of Alabama: Alabama Geological Survey Special Map 179.
Harvey, E. J., Golden, H. G., Jeffery, H. G., 1965, Water resources of the Pascagoula area, Mississippi: U.S. Geological Survey Water-Supply Paper 1763, 135 p.
Hinkle, Frank, and Sexton, Thomas, 1988, Depths to ground water in southwest Alabama with approximately 10,000 milligrams per liter of total dissolved solids: Alabama Geological Survey Special Map 214.
Isphording, W. C., 1977, Petrology and stratigraphy of the Alabama Miocene: Gulf Coast Association of Geological Societies Transactions, v. 27, p. 304-313.
Isphording, W. C., and Lamb, G. M., 1971, Age and origin of the Citronelle Formation in Alabama: Geological Society of America Bulletin, v. 82, no. 4, p. 775-780.
Marsh, O. T., 1966, Geology of Escambia and Santa Rosa Counties, western Florida panhandle: Florida Geological Survey Bulletin 46, 140 p.
Martin, A. M., Jr., and Whiteman, C. D., Jr., 1989, Geohydrology and regional ground-water flow of the coastal lowlands aquifer system in parts of Louisiana, Mississippi, Alabama, and Florida—a preliminary analysis: U.S. Geological Survey Water-Resources Investigations Report 88-4100, 88 p.
Moore, J. D., 1998, Aquifers in Alabama: Alabama Geological Survey Special Map 231 (revised).
Moore, J. D., and Hunter, J. A., 1991, Watercourse aquifers in Alabama: Alabama Geological Survey Circular 159, 26 p.
Moore, J. D., and Raymond, D. E., 1985, Configuration of the base of the Miocene Series: Alabama Geological Survey Special Map 199D.
Mooty, W. S., 1988, Geohydrology and susceptibility of major aquifers to surface contamination in Alabama; Area 13: U.S. Geological Survey Water-Resources Investigations Report 88-4080, 29 p.
Mooty, W. S., and Richardson, J. R., 1998, Water use in Alabama, 1995: U.S. Geological Survey Water-Resources Investigations Report 98-4154, 92 p.
Moser, P. H., and Chermock, R. L., 1978, Geologic and hydrologic environmental atlas of Mobile and Baldwin Counties, Alabama: Alabama Geological Survey Open-File Report, 210 p.
National Oceanic and Atmospheric Administration, 1985, Alabama precipitation yearly normals 1951-80: Birmingham, River Forecast Office.
Peterson, C. G., 1947, Ground-water investigations in the Mobile area, Alabama: Alabama Geological Survey Bulletin 58, 32 p.

Pettyjohn, W. A., Savoca, Mark, and Self, Dale, 1991, Regional assessment of aquifer vulnerability and sensitivity in conterminous United States: U.S. Environmental Protection Agency Report EPA/600/2-91/043, 319 p.

Pettyjohn, R. A., Busby, J. F., and Layman, T. B., 1993a, Properties and chemical constituents in ground water from permeable zone B (lower Pleistocene-upper Pliocene deposits), Coastal Lowlands aquifer system, south-central United States: U.S. Geological Survey Water-Resources Investigations Report 91-4152.

_____1993b, Properties and chemical constituents in ground water from permeable zone E (lower Miocene-Upper Oligocene deposits), Coastal Lowlands aquifer system, south-central United States: U.S. Geological Survey Water-Resources Investigations Report 92-4103.

Pettyjohn, R. A., Busby, J. F., and Cervantes, M. A., 1993, Properties and chemical constituents in ground water from permeable zone C (lower Pliocene-upper Miocene deposits), Coastal Lowlands aquifer system, south-central United States: U.S. Geological Survey Water-Resources Investigations Report 91-4151.

Raymond, D. E., 1985, Depositional sequences in the Pensacola Clay (Miocene) of southwest Alabama: Alabama Geological Survey Bulletin 114, 87 p.

Raymond, D. E., Copeland, C. W., and Rindsberg, A. K., 1993, Post-Miocene sediments of the shallow subsurface of coastal Alabama: Alabama Geological Survey Circular 168, 93 p.

Reed, P. C., 1971a, Geology of Mobile County, Alabama: Alabama Geological Survey Map 93, 8 p.

_____1971b, Geology of Baldwin County, Alabama: Alabama Geological Survey Map 94, 5 p.

Reed, P. C., and McCain, J. F., 1971, Water availability of Baldwin County, Alabama: Alabama Geological Survey Map 96, 55 p.

_____1972, Water availability in Mobile County, Alabama: Alabama Geological Survey Map 121, 45 p.

Riccio, J. F., Hardin, J. D., and Lamb, G. M., 1973, Development of a hydrologic concept for the greater Mobile metropolitan-urban environment: Alabama Geological Survey Bulletin 106, 171 p.

Robinson, J. L., Moreland, R. S., and Clark, A. E., 1996, Potentiometric surface of the Miocene-Pliocene aquifer system of Baldwin County, Alabama, 1995: U.S. Geological Survey WRD Open-File Report 96-590, 64 p.

Sapp, D. C., and Emplaincourt, Jacques, 1975, Physiographic regions of Alabama: Alabama Geological Survey Special Map 168, 1 sheet.

Smith, C. C., 1991, Foraminiferal biostratigraphy framework, paleoenvironments, rates of sedimentation, and geologic history of the subsurface Miocene of southern Alabama and adjacent State and Federal waters: Alabama Geological Survey Bulletin 138, 223 p.

Szabo, M. W., and Copeland, C. W., Jr., 1988, Geologic map of Alabama: southwest sheet: Alabama Geological Survey Special Map 220.

U.S. Department of Commerce, Bureau of Census, 1991, 1990 Estimated Alabama population: Special Tabulation, U.S. Department of Commerce, Bureau of Census.

U.S. Environmental Protection Agency, 1984, A ground-water protection strategy for the Environmental Protection Agency: U.S. Environmental Protection Agency, 56 p.

U.S. Geological Survey, 1986, Water resources data, Alabama water year 1985: U.S. Geological Survey Water Data Report AL-85-1, 286 p.

_____1997, Water resources data, Alabama water year 1996: U.S. Geological Survey Water Data Report AL-96-1, 456 p.

Walter, G. R., 1976, The Miocene-Pliocene aquifer and the alluvial aquifer, *in* Barksdale, H. C., and contributors, 1976, Water content and potential yield of significant aquifers in Alabama: Alabama Geological Survey Open-File Report, 449 p.

Walter, G. R., and Kidd, R. E., 1979, Ground-water management techniques for the control of salt-water encroachment in Gulf Coast aquifers, a summary report: Alabama Geological Survey Open-File Report, 84 p.

Williamson, A. K., Grubb, H. F., and Weiss, J. S., 1990, Ground-water flow in the Gulf Coast aquifer systems, south central United States—A preliminary analysis: U.S. Geological Survey Water-Resources Investigations Report 89-4071,124 p.

Whitmore, F. C., Jr., 1983, Hemphillian vertebrate fauna from Mobile County, Alabama, *in* Isphording, W. C., and Flowers, G. C., Differentiation of unfossiliferous clastic sediments: Solutions from the southern portion of the Alabama-Mississippi Coastal Plain: Tulane Studies in Geology and Paleontology, v. 17, no. 3, p. 71-72.

EXPLANATION FOR TABLE 3

SYSTEM, water system name.
PWS ID, Public water system identification number as assigned by the Alabama Department of Environmental Management.
SE ID, Source identification number as assigned by the Alabama Department of Environmental Management. New wells may not have SE ID's assigned at press time.
GSA ID, Well identification number assigned by the Geological Survey of Alabama (GSA).
DEPTH, total depth of well in feet. Number in parentheses denotes total depth of the test well drilled at the same location.
YEAR DRILLED, the year the well was completed and ready for operation.
DRILLING CONTRACTOR, name of driller.
ALTITUDE, elevation of land surface in feet above mean sea level.
AQUIFER: Qalt, alluvial and terrace deposits of Quaternary age;
Tmp, undifferentiated Pliocene and Miocene deposits of Tertiary age.
WATER LEVEL, water level in feet below land surface. The date the measurement was made is shown below the measurement.
WELL CONSTRUCTION, YIELD, REMARKS, gpm is gallons per minute.

Table 3.--Records of public water-supply wells in Area 13

BALDWIN COUNTY

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Tensaw Water Authority	1679	1	BALG-02	963	1990	Griner Drilling Service, Inc.	68	Tmp	4.87 5/16/90	Casing: 8-in. from 0 to 320 ft, 4-in. from 268 to 328 ft and 377.67 to 387.67 ft. Screen: 4-in. from 328 to 377.67 ft and 387.67 to 410 ft. Drawdown 34 ft when pumped 72 hrs at 226 gpm in May, 1990.
Stockton Water System	71	1	BALK-01	207	1974	Acme Drilling Co.	115	Tmp	89 3/12/74	Casing: 12-in. from 0 to 169 ft, 8-in. from 128 to 168 ft, 6-in. from 188 to 196 ft. Screen: 6-in. from 168 to 188 ft and 196 to 207 ft. Drawdown 37 ft when pumped 8 hrs at 200 gpm in 1974.
North Baldwin Water Authority	1768	1	BALO-03	425	1996	Layne-Central Co.	308	Tmp	182 1996	Casing: 12-in. From 0 to 360 ft, 12-in. From 0 to 360 ft. Screen: 12-in. From 360 to 425 ft. Drawdown 37 ft when pumped at 450 gpm.
Bay Minette Utilities	23	1	BALU-5	229	1938	Layne-Central Co.	269	Tmp	90.4 7/20/66	Casing: 12-in. from 0 to 196 ft, 8-in. from 162 to 207 ft. Screen: 8-in. from 207 to 229 ft. Drawdown 41 ft when pumped 24 hrs at 320 gpm in 1938.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Bay Minette Utilities	23	2	BALU-9	204	1948	Layne-Central Co.	270	Tmp	88.88 7/20/66	Casing: 18-in. from 0 to 148 ft, 12-in. from 0 to 160 ft. Screen: 8-in. from 160 to 200 ft. Drawdown 23 ft when pumped 8 hrs at 361 gpm in 1948.
Bay Minette Utilities	23	3	BALU-11	187	1965	Layne-Central Co.	265	Tmp	66 1965	Casing: 24-in. from 0 to 130 ft, 12-in. from 80 to 135 ft. Screen: 10-in. from 135 to 175 ft. Drawdown 40 ft when pumped at 500 gpm in 1965.
Bay Minette Utilities	23	4	BALU-01	186	1975	Layne-Central Co.	255	Tmp	68 1/8/75	Casing: 24-in. from 0 to 130 ft, 12-in. from 80 to 135 ft. Screen: 10-in. from 135 to 175 ft. Drawdown 47 ft when pumped 8 hrs at 750 gpm in 1975.
Bay Minette Utilities	23	5	BALU-02	265	1983	Layne-Central Co.	269	Tmp	82 12/12/83	Casing: 24-in. from 0 to 165 ft, 16-in. from 112 to 170 and 190 to 205 ft, 6-in. from 255 to 265 ft. Screen: 16-in. from 170 to 190 ft and 205 to 255 ft. Drawdown 60 ft when pumped 16 hrs at 1,102 gpm in Dec. 1983.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Spanish Fort Water System	68	1	BALCC-5	326 (419)	1964	Layne-Central Co.	150	Tmp	109.6 3/15/66	Casing: 16-in. from 0 to 260 ft, 10-in. from 210 to 265 ft. Screen: 8-in. from 265 to 305 ft. Drawdown 13 ft when pumped at 200 gpm in 1966.
Spanish Fort Water System	68	2	BALCC-6	378 (414)	1959	Layne-Central Co.	160	Tmp	149.2 4/27/66	Casing: 18-in. from 0 to 289 ft, 12-in. from 239 to 294 ft and 8-in. from 319 to 348 ft. Screen: 8-in. from 294 to 319 ft and 348 to 368 ft. Drawdown 119 ft when pumped at 554 gpm in 1959.
Spanish Fort Water System	68	3	BALCC-07	374 (501)	1990	Griner Drilling Service, Inc.	197	Tmp	166.34 5/2/90	Casing: 16-in. from 0 to 324 ft, 8-in. from 264 to 324 ft. Screen: 8-in. from 324 to 364 ft. Drawdown 73 ft when pumped 25 hrs at 503 gpm in May 1990.
Spanish Fort Water System	68	4	BALCC-08	350 (502)	1995	Griner Drilling Service, Inc.	150	Tmp	136 9/25/93	Casing: 16-in. from 0 to 305 ft, 10-in. from 251 to 308.51 ft. Screen: 10-in. from 308.51 to 349 ft. Drawdown 22 ft when pumped 24 hrs at 42 gpm in Sept. 1993.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Spanish Fort Water System	68	5	BALCC-09	295 (504)	1998	Griner Drilling Service, Inc.	150	Tmp	127 1998	Casing: 16-in. from 0 to 305 ft, 10-in. from 251 to 308.51 ft. Screen: 10-in. from 308.51 to 349 ft. Drawdown 22 ft when pumped 24 hrs at 42 gpm in Sept. 1993.
Loxley Water Department	48	1	BALKK-3	184	1959	Layne Central	170	Tmp	40 5/26/59	Casing: 12-in. from 0 to 140 ft, 8-in. from 100 to 144 ft. Screen: 8-in. from 144 to 174 ft. Drawdown 30 ft when pumped 7 hrs at 305 gpm in 1959.
Loxley Water Department	48	2	BALKK-05	190	1984	Holland Well Co. Inc.	165	Tmp	55.41 5/30/91	Casing: 16-in. from 0 to 139 ft, 10-in. from 89 to 139 ft. Screen: 8-in. from 140 to 180 ft. Drawdown 61 ft when pumped 24 hrs at 1,125 gpm in 1984 .
Malbis Plantation	50	1	BALCC-06	260	1983	Holland Well Co. Inc.	197	Tmp	135 3/24/83	Casing: 16-in. from 0 to 208 ft, 8-in. from 190 to 208 ft. Screen: 8-in. from 208 to 258 ft. Drawdown 38 ft when pumped 24 hrs at 509 gpm on April 29, 1983.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Daphne Utilities Board	29	1	BALLL-04	430 (442)	1957 (re-worked in 1983)	Layne Central	157	Tmp	1321957	Casing: 12-in. from 0 to 397 ft, 6-in. from 337 to 402 ft. Screen: 6-in. from 380 to 430 ft. Drawdown 22 ft when pumped 16 hrs at 400 gpm in 1983.
Daphne Utilities Board	29	2	BALLL-6	452 (611)	1963	Layne Central	155	Tmp	144.72 11/13/82	Casing: 12-in. from 0 to 397 ft, 6-in. from 352 to 402 ft. Screen: 6-in. from 402 to 442 ft. Drawdown 31 ft when pumped at 250 gpm in 1965.
Daphne Utilities Board	29	3	BALLL-020	215 (314)	1992	Griner Drilling Service, Inc.	152	Tmp	63.89 12/19/91	Casing: 20-in. from 0 to 155 ft, 12-in. from 110 to 165 ft. Screen: 12-in. from 165 to 215 ft. Drawdown 36 ft when pumped 24 hrs at 503 gpm on Dec. 20, 1991.
Daphne Utilities Board	29	4	BALLL-011	198 (610)	1984	Powell Drilling Co., Inc.	143	Tmp	56 10/23/84	Casing: 18-in. from 0 to 151 ft, 12-in. from 95 to 152 ft. Screen: 10-in. from 152 to 193 ft. Drawdown 23 ft when pumped 8 hrs at 125 gpm on Oct. 23, 1984.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Daphne Utilities Board	29	5	BALLL-09	315 (399)	1959	Powell Drilling Co., Inc.	140	Tmp	48.5 1959	Casing: 12-in. from 0 to 270 ft, 8-in. from 220 to 275 ft. Screen: 6-in. from 275 to 305 ft. Drawdown 48 ft when pumped 8 hrs at 319 gpm n 1959.
Daphne Utilities Board	29	6	BALLL-02	155	1977	Graves Well Drilling Co.	142	Tmp	79.5 8/2/77	Casing: 6-in. from 0 to 140 ft. Screen: 6-in. from 140 to 155 ft. Drawdown 24.5 ft when pumped 8 hrs at 300 gpm on Aug. 8, 1977.
Daphne Utilities Board	29	7	BALLL-03	176 (204)	1982	Powell Drilling Co., Inc.	115	Tmp	63 9/3/82	Casing: 16-in. from 0 to 131 ft, 10-in. from 101 to 131 ft. Screen: 8-in. from 131 to 171 ft. Drawdown 34 ft when pumped 16 hrs at 608 gpm on Sept. 3, 1982. Formerly owned by Lake Forest Utilities.
Daphne Utilities Board	29	8	BALLL-06	300 (608)	1991	Griner Drilling Service, Inc.	152	Tmp	97.35 3/7/83	Casing: 20-in. from 0 to 155 ft. Screen: 12-in. from 165 to 210 ft.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Belforest Water System	25	1	BALLL-01	184	1974	Acme Drilling Co.	147	Tmp	53 1/30/84	Casing: 12-in. from 0 to 141 ft, 8-in. from 79.5 to 139.5 ft, 6-in. from 159.8 to 161.2 ft. Screen: 6-in. from 139.5 to 159.8 ft and from 161.2 to 181.5 ft. Drawdown 39 ft when pumped 8 hrs at 510 gpm on Nov. 4, 1974.
Robertsdale Utilities	61	1	BALPP-6	260	1958	Layne-Central Co.	148	Tmp	32.0 9/15/49 51.9 10/23/68 35.9 3/23/87	Casing: 16-in. from 0 to 99 ft, 10-in. from 77.5 to 220 ft. Screen: 10-in. from 220 to 260 ft. Drawdown 16 ft when pumped 4 hrs at 349 gpm in 1977. GSA observation well.
Robertsdale Utilities	61	2	BALPP-1	203	1959	Layne-Central Co.	138	Tmp	37.66 5/9/66	Casing: 18-in. from 0 to 150 ft, 12-in. from 110 to 153 ft. Screen: 10-in. from 153 to 193 ft. Drawdown 41 ft when pumped 3 hrs at 503 gpm in 1959.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Robertsdale Utilities	61	3	BALPP-09	250	1987	Weldon Drilling Co.	140	Tmp	39.46 6/3/87	Casing: 18-in. from 0 to 148 ft, 12-in. from 98 to 150 ft. Screen: 10-in. from 150 to 210 ft. Drawdown 68.8 ft when pumped 24 hrs at 1,823 gpm in June 1987.
Silverhill Water Works	65	1	BALOO-1	198	1962	Acme Drilling Co.	145	Tmp	50 1962 47.0 7/10/87	Casing: 10-in. from 0 to 153 ft, 4-in. from 112 to 155 ft. Screen: 4-in. from 155 to 195 ft. Drawdown 8 ft when pumped 7 hrs at 157 gpm in 1962.
Silverhill Water Works	65	2	BALOO-06	186	1973	Acme Drilling Co.	144	Tmp	7 1973 50.3 7/10/87	Casing: 12-in. from 0 to 153 ft, 8-in. from 111 to 153 ft. Screen: 6-in. from 153 to 184 ft.
Fairhope Water Department	35	1	BALNN-02	223	1974	Carloss Well Supply Co.	115	Tmp	71.5 1975 70.8 3/10/87	Casing: 20-in. from 0 to 158 ft. Screen: 12-in. from 158 to 218 ft. Drawdown 50 ft when pumped 24 hrs at 750 gpm in 1975.
Fairhope Water Department	35	2	BALNN-01	265	1974	Carloss Well Supply Co.	95	Tmp	51 1975 43.0 3/10/87	Casing: 20-in. from 0 to 192 ft. Screen: 12-in. from 201 to 261 ft. Drawdown 50 ft when pumped 24 hrs at 750 gpm in 1975.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Fairhope Water Department	35	3	BALOO-02	196 (511)	1981	Layne-Central Co.	105	Tmp	81 1981	Casing: 14-in. from 0 to 126 ft. Screen: 12-in. from 131 to 186 ft. Drawdown 19 ft when pumped 26 hrs at 750 gpm in 1981.
Fairhope Water Department	35	4	BALNN-04	230 (383)	1981	Layne-Central Co.	85	Tmp	61 1981	Casing: 14-in. from 0 to 105 ft, 12-in. from 120 to 129 ft, 154 to 195 ft and 220 to 230 ft. Screen: 12-in. from 110 to 120 ft, 129 to 154 ft and 195 to 220 ft. Drawdown 13 ft when pumped 28 hrs at 750 gpm in 1981.
Fairhope Water Department	35	5	BALWW-016	335 (501)	1990	Griner Drilling Service, Inc.	80	Tmp	50.50 7/25/90	Casing: 24-in. from 0 to 234 ft, 16-in. from 174 to 244 ft, 12-in. from 266 to 290 ft. Screen: 12-in. from 24 to 266 ft and 290 to 330 ft. Drawdown 166 ft when pumped 24 hrs at 752 gpm in July, 1990.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Fairhope Water Department	35		BALNN-017	260 (501)	1998	Griner Drilling Service, Inc.	105	Tmp	59 3/30/98	Casing: 24-in. from 0 to 234 ft, 16-in. from 174 to 244 ft, 12-in. from 266 to 290 ft. Screen: 12-in. from 24 to 266 ft and 290 to 330 ft. Drawdown 166 ft when pumped 24 hrs at 752 gpm in July, 1990.
Summerdale Water Works	73	1	BALPP-5	146	1955	Layne-Central Co.	115	Tmp	20 1955	Casing: 16-in. from 0 to 71 ft, 10-in. from 0 to 75 ft and 95 to 120 ft. Screen:10-in. from 75 to 95 ft and 120 to 140 ft. Drawdown 20 ft when pumped 8 hrs at 503 gpm in 1955.
East Central Baldwin Water & Fire Protection Authority			BALQQ-03	550 (600)	1998	Griner Drilling Service, Inc.	105	Tmp	56 3/27/97	Casing: 24-in. from 0 to 460 ft, 16-in. from 390 to 470 ft, 14-in. from 470 to 510 ft. Screen: 14-in. from 510 to 550 ft. Drawdown 135 ft when pumped 6 hrs at 1,051 gpm on 03/27/98.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Elberta Water Works	33	1	BALTT-6	103 (110)	1964	Spillers Well & Pump Co.	75	Tmp	29 3/28/84	Casing: 8-in. from 0 to 72 ft, 6-in. from 70 to 73 ft. Screen: 6-in. from 73 to 103 ft. Drawdown 30 ft when pumped 3 hrs at 335 gpm in 1964.
Riviera Utilities	36	1	BALUU-6	155	1962	Layne-Central Co.	75	Tmp	24 8/30/83	Casing: 24-in. from 0 to 103 ft, 16-in. from 0 to 108 ft, 12-in. from 133 to 137 ft. Screen: 12-in. from 108 to 133 ft and 137 to 147 ft. Drawdown 48 ft when pumped 8 hrs at 578 gpm in 1962.
Riviera Utilities	36	2	BALUU-9	148	1954	Layne-Central Co.	148	Tmp	29 8/30/83	Casing: 16-in. from 0 to 94 ft, 10-in. from 64 to 98 ft. Screen: 10-in. from 98 to 138 ft. Drawdown 32 ft when pumped 8 hrs at 503 gpm in 1954.
Riviera Utilities	36	3	BALUU-17	138	1971	Carloss Well Supply Co.	76	Tmp	25 8/30/83	Casing: 24-in. from 0 to 98 ft, 16-in. from 0 to 95 ft. Screen: 12-in. from 98 to 138 ft. Drawdown 44 ft when pumped 12 hrs at 625 gpm.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Riviera Utilities	36	4	BALZZ-046	210 (241)	1991	Layne-Central Co.	60	Tmp	29 11/4/91	Casing:20-in. from 0 to 155 ft, 12-in. from 105 to 160 ft. Screen:12-in. from 160 to 200 ft. Drawdown 83 ft when pumped 13 hrs at 1,050 gpm on 11/4/91.
Riviera Utilities	36		BALUU-021	131	1997	Layne Christensen Company	77	Tmp	18 6/25/97	Casing: 20-in. from 0 to 100 ft, 12-in. from 40 to 102 ft. Screen: 10-in. from 102 to 127 ft. Drawdown 46 ft when pumped 24 hrs at 704 gpm in 1997.
Riviera Utilities	36		BALUU-022	218 (310)	1997	Layne Christensen Company	72	Tmp	24 6/25/97	Casing: 20-in. from 0 to 185 ft, 12-in. from 130 to 190 ft. Screen: 10-in. from 190 to 215 ft. Drawdown 112 ft when pumped 6 hrs at 1,050 gpm in 1997.
Perdido Bay Water, Sewer and Fire Protection District	1490	1	BALBBB-04	300 (330)	1977	Layne-Central Co.	67	Tmp	42 3/28/84	Casing: 18-in. from 0 to 255 ft, 10-in. from 205 to 260 ft. Screen: 10-in. from 260 to 300 ft. Drawdown 38 ft when pumped 8 hrs at 500 gpm in 1977.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Perdido Bay Water, Sewer and Fire Protection District	1490	3	BALSS-03	280 (318)	1974	Layne-Central Co.	66	Tmp	27.5 3/28/84	Casing: 18-in. from 0 to 235 ft, 10-in. from 185 to 240 ft. Screen: 10-in. from 240 to 270 ft. Drawdown 37 ft when pumped 5 hrs at 457 gpm in 1976.
Perdido Bay Water, Sewer and Fire Protection District	1490	4	BALAAA-010	480 (500)	1995	Griner Drilling Service, Inc.	65	Tmp	41 2/1/95	Casing: 6-in. from 0 to 280 ft. Screen: 6-in. from 280 to 320 ft. Drawdown 43 ft when pumped 24 hrs at 250 gpm in 1995.
Gulf Shores Water System	38	1	BALDDD-3	98	1955	Layne-Central Co.	16	Tmp	7.5 3/26/84	Casing: 16-in. from 0 to 70 ft, 10-in. from 0 to 72 ft. Screen: 10-in. from 72 to 93 ft. Drawdown 15 ft when pumped 8 hrs at 150 gpm in 1955.
Gulf Shores Water System	38	2	BALDDD-21	138	1967	Layne-Central Co.	11	Tmp	11.10 3/26/84	Casing: 20-in. from 0 to 100 ft, 12-in. from 100 to 103 ft. Screen: 10-in. from 103 to 128 ft. Drawdown 11 ft when pumped 8 hrs at 503 gpm in 1967.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Gulf Shores Water System	38	3	BALDDD-010	225	1975	Layne-Central Co.	16	Tmp	11 1975 15.3 7/15/87	Casing: 20-in. from 0 to 170 ft, 12-in. from 185 to 183 ft. Screen: 10-in. from 185 to 215 ft. Drawdown 58 ft when pumped 11 hrs at 754 gpm in 1976.
Gulf Shores Water System	38	4	BALZZ-02	215	1979	Layne-Central Co.	36	Tmp	19.2 3/26/84	Casing: 20-in. from 0 to 205 ft, 12-in. from 120 to 175 ft. Screen: 10-in. from 175 to 205 ft. Drawdown 132 ft when pumped 24 hrs at 750 gpm in 1979.
Gulf Shores Water System	38		BALZZ-023	345	1984	Alsay-Pippin Corporation	39	Tmp	13.83 5/8/84	Casing: 20-in. from 0 to 265 ft, 10-in. from 216 to 270 ft. Screen: 10-in. from 270 to 320 ft. Drawdown 106 ft when pumped 72 hrs at 1,499 gpm in 1984.
Gulf Shores Water System	38	6	BALZZ-034	203	1986	Alsay, Inc.	11	Tmp	18.91 3/16/87	Casing: 16-in. from 0 to 145 ft, 10-in. from 108 to 148 ft. Screen: 8-in. from 148 to 198 ft. Drawdown 82 ft when pumped 89 hrs at 820 gpm in 1986.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Gulf Shores Water System	38	7	BALZZ-041	200 (421)	1987	Layne-Western Company, Inc.	30	Tmp	16 12/6/88	Casing: 20-in. from 0 to 112 ft, 12-in. from 72 to 112 ft, 10-in. from 112 to 117 ft, 132 to 152 ft and 172 to 183 ft. Screen: 10-in. from 117 to 132 ft, 152 to 172 ft and 183 to 193 ft. Reported yield 500 gpm.
Gulf Shores Water System	38	5	BALZZ-025	205 (528)	1984	Alsay-Pippin Corporation	34	Tmp	9.95 4/11/84	Casing: 20-in. from 0 to 160 ft, 12-in. from 103 to 163 ft. Screen: 10-in. from 163 to 203 ft. Drawdown 20 ft when pumped 24 hrs at 781 gpm in April 1984.
Gulf Shores Water System	38	8	BALZZ-045	370	1997	J. Patrick Scott		Tmp	26 1997	Casing: 16-in. from 0 to 265 ft, 12-in. from 260 to 270 ft and 330 to 340 ft. Screen: 12-in. from 270 to 330 ft and 340 to 360 ft. Drawdown 75 ft when pumped 19 hrs at 1,125 gpm in 1997.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Orange Beach Water Authority	53	1	BALDDD-04	144	1975	Carloss Well Supply Co.	26.2	Tmp	9.8 12/2/76 14.5 6/22/84	Casing: 12-in. from 0 to 100 ft, 8-in. from 60 to 120 ft. Screen: 8-in. from 120 to 140 ft. Drawdown 36 ft when pumped 24 hrs at 350 gpm in 1975. Also known as the Carloss well.
Orange Beach Water Authority	53	2	BALDDD-02	120	1981	Graves Well Drilling	9.8	Tmp	6 1981 0.8 3/29/88 6.5 10/1/90	Casing: 18-in. from 0 to 100 ft, 10-in. from 0 to 100 ft. Screen: 10-in. from 100 to 120 ft. Drawdown 25 ft when pumped 29 hrs at 503 gpm in 1981. Also known as the shallow Stuckey well.
Orange Beach Water Authority	53	3	BALDDD-03	408	1983	Acme Drilling Co.	9.8	Tmp	10 1981	Casing: 16-in. from 0 to 330 ft, 10-in. from 292 to 331 ft. Screen: 8-in. from 331 to 407 ft. Drawdown 66.5 ft when pumped 24 hrs at 830 gpm in 1983. Also known as deep Stuckey well.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Orange Beach Water Authority	53	4	BALDDD-017	140	1983	Acme Drilling Co.	9.8	Tmp	8 1983	Casing: 16-in. from 0 to 100., 10-in. from 43 to 100 ft. Screen: 8-in. from 100 to 140 ft. Drawdown 50 ft when pumped 12 hrs at 1,000 gpm in 1986. Also known as the Craft well.
Orange Beach Water Authority	53		BALZZ-043	197	1989	Layne-Central Co.	16.4	Tmp	7 1989	Casing: 24-in. from 0 to 105 ft, 16-in. from 60 to 109 ft and 129 to 157 ft. Screen: 16-in. from 109 to 129 ft and 157 to 182 ft. Drawdown 78 ft when pumped 53 hrs at 1,514 gpm in May, 1989. Also known as the Fodor well.
Orange Beach Water Authority	53		BALCCC-011	376	1990	Graves Well Service Co., Inc.	11	Tmp	9 1990	Casing: 14-in. from 0 to 246 ft. Screen: 8-in. from 246 to 371 ft. Also known as the Cox well.

Table 3.--Records of public water-supply wells in Area 13–Continued

MOBILE COUNTY

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
South Alabama Utilities/ Citronelle	967	1	MOBD-2	762 (770)	1959	Layne-Central Co.	339	Tmp		Casing: 16-in. from 0 to 687 ft, 8-in. from 608 to 692 ft. Screen: 8-in. from 692 to 752 ft. Drawdown 10 ft when pumped 3 hrs at 400 gpm in 1959.
South Alabama Utilities/ Citronelle	967	2	MOBD-3	745	1954	Layne-Central Co.	309	Tmp	203 5/1953	Casing: 16-in. from 0 to 650 ft, 8-in. from 570 to 655 ft. Screen: 8-in. from 655 to 735 ft. Drawdown 18 ft when pumped 8 hrs at 412 gpm in 1954.
South Alabama Utilities/ Citronelle	967	3	MOBG-1	805	1965	Layne-Central Co.	334	Tmp	252 1965	Casing: 16-in. from 0 to 700 ft, 8-in. from 640 to 705 ft, 725 to 745 ft and 760 to 770 ft. Screen: 8-in. from 705 to 725 ft, 745 to 760 ft and 770 to 795 ft. Drawdown 18 ft when pumped 8 hrs at 402 gpm in 1965.
South Alabama Utilities/ Citronelle	967	4	MOBD-01	760	1969	Carloss Well Service		Tmp	260 1969	Casing: 16-in. from 0 to 685 ft, 8-in. from 634 to 696 ft. Screen: 8-in. from 696 to 760 ft. Drawdown 30 ft when pumped 8 hrs at 554 gpm in 1969.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Mt. Vernon Water Department	1006	1	MOBA-4	95	1967	Carloss Well Service	56	Qal	29.1 2/27/67	Casing: 6-in. from 0 to 75 ft. Screen: 6-in. from 75 to 95 ft. Drawdown 14 ft when pumped 24 hrs at 406 gpm in 1967.
Mt. Vernon Water Department	1006	2	MOBA-3	95	1962	Carloss Well Service	51	Qal	27 1962	Casing: 20-in. from 0 to 60 ft, 12-in. from 0 to 75 ft. Screen: 12-in. from 75 to 95 ft. Drawdown 10 ft when pumped 8 hrs at 305 gpm in 1963.
Searcy Hospital	1024	1	MOBB-3	728	1946	Layne-Central Co.	185	Tmp	109 1/3/50 133 7/23/65	Casing: 16-in. from 0 to 242 ft, 12-in. from 200 to 660 ft, 8-in. from 585 to 665 ft. Screen: 8-in. from 665 to 710 ft. Drawdown 19 ft when pumped 12 hrs at 560 gpm in 1965.
MCB Water & Fire Protection	1004	1	MOBI-03	200	1996	Griner Drilling Service, Inc.	10	Tmp	flowing 1996	Casing: 16-in. from 0 to 150 ft, 10-in. from 90 to 160 ft. Screen: 10-in. from 160 to 200 ft. Drawdown 93 ft when pumped 24 hrs at 305 gpm on 12/19/95.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
LeMoyne Water System, Inc.	994	1	MOBL-013	165	1973	Holland Well Co.	25	Tmp	12 1973 13.10 1995	Casing: 8-in. from 0 to 102 ft, 4-in. from 90 to 105 ft. Screen: 4-in. from 105 to 135 ft. Drawdown 17 ft when pumped 4 hrs at 330 gpm in 1972.
LeMoyne Water System, Inc.	994	2	MOBL-04	160	1982	Holland Well Co.	30	Tmp	20 1981	Casing: 20-in. from 0 to 107 ft, 12-in. from 0 to 110 ft. Screen: 12-in. from 110 to 130 ft. Drawdown 30 ft when pumped 24 hrs at 600 gpm in 1981.
LeMoyne Water System, Inc.	994	3	MOBL-014	125 (140)	1992	Donald Smith Co.	32	Tmp	18 1992	Casing: 20-in. from 0 to 85 ft. Screen: 10-in. from 85 to 115 ft. Drawdown 10 ft when pumped 24 hrs at 600 gpm in 1992.
Turnerville Water & Fire Protection District	1510	1	MOBR-01	522	1979	Layne-Central Co.	240	Tmp	191 1979	Casing: 12-in. from 0 to 480 ft, 6-in. from 405 to 482 ft. Screen: 6-in. from 482 to 512 ft. Drawdown 52 ft when pumped 24 hrs at 517 gpm in 1979.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Turnerville Water & Fire Protection District	1510	2	MOBM-022	494 (594)	1995	Griner Drilling Service, Inc.	256	Tmp	182 1995	Casing: 16-in. from 0 to 447 ft, 10-in. from 386 to 450 ft. Screen: 10-in. from 450 to 494 ft. Drawdown 38 ft when pumped 24 hrs at 457 gpm in 1995.
Satsuma Water Works	1022	1	MOBS-3	117	1964	Acme Drilling	20	Tmp	22 7/1964	Casing: 12-in. from 0 to 90 ft, 8-in. from 50 to 90 ft. Screen: 6-in. from 90 to 115 ft. Drawdown 11.5 ft when pumped 3 hrs at 302 gpm in 1964.
Satsuma Water Works	1022	2	MOBS-08	127	1979	Acme Drilling	21	Qalt	10 1979	Casing: 14-in. from 0 to 95 ft. Screen: 8-in. from 94 to 125 ft. Drawdown 11 ft when pumped 12 hrs at 572 gpm in 1979.
Satsuma Water Works	1022	3	MOBS-4	124	1964	Acme Drilling	18	Qalt	20 7/1964	Casing: 12-in. from 0 to 99 ft, 8-in. from 58 to 98.5 ft. Screen: 6-in. from 98.5 to 128.5 ft. Drawdown 13.5 ft when pumped 3 hrs at 302 gpm in 1964.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Saraland Water Service	1021	1	MOBS-5	132	1963	Layne-Central Co.	34	Qalt	16 1964	Casing: 24-in. from 0 to 95 ft, 12-in. from 0 to 100 ft. Screen: 12-in. from 100 to 125 ft. Drawdown 19 ft when pumped 8 hrs at 500 gpm in 1964.
Saraland Water Service	1021	2	MOBV-1	148	1959	Layne-Central Co.	19	Qalt	17.1 8/1/67 15.26 4/21/86	Casing: 18-in. from 0 to 105 ft, 12-in. from 0 to 108 ft. Screen: 10-in. from 108 to 138 ft. Drawdown 38 ft when pumped 8 hrs at 632 gpm in 1959.
Saraland Water Service	1021	3	MOBS-015	126	1980	Layne-Central Co.	18	Qalt	8 7/15/80	Casing: 24-in. from 0 to 82 ft, 12-in. from 0 to 86 ft. Screen: 10-in. from 86 to 116 ft. Drawdown 62 ft when pumped 72 hrs at 650 gpm in 1980.
Kushla Water & Fire Protection District	993	1	MOBR-06	257	1976	Holland Well Co		Tmp		Casing: 10-in. from 0 to 227 ft. Screen: 6-in. from 227 to 257 ft. Drawdown 18 ft when pumped at 240 gpm in 1976.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Kushla Water & Fire Protection District	993	2	MOBR-02	540	1978	Holland Well Co	140	Tmp	66 1/26/78	Casing: 12-in. from 0 to 444 ft, 6-in. from 425 to 465 ft. Screen: 6-in. from 490 to 530 ft. Drawdown 29.5 ft when pumped 24 hrs at 605 gpm on Jan. 26, 1978.
Fairview Water & Fire Protection Authority	977	1	MOBX-9	442 (527)	1971	Carloss Well Supply Co.	228	Tmp	112 1/28/71	Casing: 10-in. from 0 to 390 ft, 6-in. from 328 to 397 ft. Screen: 6-in. from 397 to 437 ft. Drawdown 32 ft when pumped 8 hrs at 208 gpm on Jan. 28, 1971.
Fairview Water & Fire Protection Authority	977	2	MOBX-01	426	1978	Layne Central	208	Tmp	96 1978	Casing: 12-in. from 0 to 385 ft, 6-in. from 325 to 386 ft. Screen: 6-in. from 386 to 416 ft. Drawdown 68 ft when pumped 24 hrs at 510 gpm in 1978.
South Alabama Utilities/ Semmes	965	2	MOBQ-01	250 (380)	1983	Holland Well Company, Inc.	250	Tmp	59.0 2/4/83	Casing: 16-in. from 0 to 140 ft, 8-in. from 120 to 140 ft, 155 to 215 ft and 220 to 230 ft. Screen: 8-in. from 140 to 155 ft, 215 to 220 ft and 230 to 250 ft. Drawdown 49 ft when pumped 8 hrs at 510 gpm in 1983.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
South Alabama Utilities/ Semmes	965	3	MOBAA-07	470 (491)	1986	Layne-Central Co.	200	Tmp	163 1986	Casing: 20-in. from 0 to 414 ft, 12-in. from 370 to 420 ft. Screen: from 420 to 470 ft. Drawdown 35 ft when pumped 24 hrs at 751 gpm on Aug. 12, 1986.
South Alabama Utilities/ Semmes	965	5	MOBGG-03	484 (765)	1996	Griner Drilling Service, Inc.	185	Tmp	169 1996	Casing: 16-in. from 0 to 416 ft, 10-in. from 356 to 426 ft and 454 to 460 ft. Screen: 10-in. from 426 to 454 ft and 460 to 484 ft. Drawdown 47 ft when pumped 24 hrs at 752 gpm on 5/6/96.
South Alabama Utilities/ Semmes	965		MOBY-07	384 (507)	1998	Griner Drilling Service, Inc.	235	Tmp	139 5/14/98	Casing: 16-in. from 0 to 344 ft, 10-in. from 280 to 344 ft. Screen: 10-in. from 344 to 384 ft. Drawdown 147 ft when pumped 10 hrs at 750 gpm on 5/14/98.
Mobile County Water & Fire Protection Authority	1002	1	MOBFF-04	505	1960 deep ened 1986	Layne-Central Co. Graves Well Drilling	162	Tmp	166 4/24/86	Casing: 24-in. from 0 to 463 ft, 16-in. from 400 to 460 ft. Screen: 16-in. from 460 to 505 ft. Drawdown 166 ft when pumped 24 hrs at 900 gpm in 1986.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Mobile County Water & Fire Protection Authority	1002	2	MOBFF-4	480	1959	Layne-Central Co.	123	Tmp	91.34 6/19/67	Casing: 12-in. from 0 to 445 ft, 8-in. from 385 to 450 ft. Screen: 8-in. from 450 to 480 ft. Drawdown 35 ft when pumped 8 hrs at 470 gpm in 1960.
Mobile County Water & Fire Protection Authority	1002	3	MOBKK-05	493 (536)	1968	Layne-Central Co.	67	Tmp	31.31 6/26/67	Casing: 16-in. from 0 to 438 ft, 8-in. from 386 to 443 ft. Screen: 8-in. from 443 to 483 ft. Drawdown 15 ft when pumped 1 hr at 227 gpm in 1967.
Mobile County Water & Fire Protection Authority	1002	4	MOBKK-3	544 (714)	1968	Layne-Central Co.	87	Tmp	61.5 1967	Casing: 16-in. from 0 to 489 ft, 8-in. from 439 to 489 ft. Screen: 8-in. from 494 to 544 ft. Drawdown 24 ft when pumped 4 hrs at 302 gpm in 1967.
Mobile County Water & Fire Protection Authority	1002	5	MOBFF-05	330 (661)	1984	Layne-Central Co.	175	Tmp	105 1984	Casing: 16-in. from 0 to 225 ft, 8-in. from 175 to 230 ft and 250 to 285 ft. Screen: 8-in. from 230 to 250 ft and 285 to 320 ft. Drawdown 24 ft when pumped 8 hrs at 610 gpm on Jan. 17, 1984.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Mobile County Water & Fire Protection Authority	1002	6	MOBGG-04	570 (800)	1990	Layne-Central Co.	177	Tmp	167 1990	Casing: 20-in. from 0 to 455 ft, 10-in. from 395 to 460 ft and 520 to 535 ft. Screen: 10-in. from 460 to 520 and 535 to 560 ft. Drawdown 76 ft when pumped 24 hrs at 1,050 gpm in March 1990.
Mobile County Water & Fire Protection Authority	1002	7	MOBTT-01	390	1984	Holland Well Co., Inc.	5	Tmp	4 1984	Casing: 16-in. from 0 to 360 ft, 8-in. from 325 to 365 ft. Screen: 8-in. from 365 to 390 ft. Drawdown 56 ft when pumped 24 hrs at 300 gpm in 1984.
St. Elmo-Irvington Water System	1034	1	MOBJJ-01	143	1976	Holland Well Co., Inc.	115	Tmp	38 1977	Casing: 10-in. from 0 to 101 ft, 6-in. from 91 to 103 ft. Screen: 6-in. from 103 to 143 ft. Drawdown 31 ft when pumped 0.5 hr at 490 gpm in 1976.
St. Elmo-Irvington Water System	1034	2	MOBKK-01	266 (592)	1980	Powell Drilling Co.	75	Tmp	30 1981	Casing: 16-in. from 0 to 216 ft, 8-in. from 196 to 217 ft. Screen: 8-in. from 217 to 258 ft. Drawdown 10.8 ft when pumped 24 hrs at 495 gpm in 1980.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Grand Bay Water Works Board	983	1	MOBII-4	155	1964	Acme Drilling	102	Tmp	57 1964	Casing: 12-in. from 0 to 115 ft, 8-in. from 74 to 115 ft. Screen: 6-in. from 115 to 155 ft. Drawdown 13 ft when pumped 5 hrs at 406 gpm in 1964.
Grand Bay Water Works Board	983	2	MOBII-03	143	1974	Holland Well Co., Inc.	100	Tmp	38 1974	Casing: 10-in. from 0 to 103 ft. Screen: 8-in. from 103 to 143 ft. Drawdown 22 ft when pumped 8 hrs at 1,200 gpm in 1974.
Grand Bay Water Works Board	983	3	MOBJJ-08	170	1981	Powell Drilling Co.	125	Tmp	33 1981	Casing: 16-in. from 0 to 105 ft, 8-in. from 59 to 109 ft. Screen: 8-in. from 109 to 134 ft. Drawdown 34 ft when pumped 24 hrs at 307 gpm in 1981.
Bayou LaBatre Utilities	957	1	MOBOO-05	335	1980	Layne-Central Co.	75	Tmp	71 9/1/80	Casing: 24-in. from 0 to 280 ft, 16-in. from 220 to 285 ft. Screen: 16-in. from 285 to 325 ft. Drawdown 103 ft when pumped 3 hrs at 708 gpm in 1980.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Bayou LaBatre Utilities	957	2	MOBNN-02	379 (496)	1969	Layne-Central Co.	72	Tmp	48 9/14/67	Casing: 16-in. from 0 to 325 ft, 8-in. from 286 to 329 ft. Screen: 8-in. from 329 to 369 ft. Drawdown 64 ft when pumped 8 hrs at 500 gpm in 1969.
Dauphin Island Water & Sewer Board	971	1	MOBUU-2	305	1962	Layne-Central Co.	5.6	Tmp	4 1962	Casing: 16-in. from 0 to 230 ft, 8-in. from 180 to 235 ft and 250 to 285 ft. Screen: 8-in. from 235 to 250 ft and 285 to 295 ft. Drawdown 56 ft when pumped 24 hrs at 250 gpm in 1962.
Dauphin Island Water & Sewer Board	971	3	MOBUU-1	253 (333)	1967	Layne-Central Co.	6.5	Tmp	9 1967	Casing: 16-in. from 0 to 200 ft, 8-in. from 150 to 205 ft and 225 to 233 ft. Screen: 8-in. from 205 to 225 ft and 233 to 243 ft. Drawdown 46 ft when pumped 24 hrs at 201 gpm in 1967.
Dauphin Island Water & Sewer Board	971	4	MOBUU-01	30	1989	Donald Smith Co., Inc.	6	Qalt	8 1989	Casing: 24-in. from 0 to 17 ft, 12-in. from 0 to 18 ft. Screen: 12-in. from 18 to 28 ft. Drawdown 13 ft when pumped 24 hrs at 85 gpm in 1988.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Dauphin Island Water & Sewer Board	971	5	MOBUU-02	32.5	1989	Donald Smith Co., Inc	6	Qalt	6.5 1988	Casing: 20-in. from 0 to 19.5 ft, 12-in. from 0 to 20.5 ft. Screen: 12-in. from 20.5 to 30.5 ft. Drawdown 15 ft when pumped 48 hrs at 75 gpm in 1988.
Dauphin Island Water & Sewer Board	971	6	MOBUU-03	34.5	1988	Donald Smith Co., Inc	6	Qalt	5.8 1988	Casing: 20-in. from 0 to 21.5 ft, 12-in. from 0 to 22.5 ft. Screen: 12-in. from 22.5 to 32.5 ft. Drawdown 17.7 ft when pumped 48 hrs at 44 gpm in 1988.
Dauphin Island Water & Sewer Board	971	7	MOBUU-04	33	1988	Donald Smith Co., Inc	7	Qalt	6 1988	Casing: 20-in. from 0 to 20 ft, 12-in. from 0 to 21 ft. Screen: 12-in. from 21 to 31 ft. Drawdown 16 ft when pumped 48 hrs at 63 gpm in 1988.
Dauphin Island Water & Sewer Board	971	8	MOBUU-05	40	1992	Griner Drilling Service, Inc.	7	Qalt	7.22 1992	Casing: 24-in. from 0 to 22.65 ft, 12-in. from 0 to 23.65 ft. Screen: 12-in. from 23.65 to 33.65 ft. Drawdown 8.68 ft when pumped 24 hrs at 55 gpm in 1992.

Table 3.--Records of public water-supply wells in Area 13–Continued

System	PWS ID	SE ID	GSA ID	Depth	Year drilled	Drilling contractor	Altitude	Aquifer	Water level Date measured	Well construction, yield, remarks
Dauphin Island Water & Sewer Board	971	9	MOBUU-06	40	1992	Griner Drilling Service, Inc	7	Qalt	6.50 1992	Casing: 24-in. from 0 to 23.75 ft, 12-in. from 0 to 24.75 ft. Screen: 12-in. from 24.75 to 34.75 ft. Drawdown 6.30 ft when pumped 24 hrs at 55 gpm in 1992.
Dauphin Island Water & Sewer Board	971	10	MOBUU-07	40	1992	Griner Drilling Service, Inc	7	Qalt	6.75 1992	Casing: 24-in. from 0 to 25.10 ft, 12-in. from 0 to 26.10 ft. Screen: 12-in. from 26.10 to 36.10 ft. Drawdown 10.88 ft when pumped 24 hrs at 55 gpm in 1992.
Dauphin Island Water & Sewer Board	971	11	MOBUU-08	40	1992	Griner Drilling Service, Inc	8	Qalt	6.15 1992	Casing: 24-in. from 0 to 25.65 ft, 12-in. from 0 to 26.65 ft. Screen: 12-in. from 26.65 to 36.65 ft. Drawdown 10.83 ft when pumped 24 hrs at 55 gpm in 1992.

RELATED LINKS

http://www.adem.state.al.us/
Alabama Department of Environmental Management (ADEM)
ADEM administers all major federal environmental laws, including the Clean Air, Clean Water and Safe Drinking Water acts and federal solid and hazardous waste laws. Information regarding ADEM news, regulations, funded programs, and status of filings are available on this site.

http://www.epa.gov/OW
United States Environmental Protection Agency (EPA)
This is the home page of the EPA Office of Water. Information includes America's water resources, environmental programs and partnerships, monitoring, data, and tools, you and clean water, regulations and legislation, information resources, etc. Pages for EPA Water are maintained as well: Wetlands, Oceans, and Watersheds, Science and Technology, Wastewater Management, Groundwater and Drinking Water, etc. The various regional programs are also covered as well as EMAP Estuaries.

http://www.ga.nrcs.usda.gov/al/
United States Department of Agriculture (USDA)
The Natural Resources Conservation Service (NRCS) is the USDA agency that works at the local level to help people conserve all natural resources on private lands. USDA provides soil information and other agricultural information, including maps of soil types.

http://www.ngwa.org/
National Ground Water Association (NGWA)
NGWA operates the National Ground Water Information Center ®, the largest non-governmental clearinghouse on ground water science and well technology in the world, with more than 40,000 volumes. Ground Water On-Line ®, a nearly 80,000 citation bibliographic database of ground water literature is available at no cost to NGWA members. A database of standards, guidelines, criteria, practices and procedures is also available at the Web site.

http://www.gsa.state.al.us
Geological Survey of Alabama (GSA)
The Geological Survey of Alabama, established in 1848, is a data gathering and research agency that explores and evaluates the mineral, water, energy, biological, and other natural resources of the State of Alabama and conducts basic and applied research in these fields as a public service to citizens of the State.

http://water.usgs.gov/
United States Geological Survey (USGS)
This site is the http server Water Division home page. It contains links to information from the water, geologic, and mapping divisions. USGS fact sheets, information releases, publications, data products, etc. are available. Information on GIS and the National Spatial Data Infrastructure is also included. Contact information for USGS resources (maps, etc.) Is given as well as the USGS telephone book. Links to other USGS sites on-line are available.

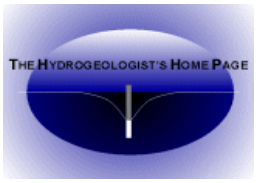
http://www.uwin.siu.edu:80/dir_search/index.html
Universities Water Information Network (UWIN)
UWIN maintains several databases for providing water information. Over 100 different water related links are listed by categories.

http://gwpc.site.net/
Ground Water Protection Council (GWPC)
The Ground Water Protection Council is a nonprofit (501(c)3) organization whose members consist of state and federal ground water agencies, industry representatives, environmentalists and concerned citizens, all of whom come together within the GWPC organization to mutually work toward the protection of the nation's ground water supplies.

http://www.gwrtac.org
Ground-Water Remediation Technologies Analysis Center (GWRTAC)
The Ground-Water Remediation Technologies Analysis Center compiles, analyzes, and disseminates information on innovative ground-water remediation technologies. GWRTAC prepares reports by technical teams selectively chosen from Concurrent Technologies Corporation (CTC), the University of Pittsburgh, and other supporting institutions, and also maintains an active outreach program.

http://www.fws.gov/
U.S. Fish & Wildlife Service (FWS)
This site has general information, news releases, and employment information for the Fish and Wildlife Services. Pages on FWS activities such as Conservation Programs, Endangered Species, Contaminants, Federal Aid to States, Fire Management, Fisheries, Migratory Birds and Waterfowl, National Wildlife Refuge System, Wetlands, Wildlife Law, and Wildlife Species are included. Pages for the various FWS Regions are also incorporated.

http://hermes.ecn.purdue.edu:8001/server/water/water.html
National Extension Water Quality Database
This site allows for searches in a database that has 2,500 abstracts and 1,500 documents on all aspects of water quality. The documents are full text and list available contacts. Also available are Quick Time Movies.



http://www.TheHydrogeologist.com/
This page is a collection of hundreds of links to hydrogeological organizations, software and data repositories, publications, and other resources of potential use to hydrogeologists.

http://www.nws.noaa.gov/oh/

The Office of Hydrology serves as a primary link between the National Weather Service Headquarters and the hydrologic field service programs. Activities include development of hydrologic models, hydrologic data for rivers and flood forecasts, warnings, and water supply forecasts. Current and Historical Data include floods, hydrologic conditions, and water supply outlooks. Data systems available online are HADS (a real time hydrological and meteorological data acquisition and distribution system) and INFLOWS (Integrated Flood Observing and Warning System). Full text handbooks, reports, and user manuals are available. Information on forecast systems are also available.

Published by

GEOLOGICAL SURVEY OF ALABAMA

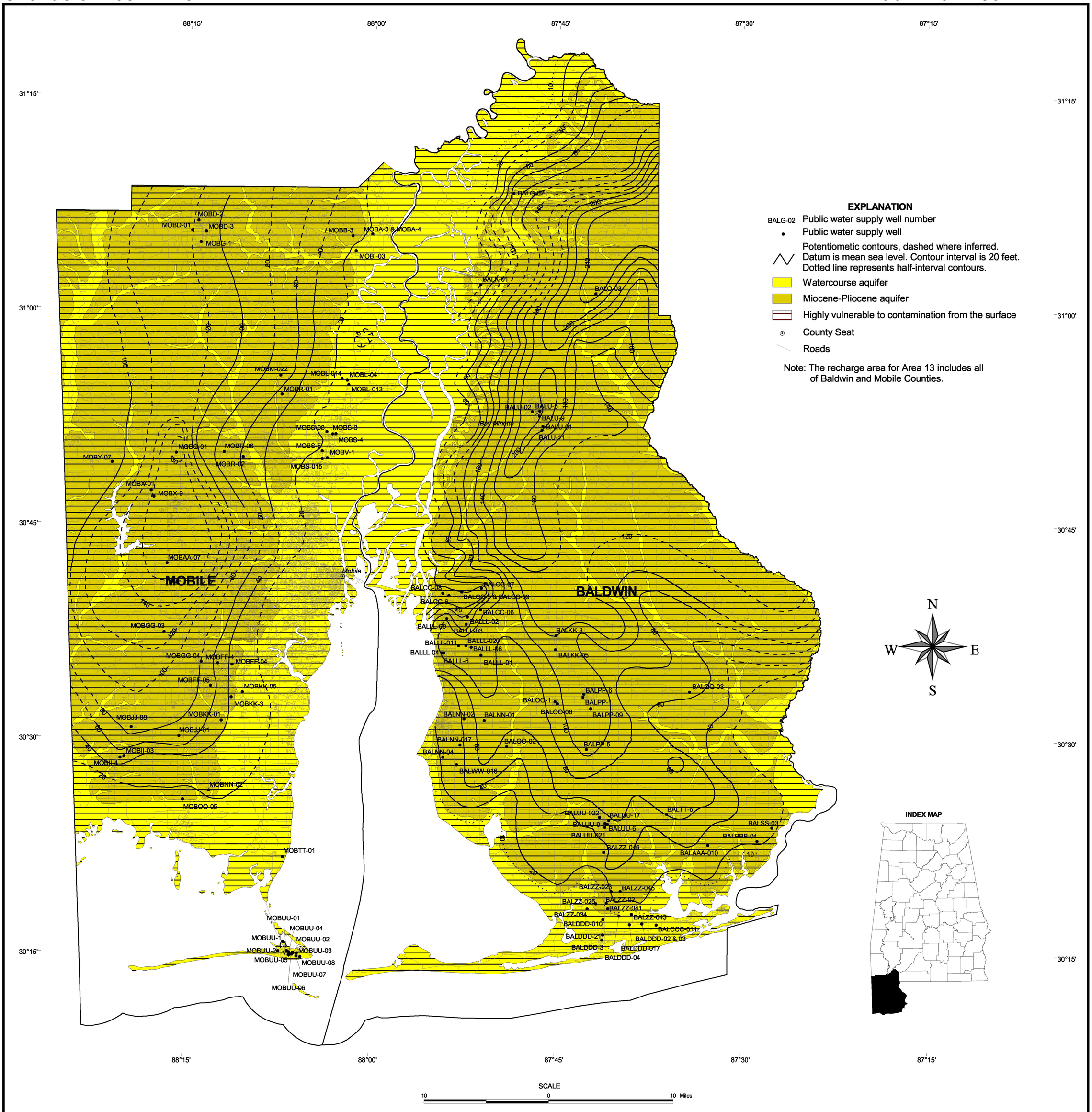
Serving Alabama since 1848

Donald F. Oltz, State Geologist

For additional copies write:
Publication Sales Office
P.O. Box 869999
Tuscaloosa, Alabama 35486-6999

Telephone 205/349-2852

A complete list of Geological Survey of Alabama and Oil and Gas Board publications can be obtained at the Publication Sales Office or through our web page at
http://www.gsa.state.al.us/



AQUIFER RECHARGE AREAS, AREA OF VULNERABILITY, POTENTIOMETRIC SURFACE OF MAJOR AQUIFERS, AND LOCATIONS OF PUBLIC WATER SUPPLY WELLS IN AREA 13

By Blakeney Gillett and Dorothy E. Raymond
(modified in part from Robinson and others, 1996)

2000

STATE OF ALABAMA
GEOLOGICAL SURVEY
DONALD F. OLTZ
State Geologist

GIS by Douglas R. Taylor and Ruth T. Collier

88°15' 88°00' 87°45' 87°30' 87°15'

31°15' 31°00' 30°45' 30°30' 30°15'

C

A

D-01

M-022

R-02

X-012

MOBILE

AA-07

AA-06

GG-03

KK-3

Bayou La Batre

TT-01

UU-1

B76#1

A'

Mobile

B

O-03

Bay Minette

U-11

Y-01

KK-06

BALDWIN

PP-09

UU-22

ZZ-044

TW-8

C'

B'

EXPLANATION

O-03 Public water supply well number

Public water supply well

Quaternary

- Alluvial, coastal, and low terrace deposits
- High terrace deposits

Tertiary

- Citronelle Formation
- Miocene Series undifferentiated

A—A' Line of cross section

County Seat

N W E S

INDEX MAP

SCALE

10 0 10 Miles

GEOLOGY AND LOCATIONS OF GEOLOGIC CROSS SECTIONS IN AREA 13

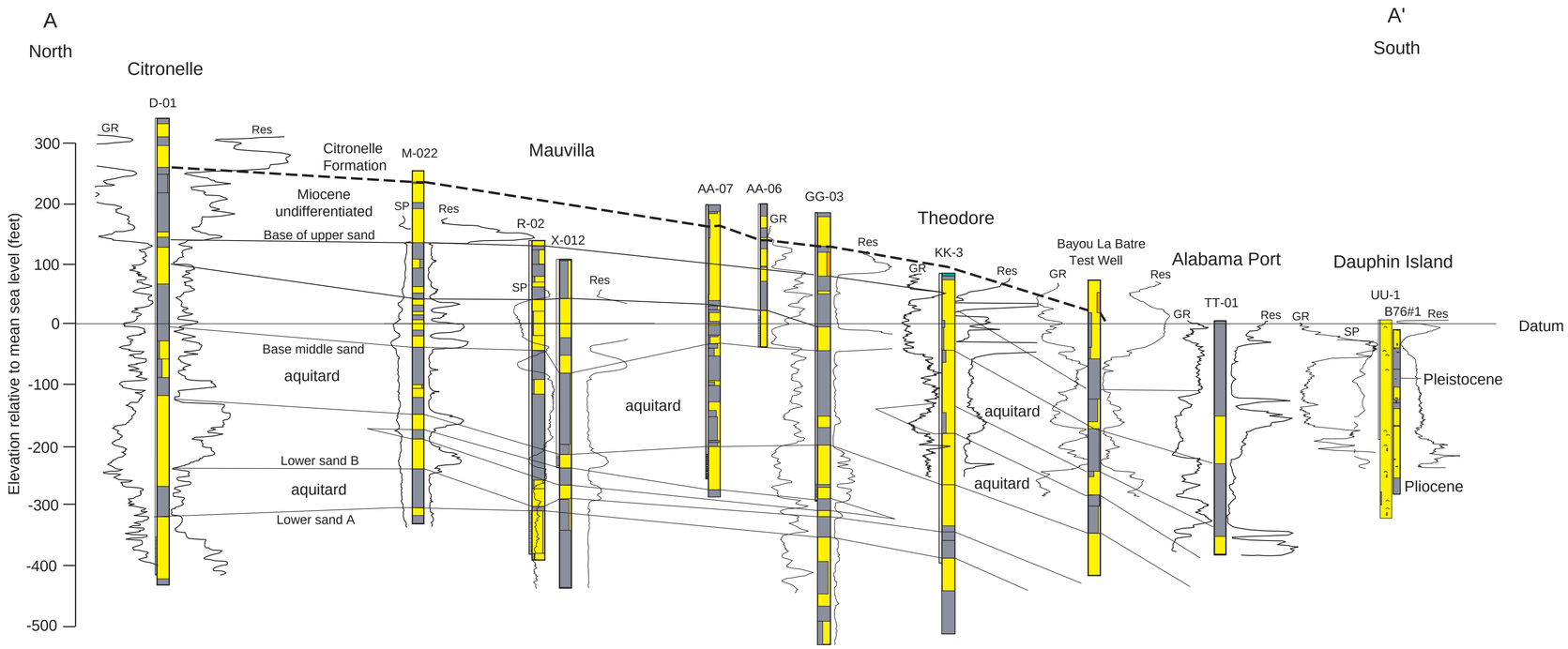
Geology from Szabo and Copeland (1988)

2000

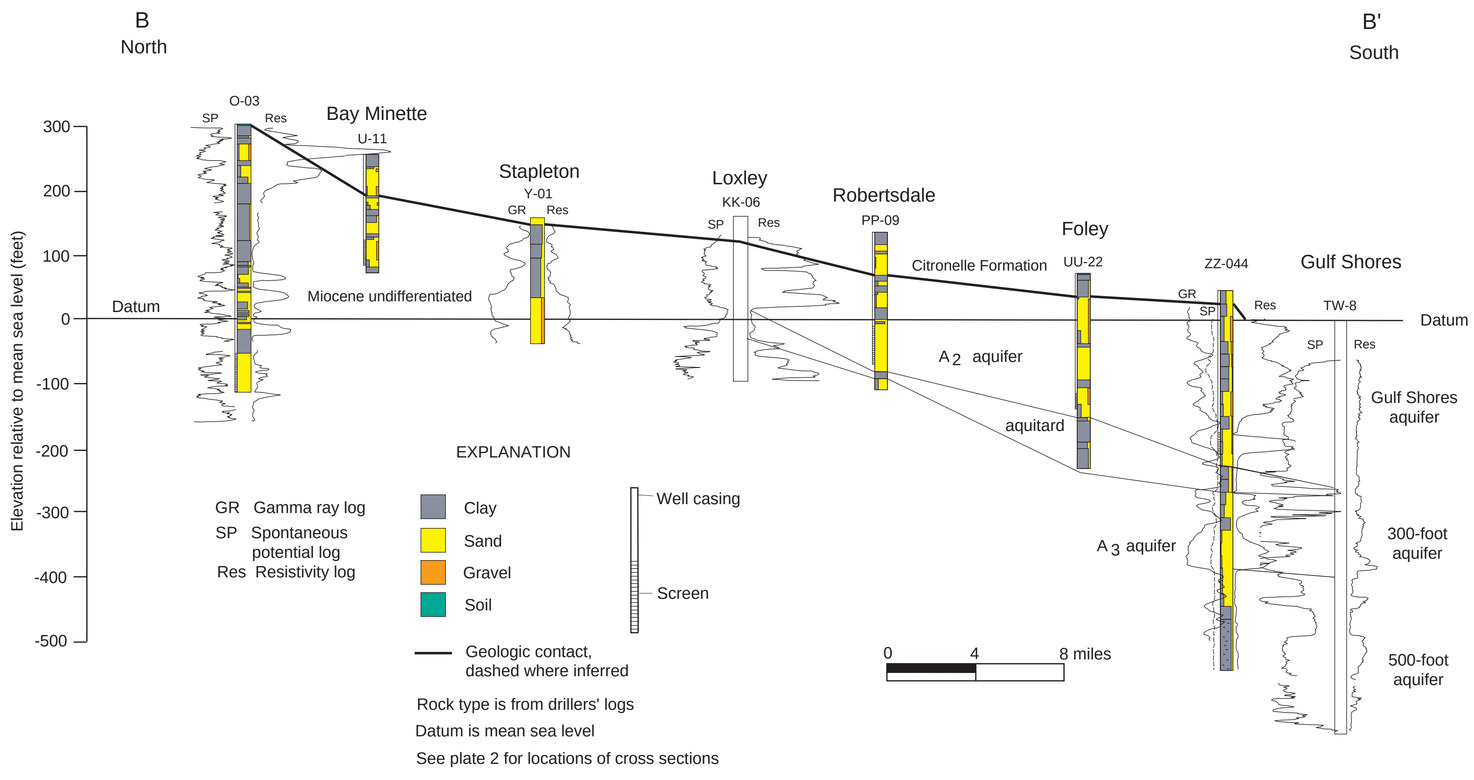
STATE OF ALABAMA GEOLOGICAL SURVEY

DONALD F. OLTZ
State Geologist

GIS by Douglas R. Taylor and Ruth T. Collier



Hydrogeologic Cross Section of Mobile County, Alabama



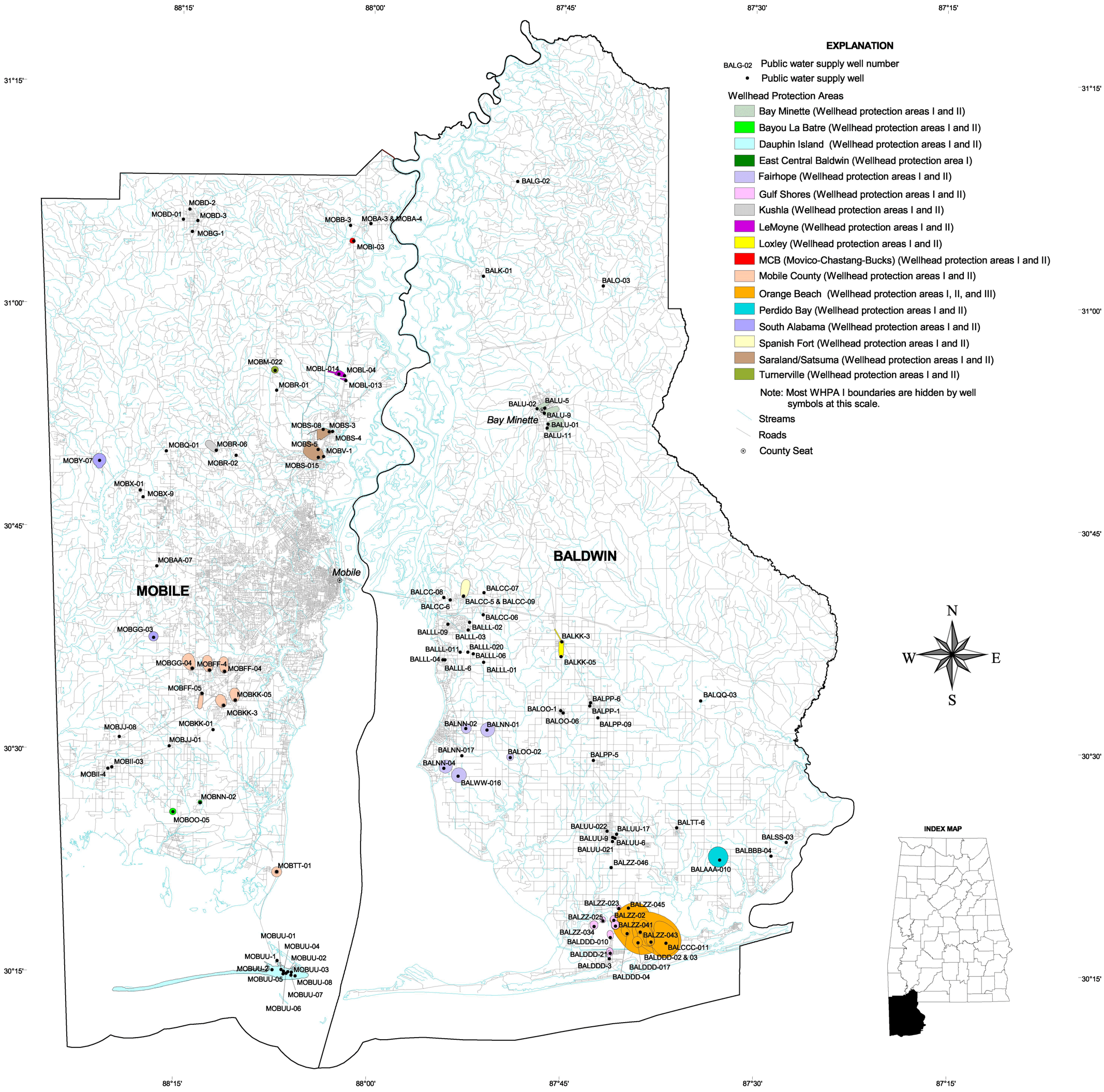
Hydrogeologic Cross Section of Baldwin County, Alabama

HYDROGEOLOGIC CROSS SECTIONS OF THE MIOCENE-PLIOCENE AQUIFER FOR BALDWIN AND MOBILE COUNTIES, ALABAMA

By
Dorothy E. Raymond and Blakeney Gillett
2000

STATE OF ALABAMA
GEOLOGICAL SURVEY

Donald F. Oltz
State Geologist



LOCATIONS OF PUBLIC WATER SUPPLY WELLS AND WELLHEAD PROTECTION AREAS DELINEATED IN AREA 13

By Blakeney Gillett

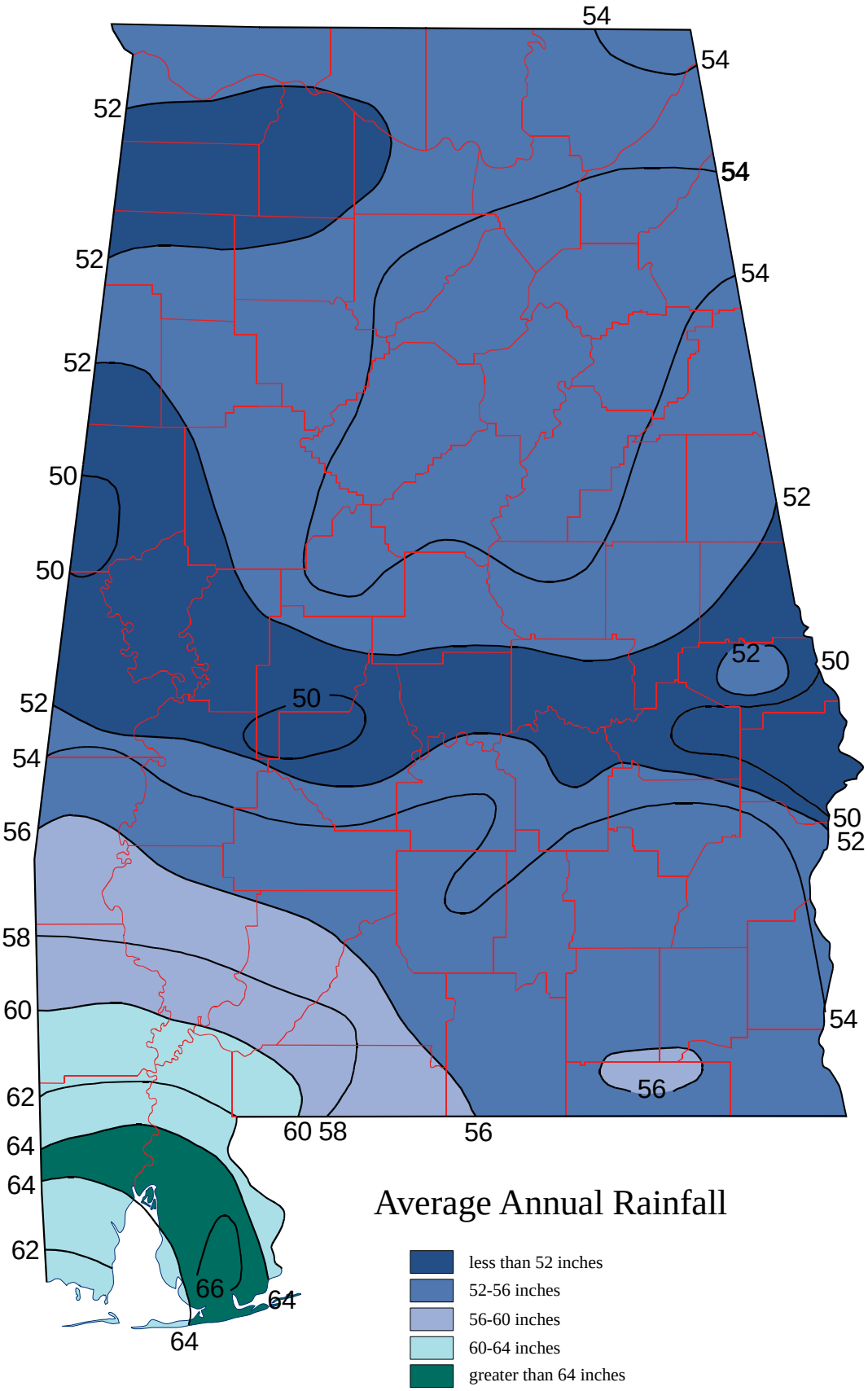
2000

STATE OF ALABAMA
GEOLOGICAL SURVEY
DONALD F. OLTZ
State Geologist

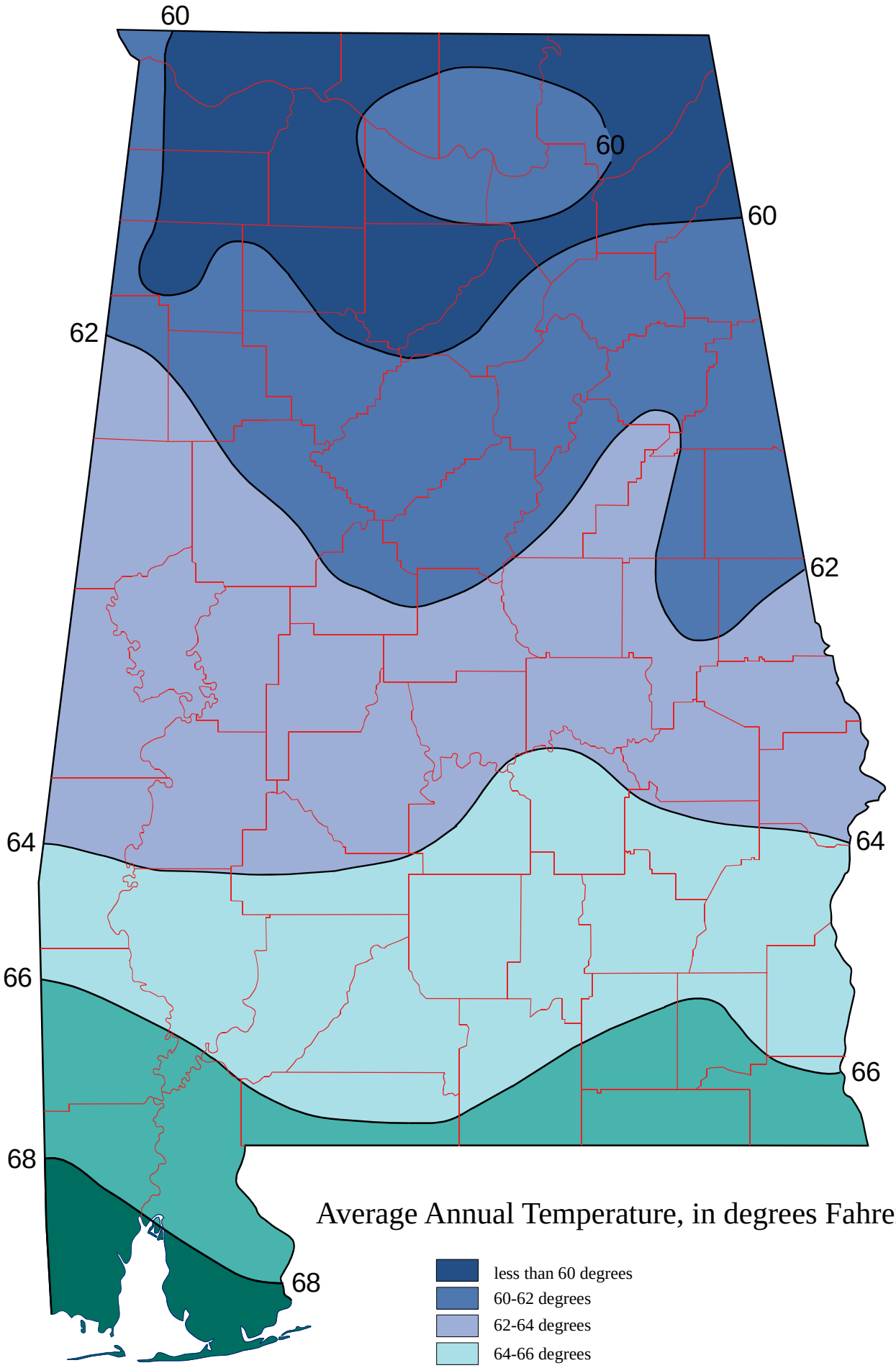
GIS by Ruth T. Collier

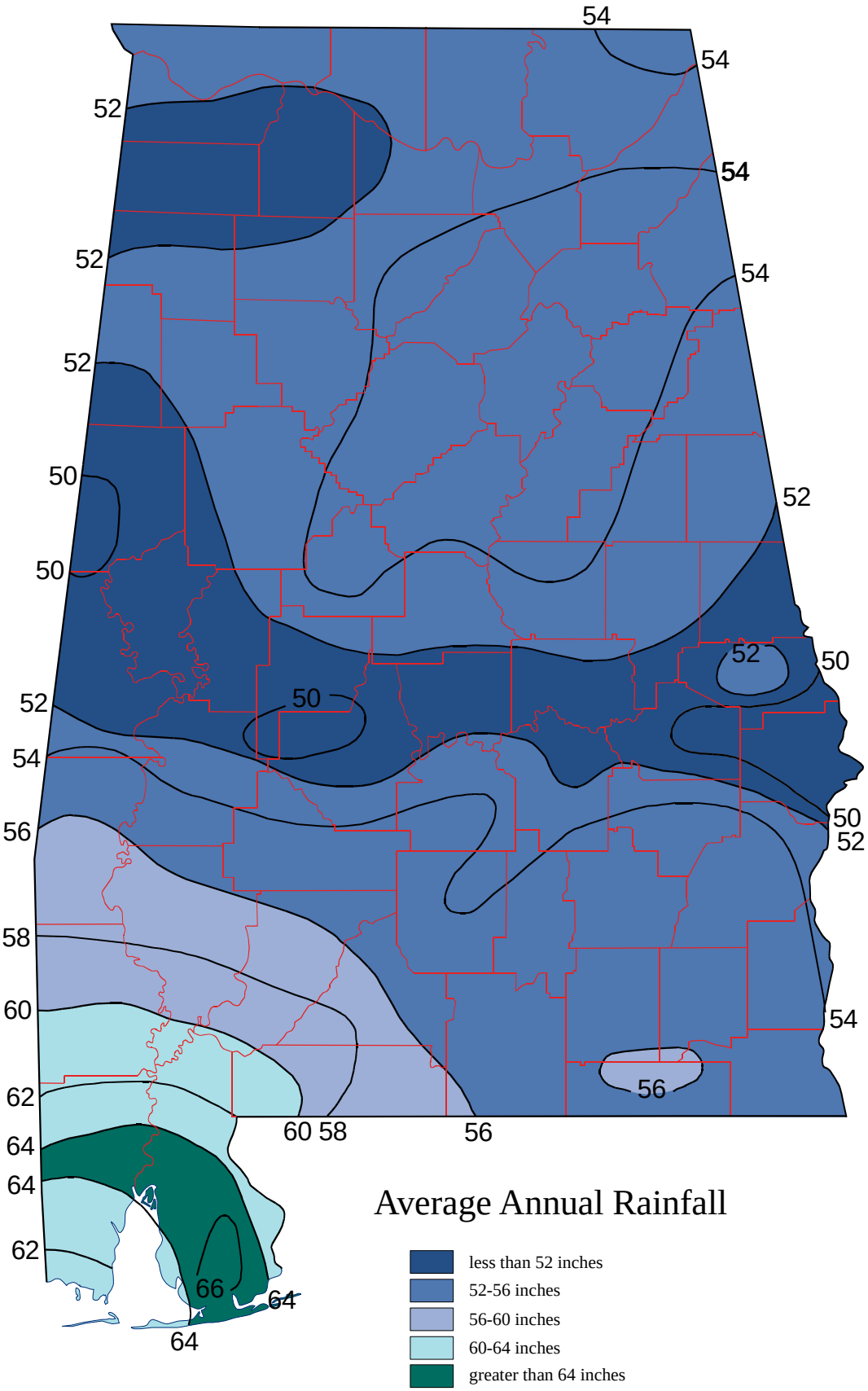
APPENDIX C

CLIMATE & PRECIPITATION

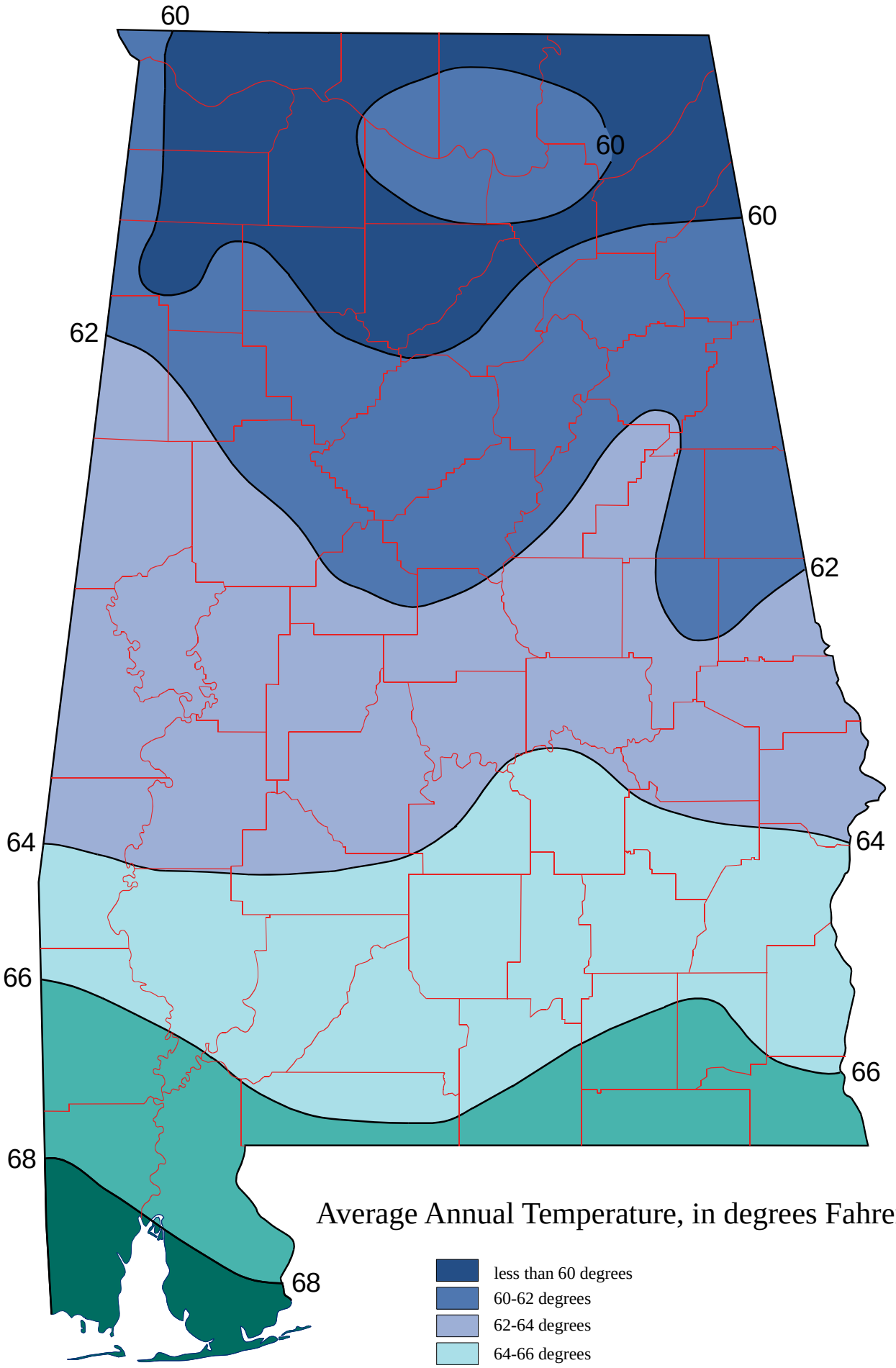


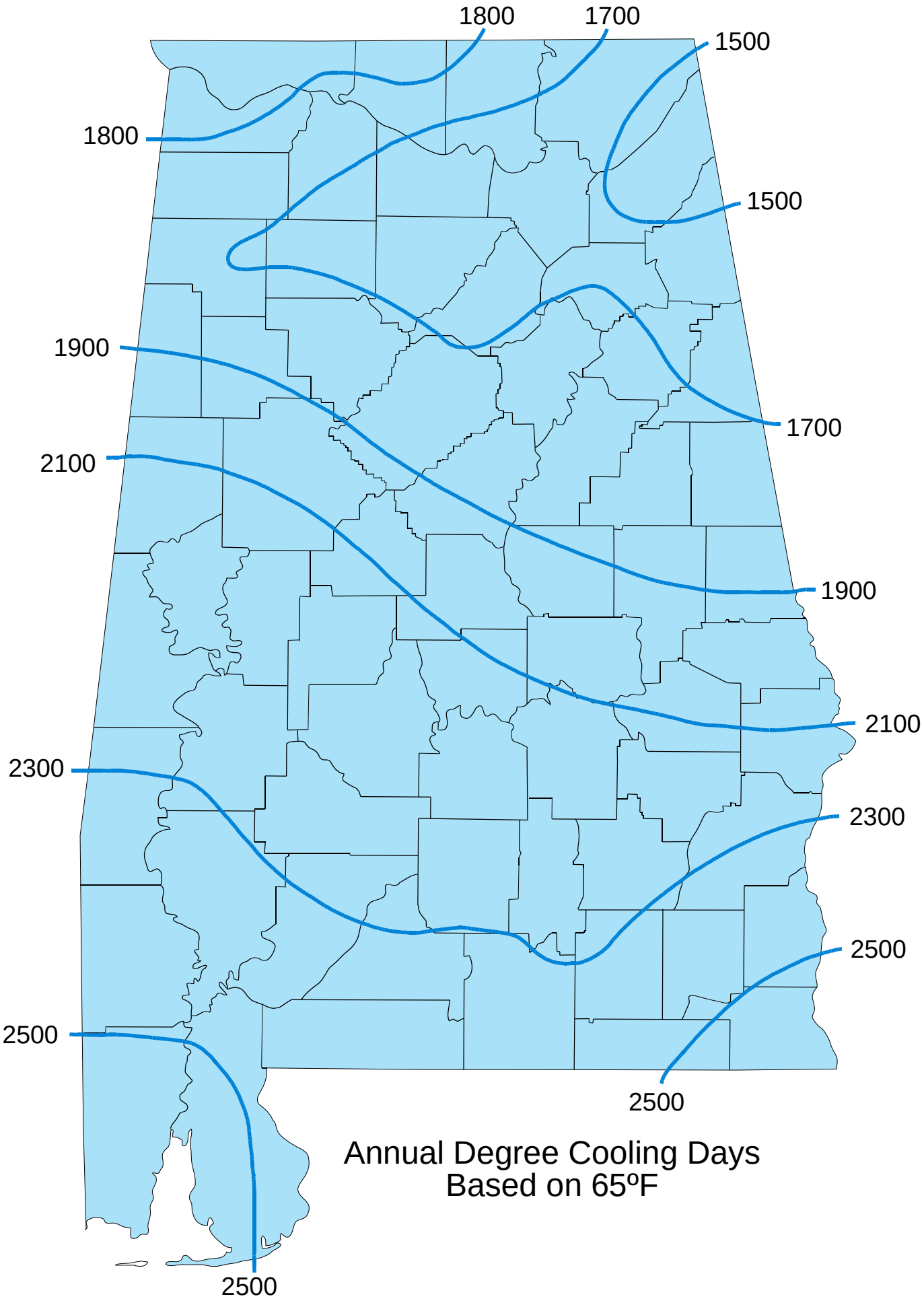
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama


60
60
60
62
62
64
64
66
66
68
68
Average Annual Temperature, in degrees Fahrenheit
less than 60 degrees
60-62 degrees
62-64 degrees
64-66 degrees
66-68 degrees
greater than 68 degrees
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama



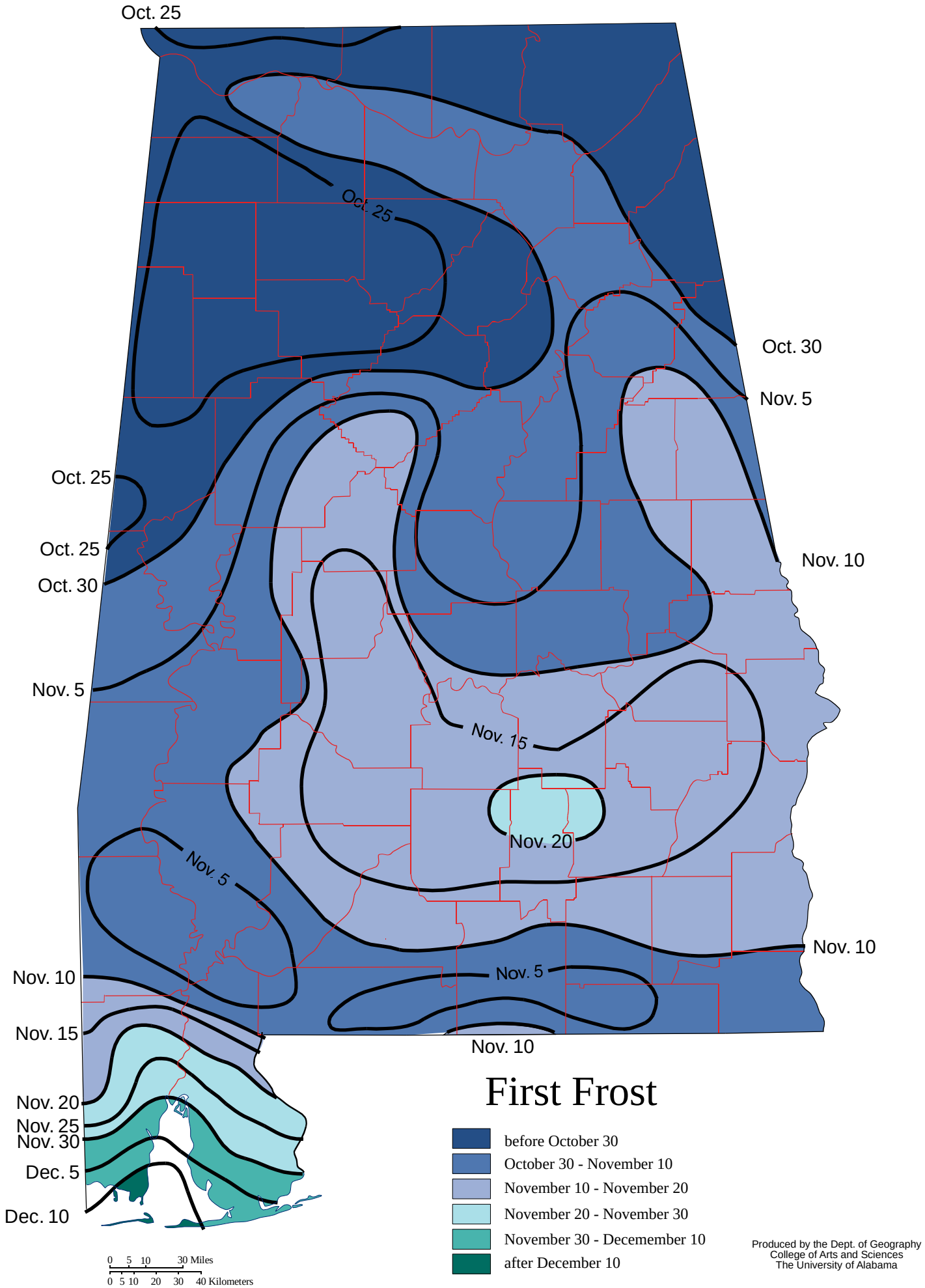
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

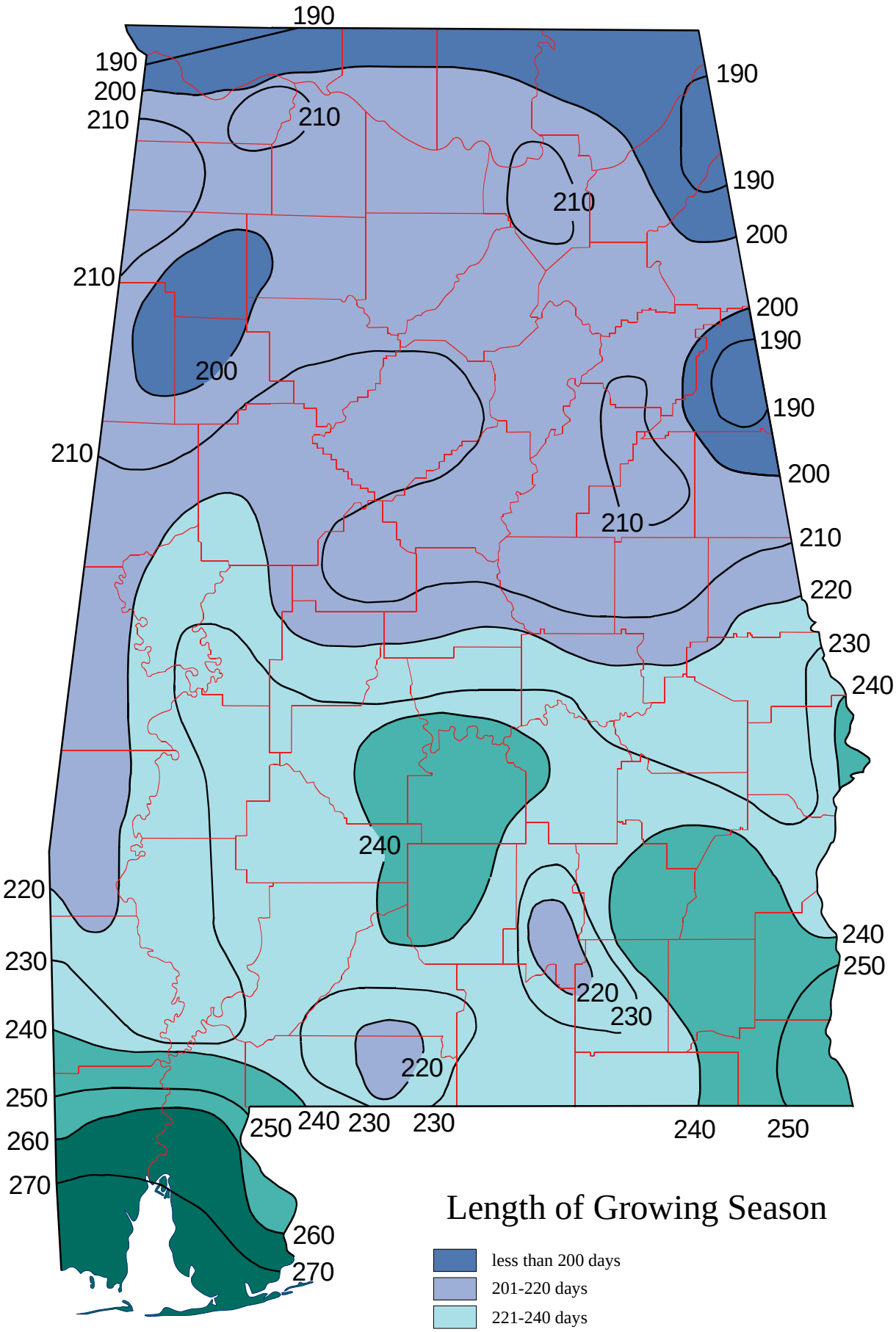

60
60
60
62
62
64
64
66
66
68
68
Average Annual Temperature, in degrees Fahrenheit
less than 60 degrees
60-62 degrees
62-64 degrees
64-66 degrees
66-68 degrees
greater than 68 degrees
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

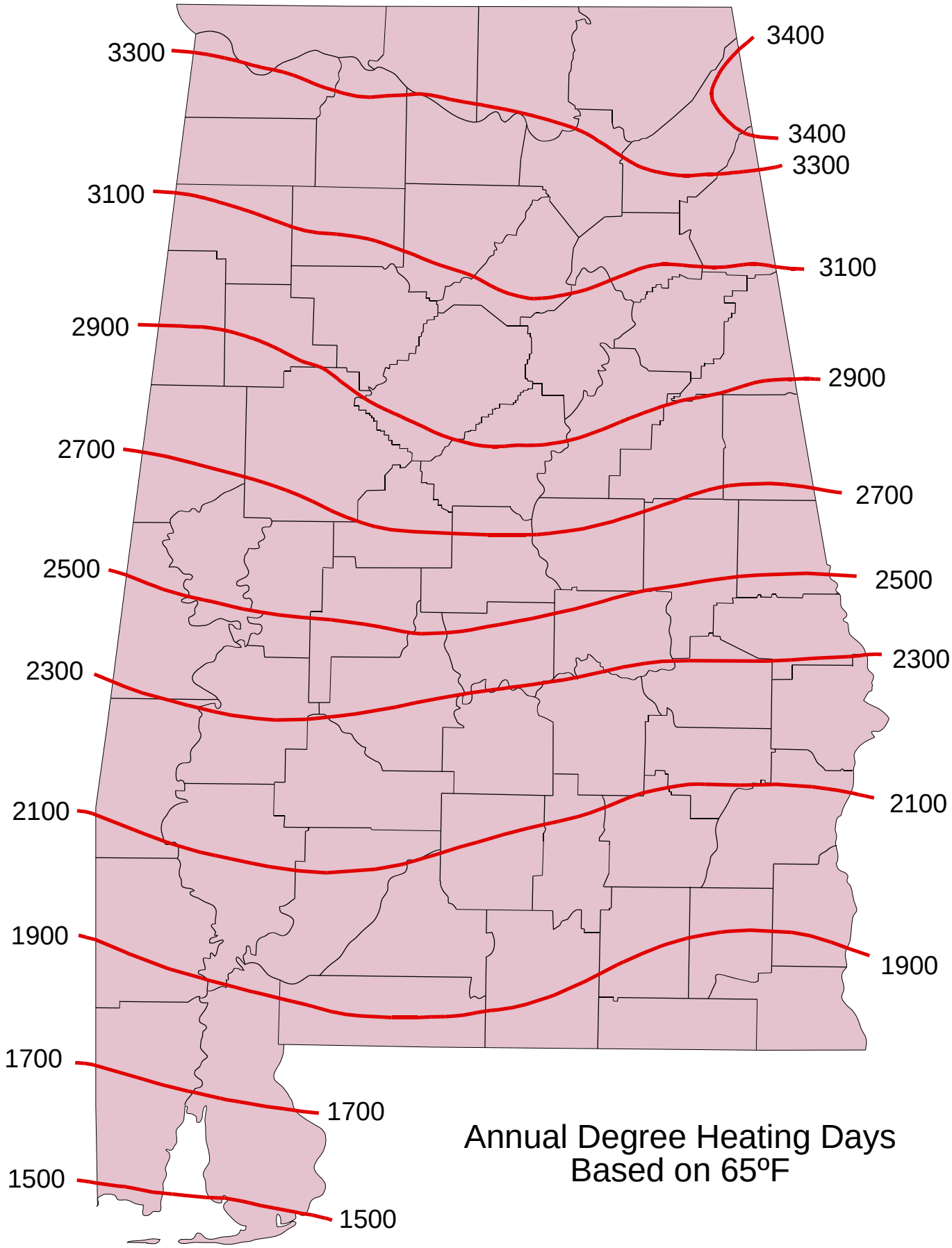


Annual Degree Cooling Days
Based on 65ºF

Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama


Oct. 25
Oct. 25
Oct. 30
Nov. 5
Oct. 25
Oct. 25
Oct. 30
Nov. 10
Nov. 5
Nov. 15
Nov. 20
Nov. 5
Nov. 10
Nov. 5
Nov. 10
Nov. 10
Nov. 15
Nov. 20
Nov. 25
Nov. 30
Dec. 5
Dec. 10
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
First Frost
before October 30
October 30 - November 10
November 10 - November 20
November 20 - November 30
November 30 - Decemember 10
after December 10
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

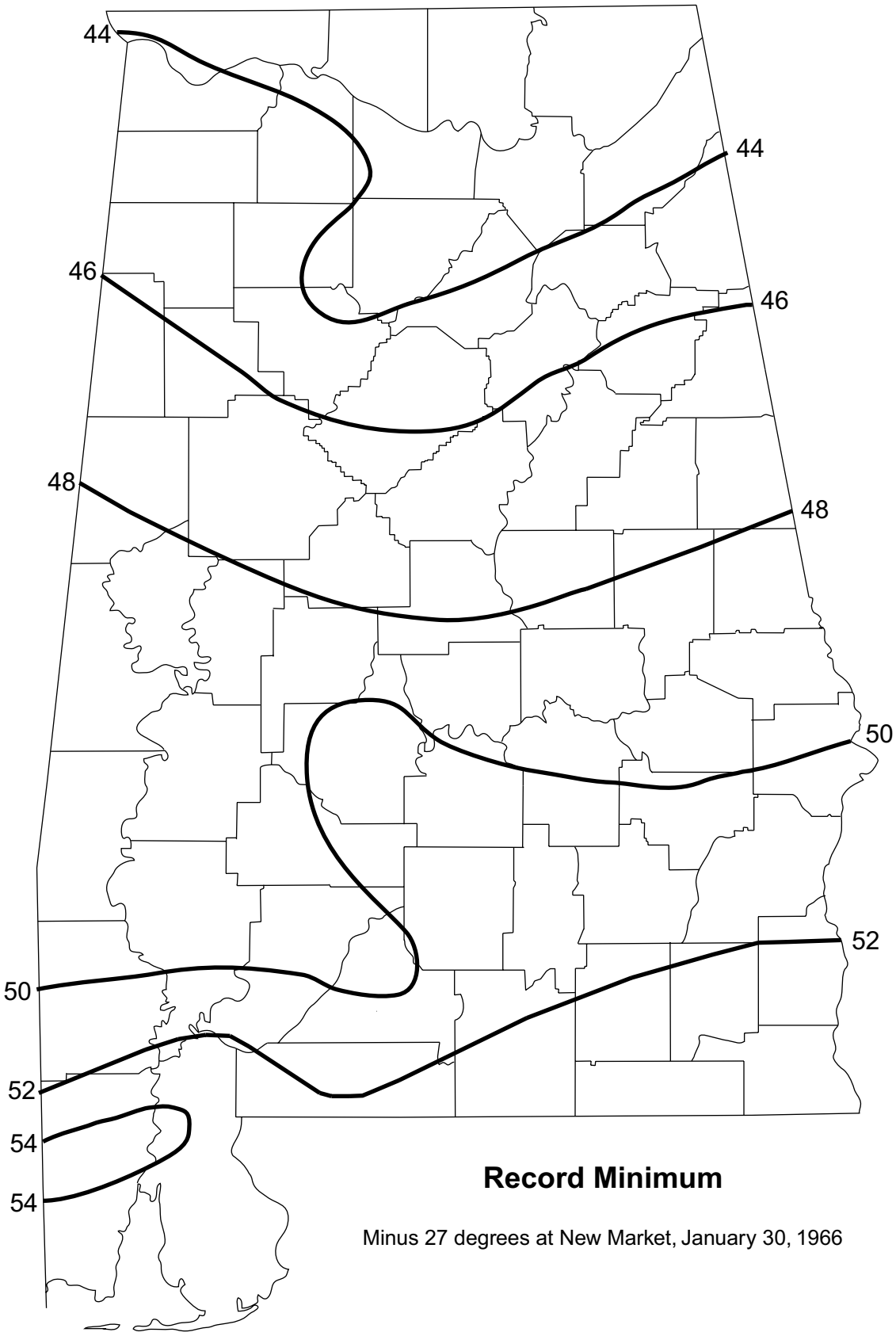

190
190
200
210
210
190
210
190
200
210
200
200
190
190
210
200
210
210
220
230
240
240
220
230
240
250
220
230
240
220
250
240
230
230
240
250
250
260
270
260
270
Length of Growing Season
less than 200 days
201-220 days
221-240 days
241-260 days
greater than 260 days
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama



Annual Degree Heating Days
Based on 65ºF

Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

Average January Temperature
(Degrees Fahrenheit)



Record Minimum

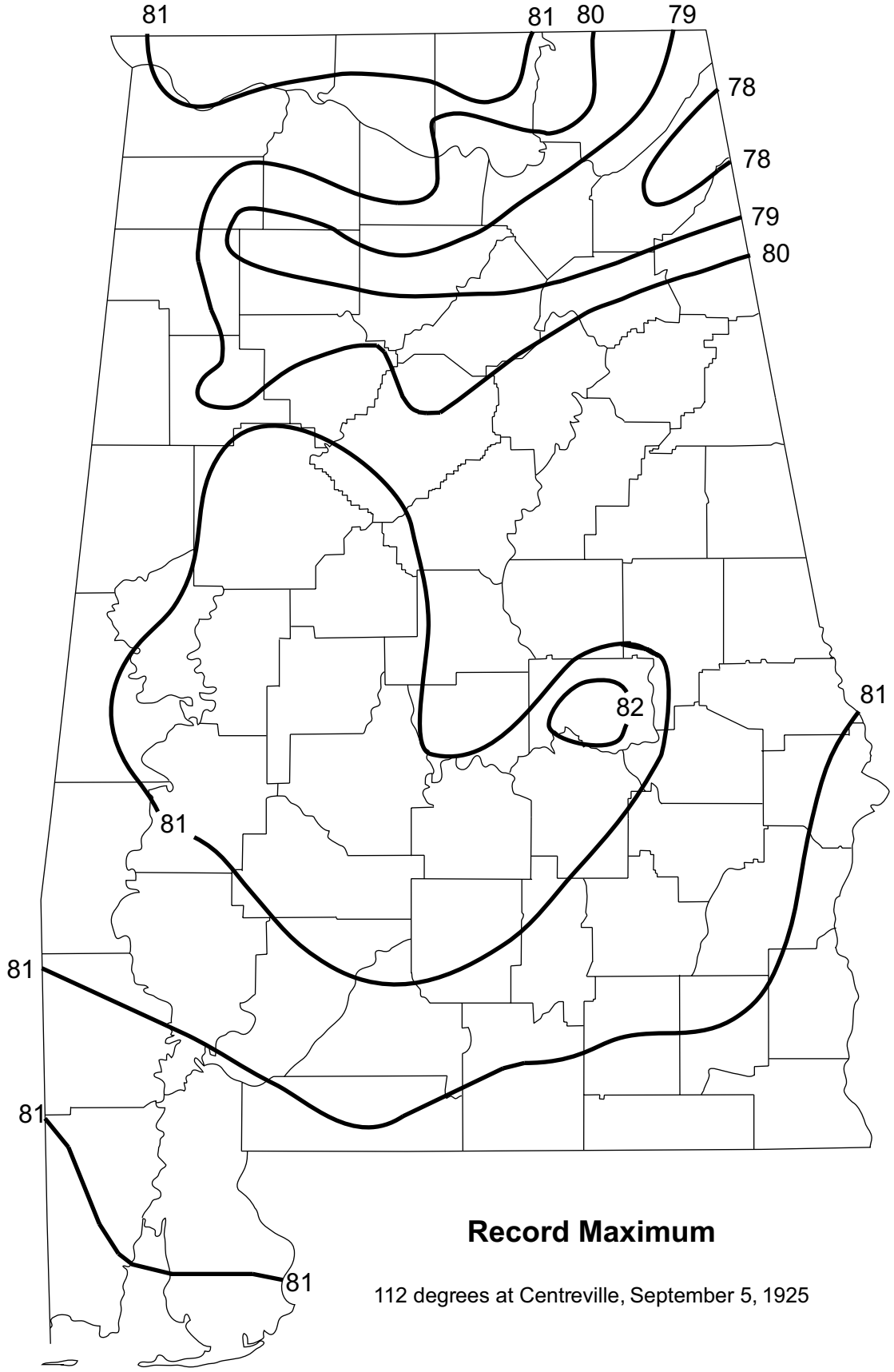
Minus 27 degrees at New Market, January 30, 1966

Source: National Weather Service

Produced by the Cartographic Research Lab
Department of Geography
University of Alabama

Average July Temperature

(Degrees Fahrenheit)

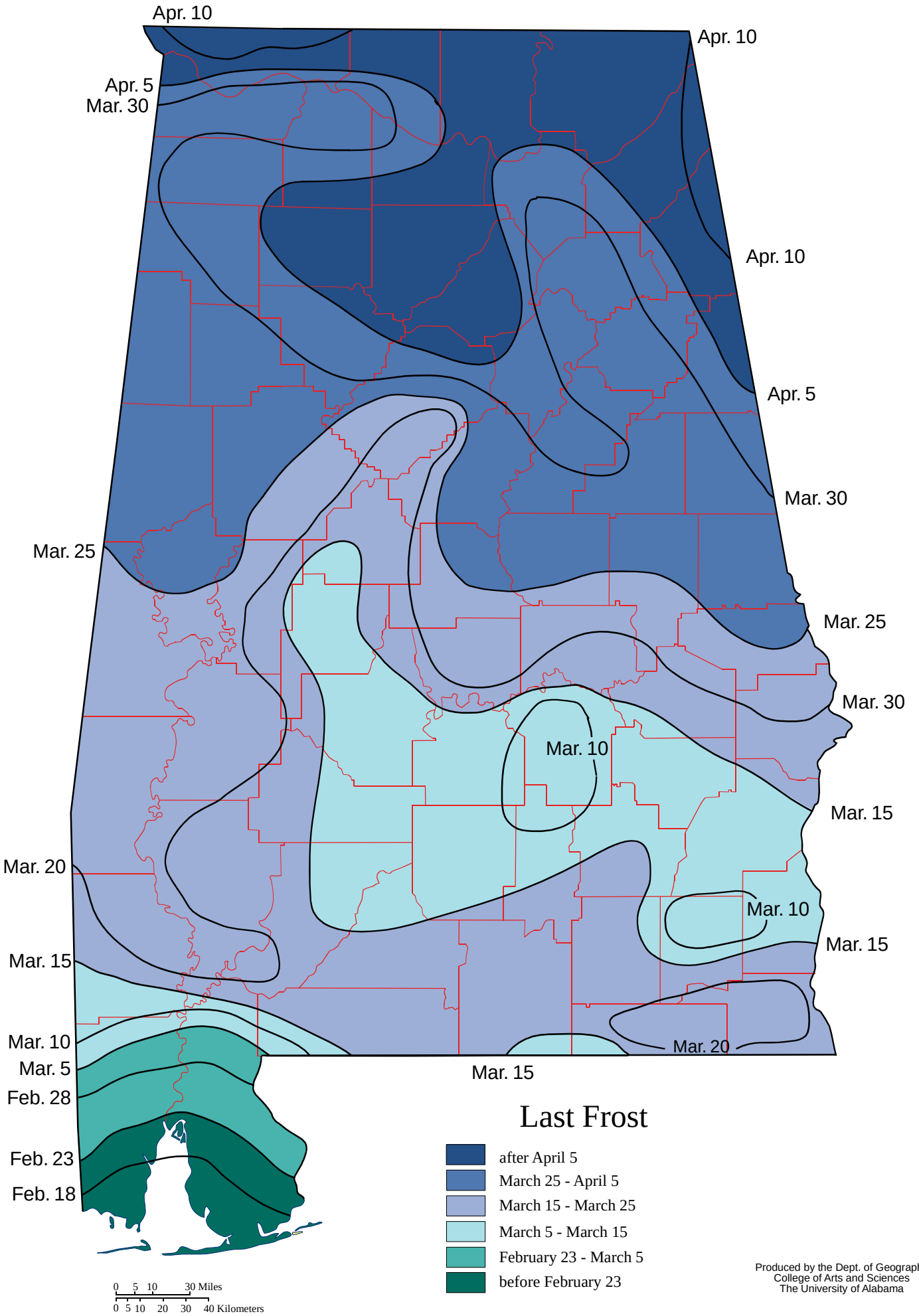


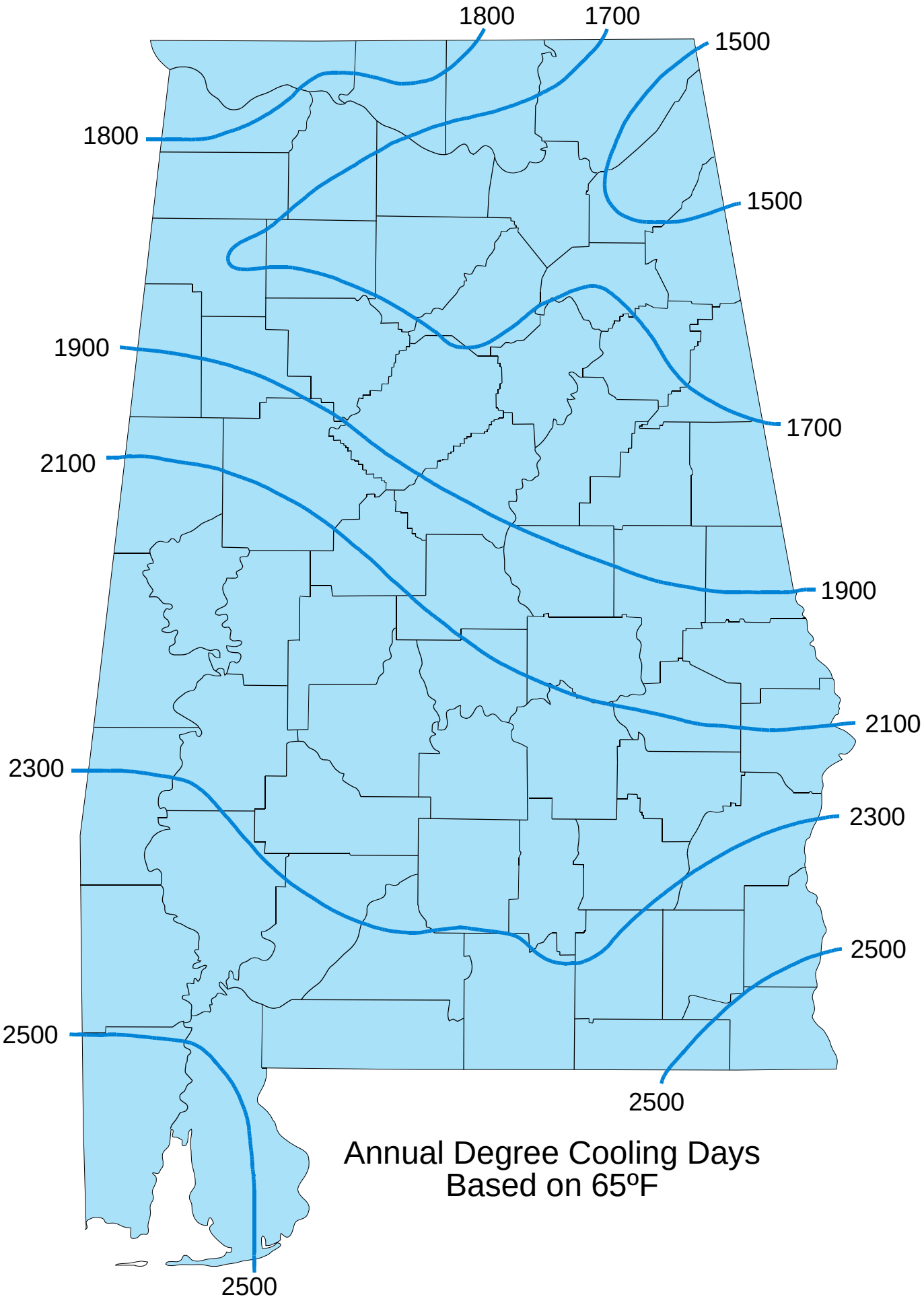
Record Maximum

112 degrees at Centreville, September 5, 1925

Source: National Weather Service

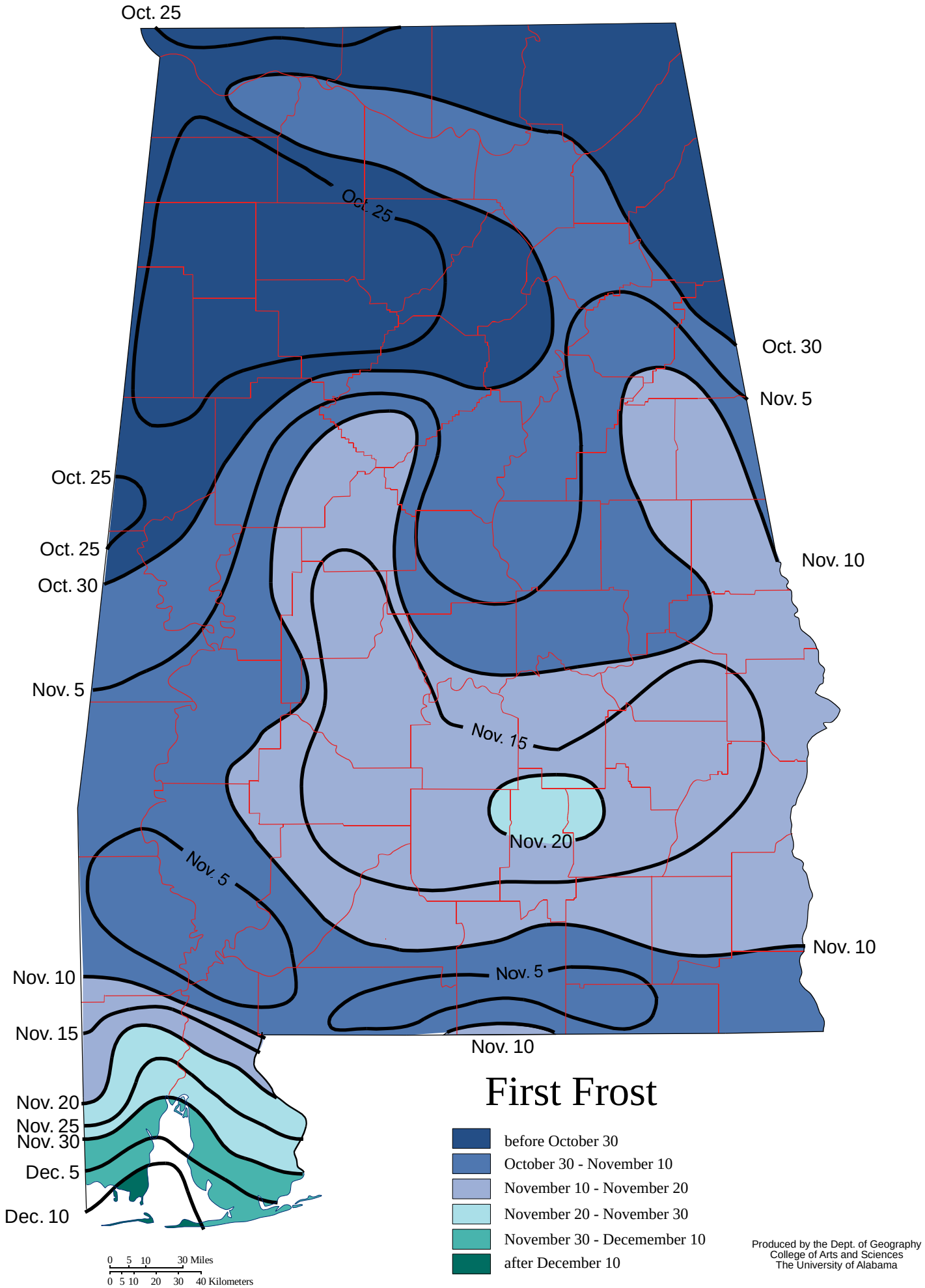
Produced by the Cartographic Research Lab
Department of Geography
University of Alabama

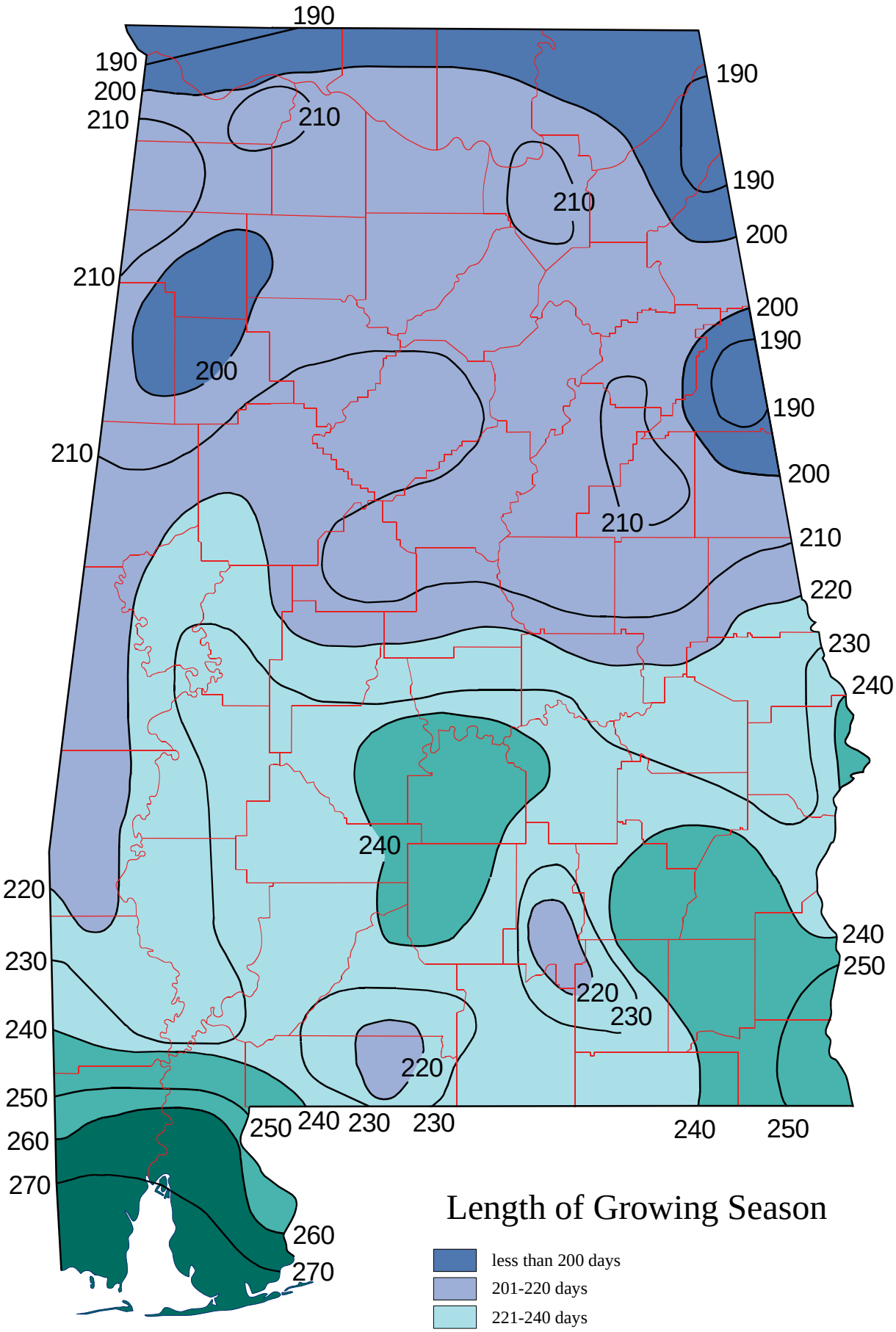

Apr. 10
Apr. 10
Apr. 5
Mar. 30
Apr. 10
Apr. 5
Mar. 30
Mar. 25
Mar. 25
Mar. 30
Mar. 10
Mar. 15
Mar. 20
Mar. 10
Mar. 15
Mar. 15
Mar. 10
Mar. 5
Feb. 28
Mar. 20
Feb. 23
Feb. 18
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
Last Frost
after April 5
March 25 - April 5
March 15 - March 25
March 5 - March 15
February 23 - March 5
before February 23
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

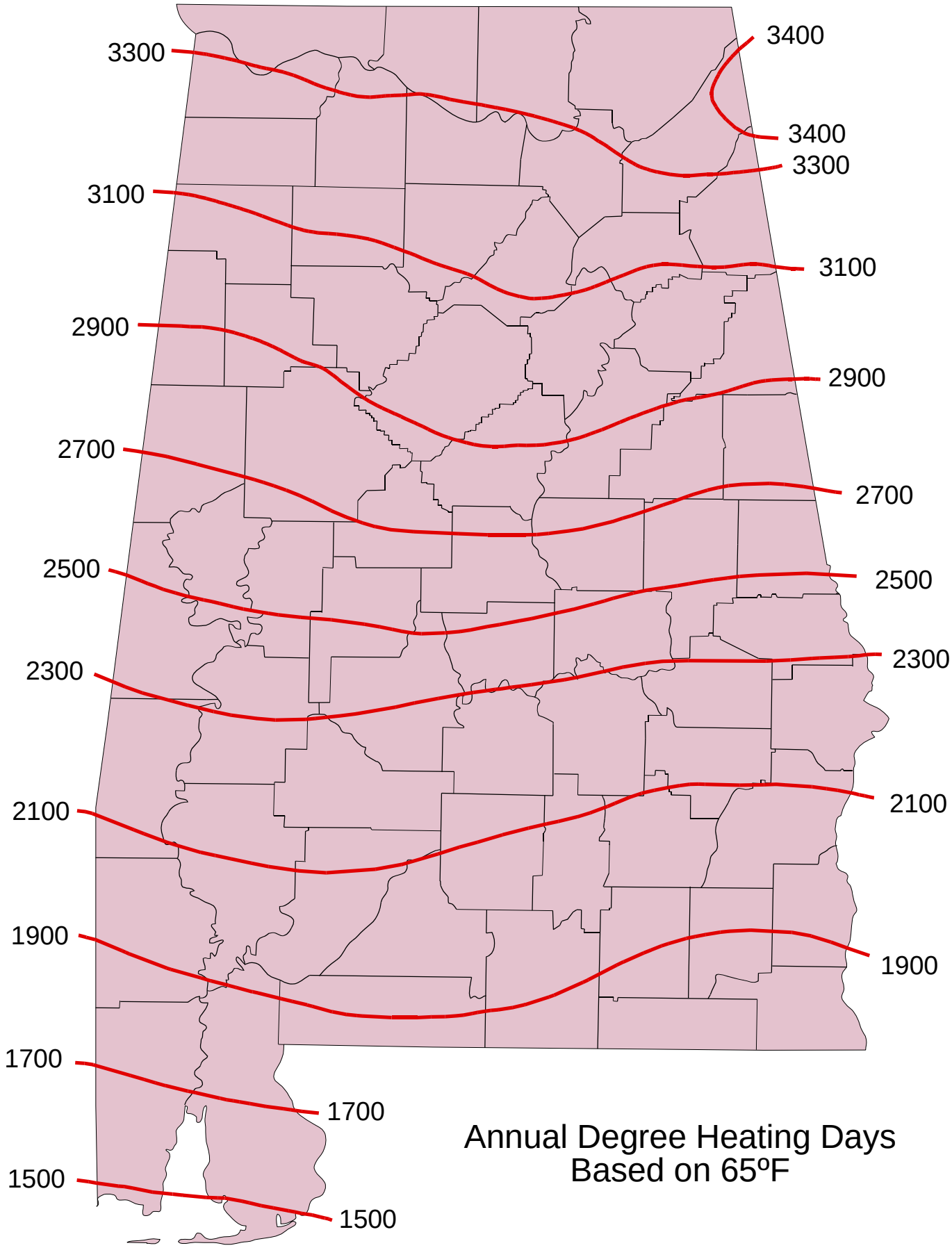


Annual Degree Cooling Days
Based on 65ºF

Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama


Oct. 25
Oct. 25
Oct. 30
Nov. 5
Oct. 25
Oct. 25
Oct. 30
Nov. 10
Nov. 5
Nov. 15
Nov. 20
Nov. 5
Nov. 10
Nov. 5
Nov. 10
Nov. 10
Nov. 15
Nov. 20
Nov. 25
Nov. 30
Dec. 5
Dec. 10
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
First Frost
before October 30
October 30 - November 10
November 10 - November 20
November 20 - November 30
November 30 - Decemember 10
after December 10
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

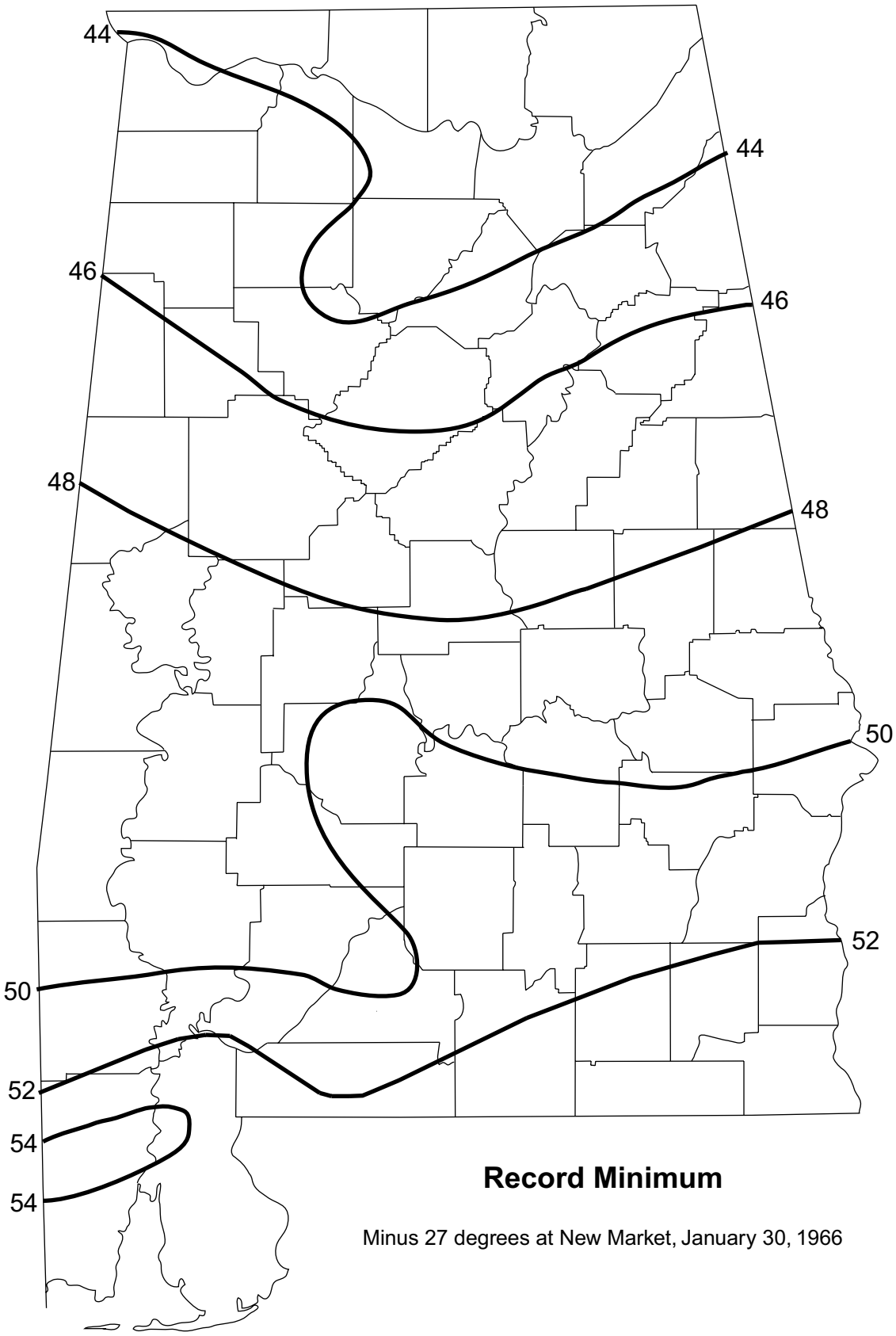

190
190
200
210
210
190
210
190
200
210
200
200
190
190
210
200
210
210
220
230
240
240
220
230
240
250
220
230
240
220
250
240
230
230
240
250
250
260
270
260
270
Length of Growing Season
less than 200 days
201-220 days
221-240 days
241-260 days
greater than 260 days
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama



Annual Degree Heating Days
Based on 65ºF

Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

Average January Temperature
(Degrees Fahrenheit)



Record Minimum

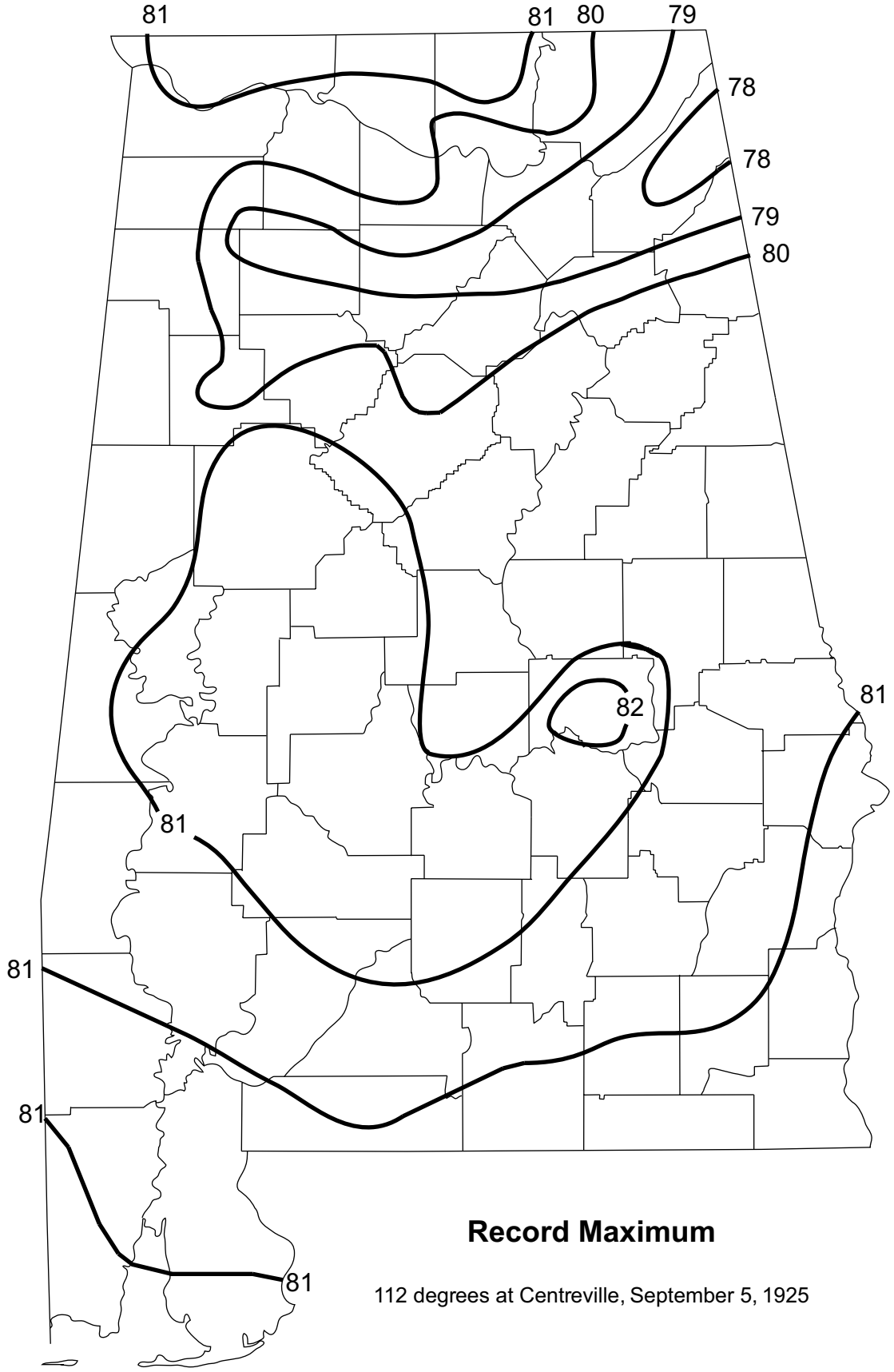
Minus 27 degrees at New Market, January 30, 1966

Source: National Weather Service

Produced by the Cartographic Research Lab
Department of Geography
University of Alabama

Average July Temperature

(Degrees Fahrenheit)

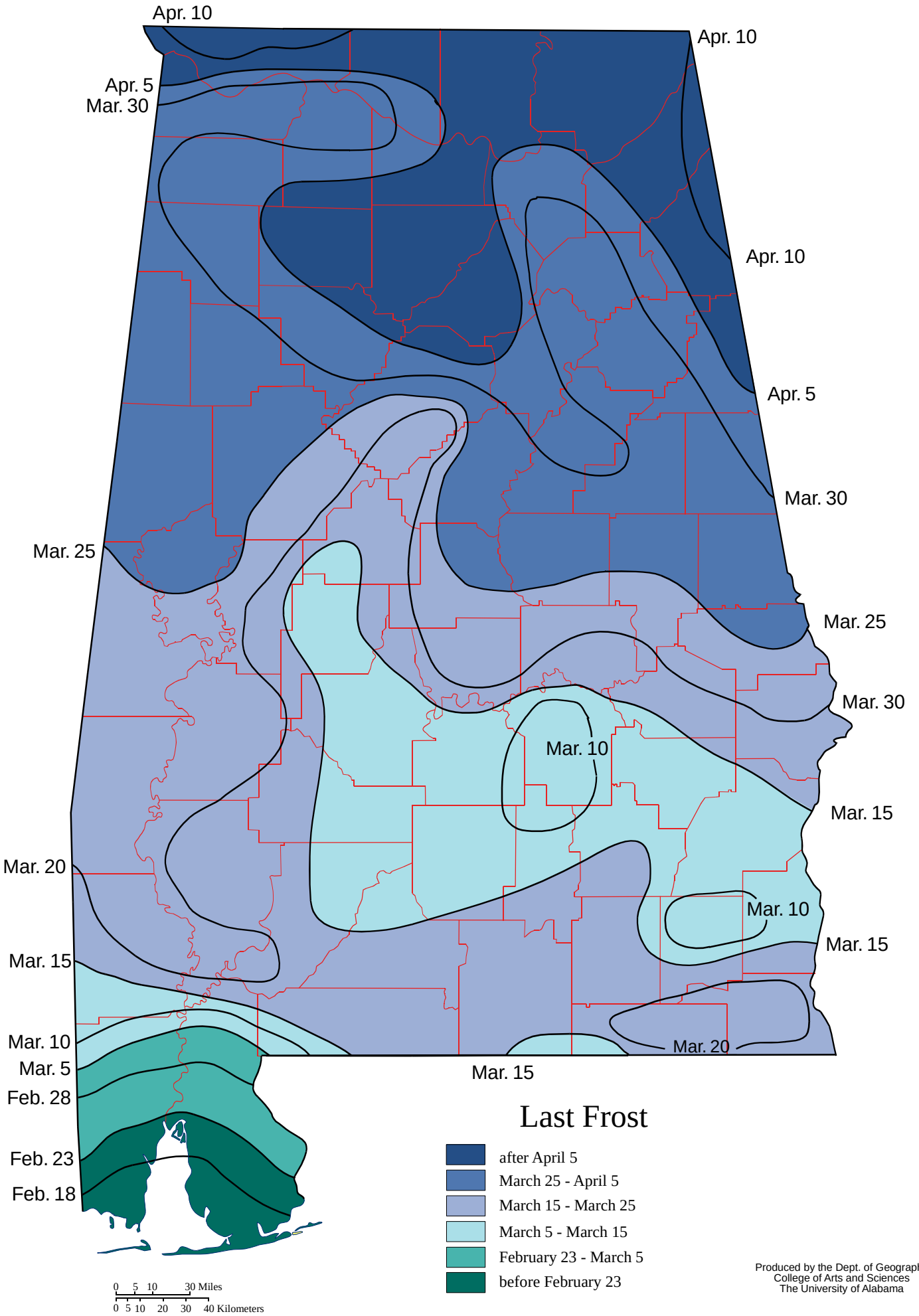


Record Maximum

112 degrees at Centreville, September 5, 1925

Source: National Weather Service

Produced by the Cartographic Research Lab
Department of Geography
University of Alabama


Apr. 10
Apr. 10
Apr. 5
Mar. 30
Apr. 10
Apr. 5
Mar. 30
Mar. 25
Mar. 25
Mar. 30
Mar. 10
Mar. 15
Mar. 20
Mar. 10
Mar. 15
Mar. 15
Mar. 10
Mar. 5
Feb. 28
Mar. 20
Feb. 23
Feb. 18
0 5 10 30 Miles
0 5 10 20 30 40 Kilometers
Last Frost
after April 5
March 25 - April 5
March 15 - March 25
March 5 - March 15
February 23 - March 5
before February 23
Produced by the Dept. of Geography
College of Arts and Sciences
The University of Alabama

APPENDIX D

FLOOD INSURANCE RATE MAPS

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcuton and/or floodplain management puiposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

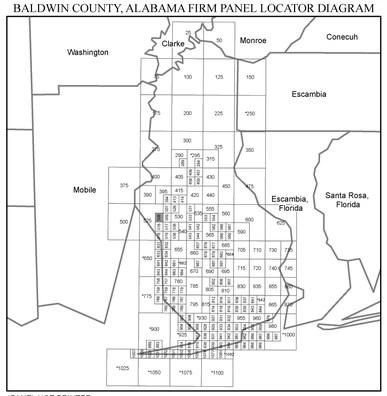
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
	CBRS and OPA boundary
	International, State, or County boundary
	Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
	Area Not Included boundary
	Military Reservation, Native American Lands boundary
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000mE	1000-meter Universal Transverse Mercator grid values, zone 16
600000 FT	5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile
	Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
	Road or Railroad Bridge
	Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0508M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 508 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0508	M
SPANISH FORT, CITY OF	010429	0508	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0508M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcuton and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

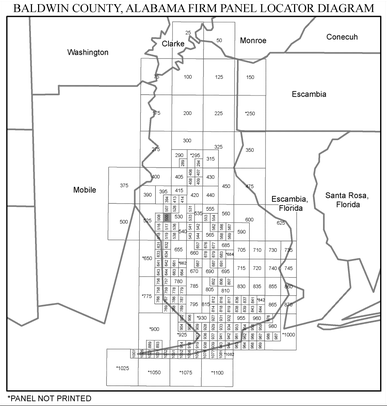
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

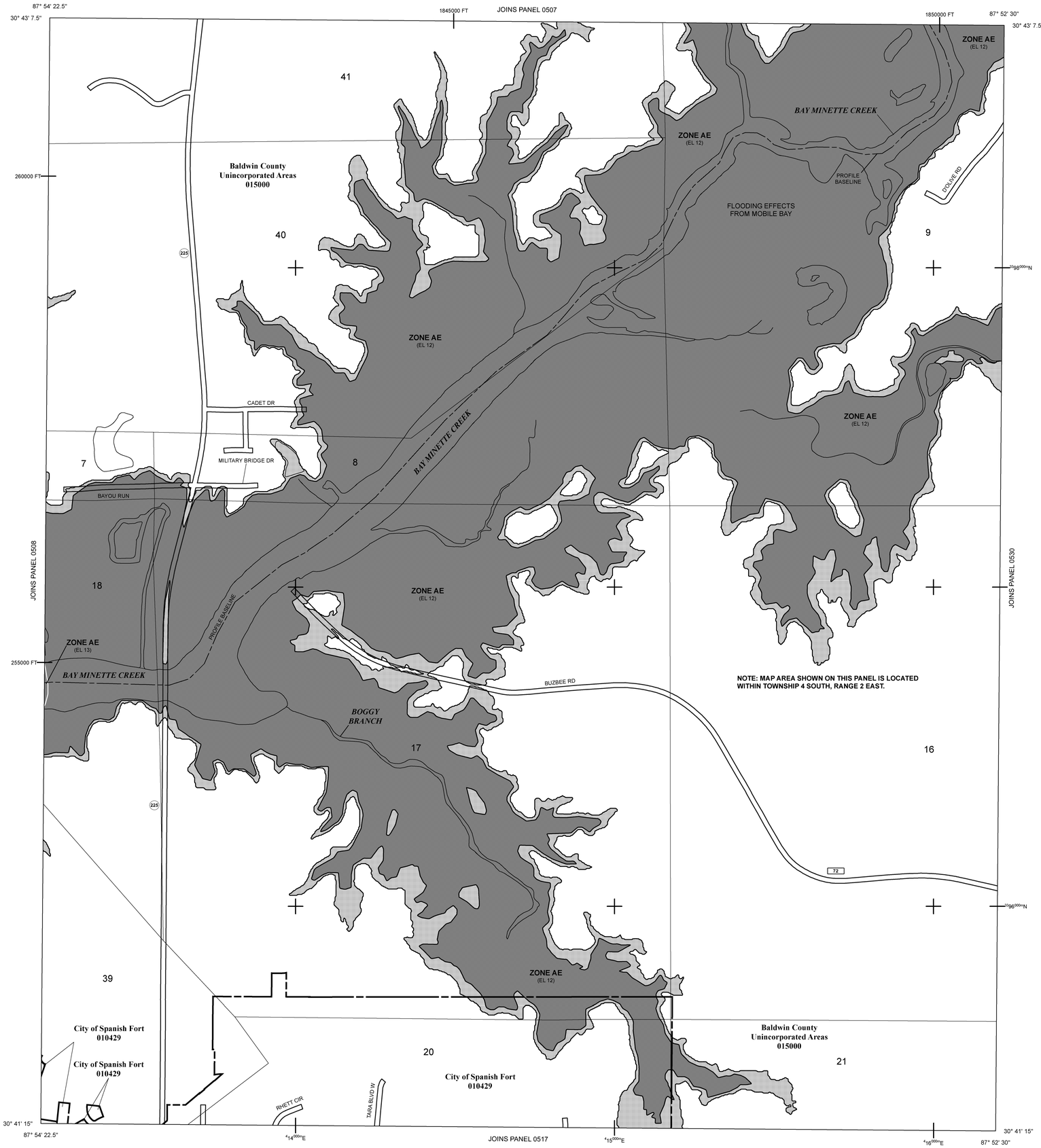
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
	CBRS and OPA boundary
	International, State, or County boundary
	Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
	Area Not Included boundary
	Military Reservation, Native American Lands boundary
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000mE	1000-meter Universal Transverse Mercator grid values, zone 16
600000 FT	5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile
	Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
	Road or Railroad Bridge
	Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0509M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 509 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0509	M
SPANISH FORT, CITY OF	010429	0509	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0509M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcotn and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

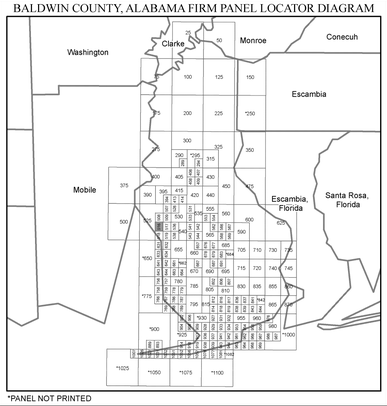
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT — 5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge
- Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0516M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 516 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0516	M
DAPHNE, CITY OF	010005	0516	M
SPANISH FORT, CITY OF	010429	0516	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0516M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcuton and/or floodplain management puiposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

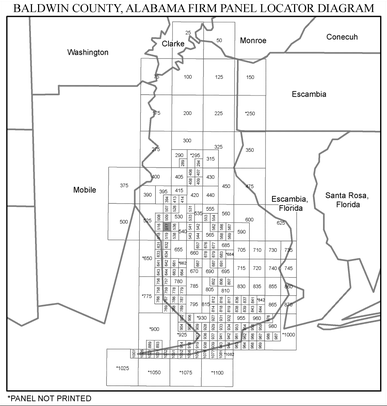
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

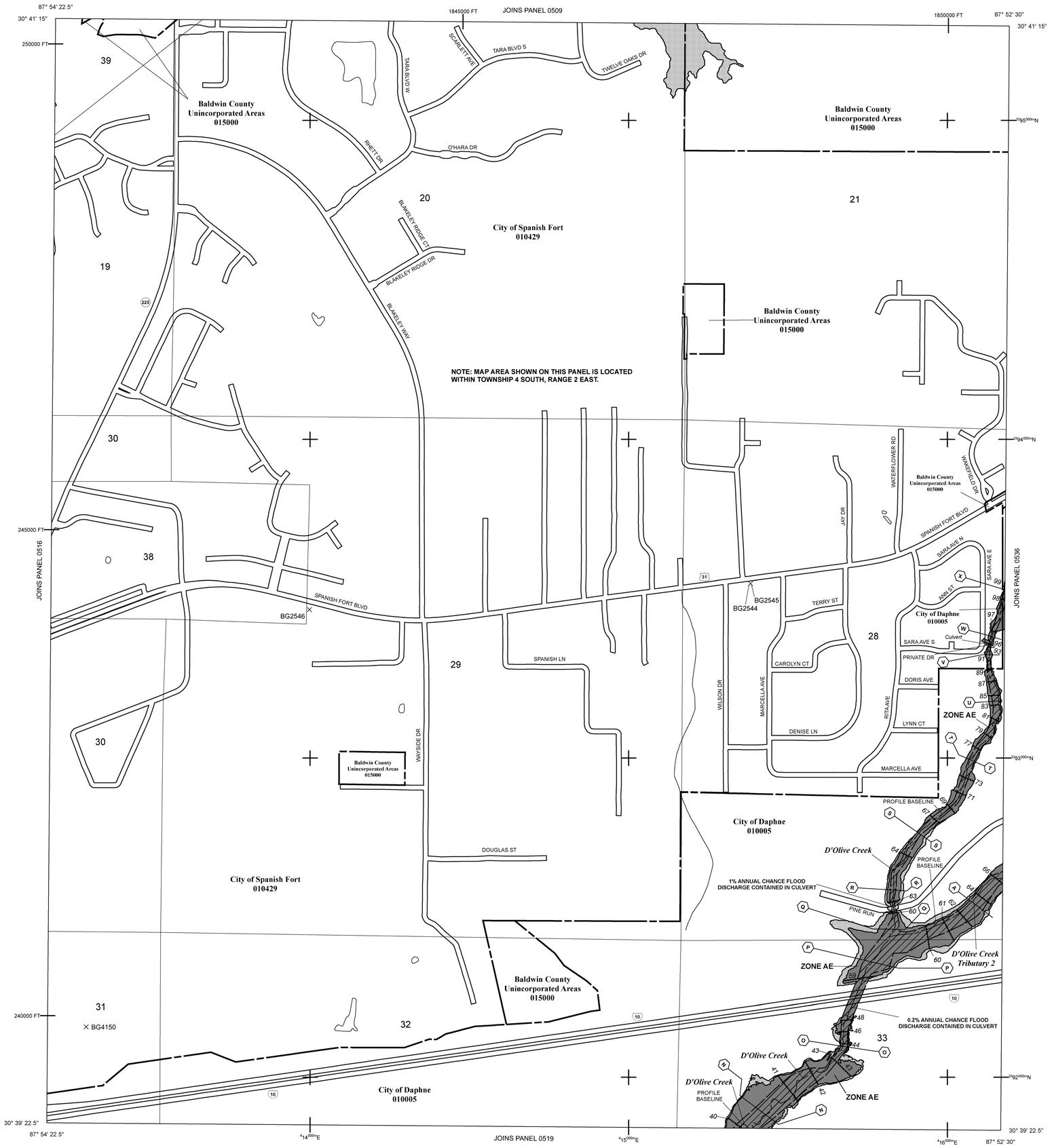
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT — 5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge
- Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0517M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 517 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0517	M
DAPHNE, CITY OF	010005	0517	M
SPANISH FORT, CITY OF	010429	0517	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0517M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

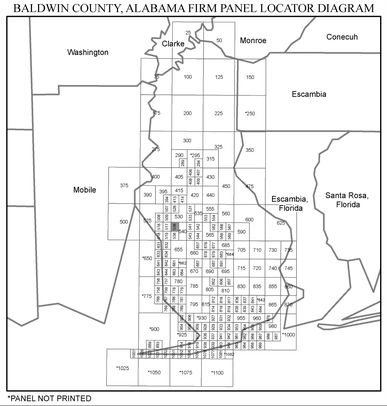
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

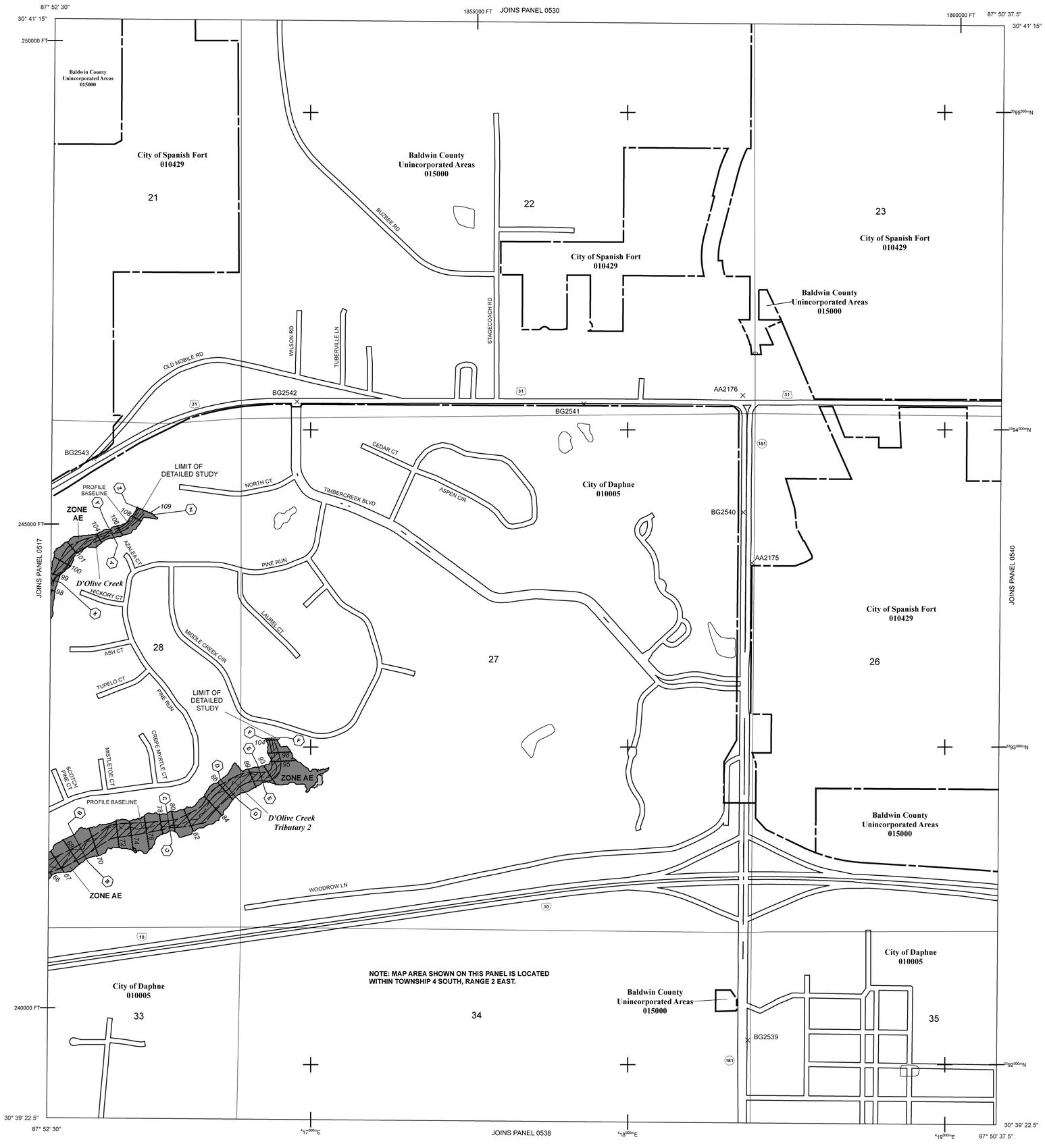
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT — 5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge
- Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0536M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 536 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0536	M
DAPHNE, CITY OF	010005	0536	M
SPANISH FORT, CITY OF	010429	0536	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0536M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

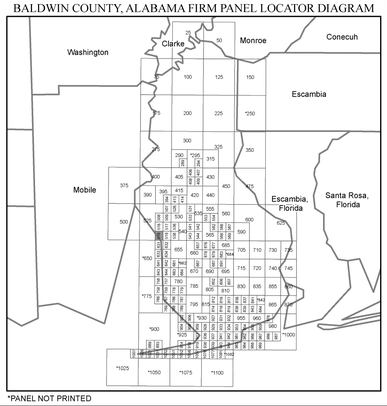
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

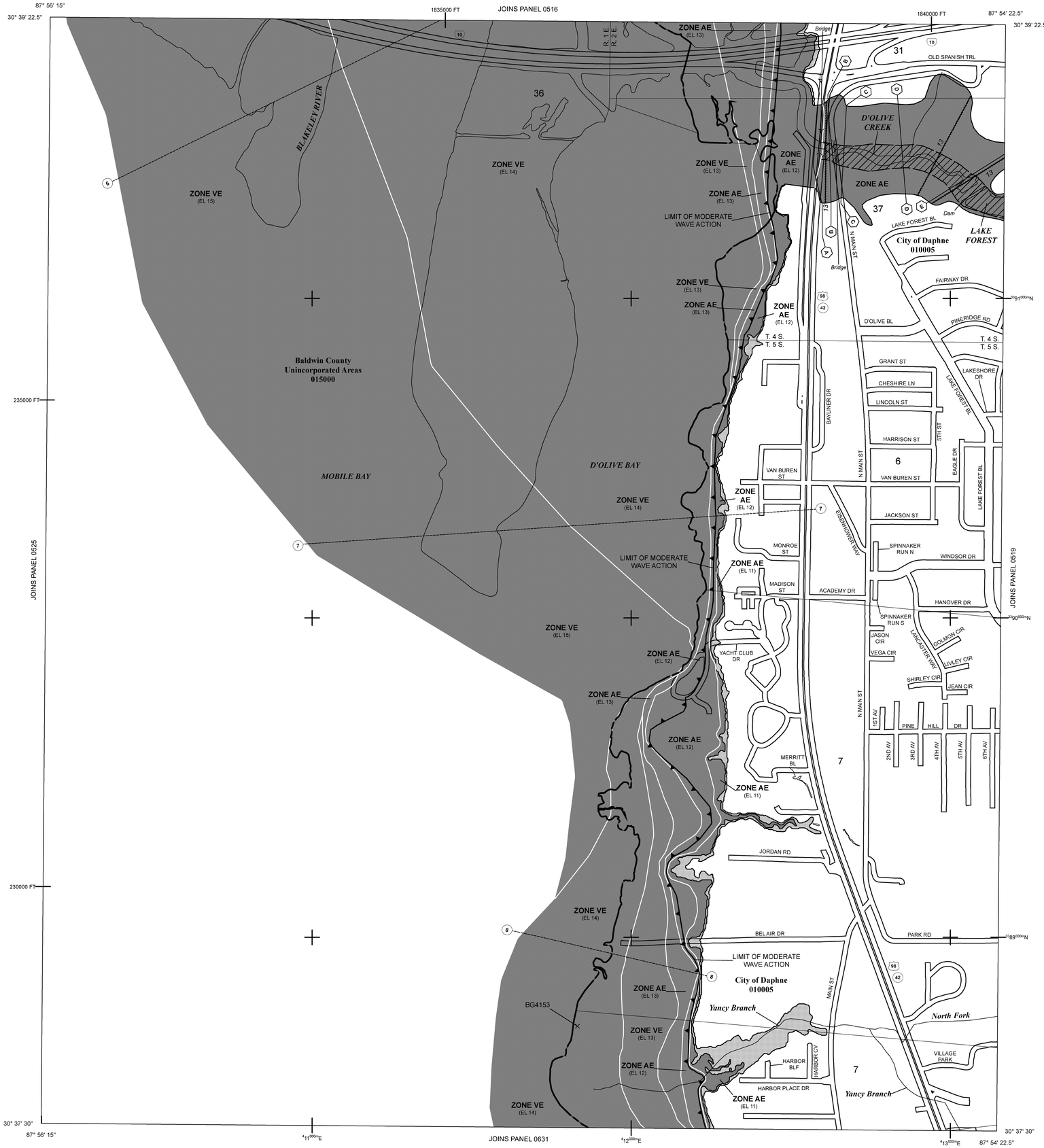
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
	CBRS and OPA boundary
	International, State, or County boundary
	Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
	Area Not Included boundary
	Military Reservation, Native American Lands boundary
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276 000m E	1000-meter Universal Transverse Mercator grid values, zone 16
600000 FT	5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile
	Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
	Road or Railroad Bridge
	Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0518M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 518 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0518	M
DAPHNE, CITY OF	010005	0518	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0518M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcuton and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

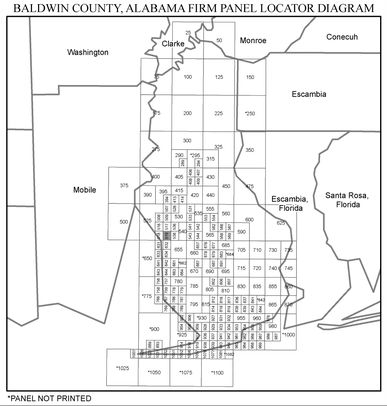
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

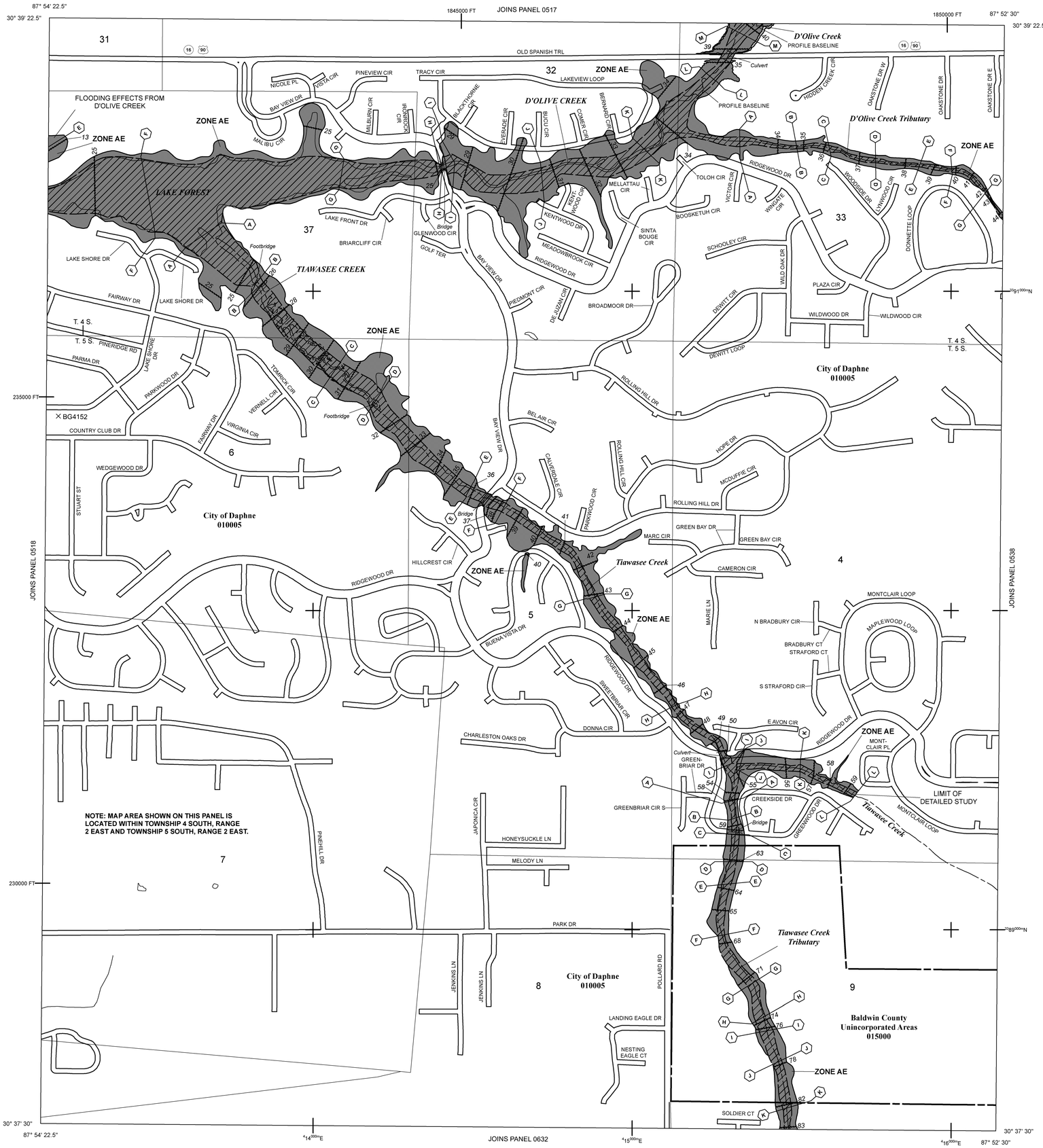
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
	CBRS and OPA boundary
	International, State, or County boundary
	Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
	Area Not Included boundary
	Military Reservation, Native American Lands boundary
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{4}276^{000}$mE	1000-meter Universal Transverse Mercator grid values, zone 16
600000 FT	5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile
	Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
	Road or Railroad Bridge
	Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0519M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 519 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0519	M
DAPHNE, CITY OF	010005	0519	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0519M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management puiposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

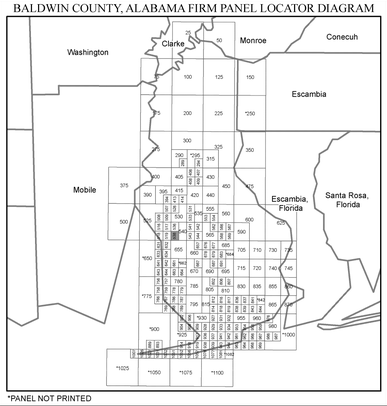
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

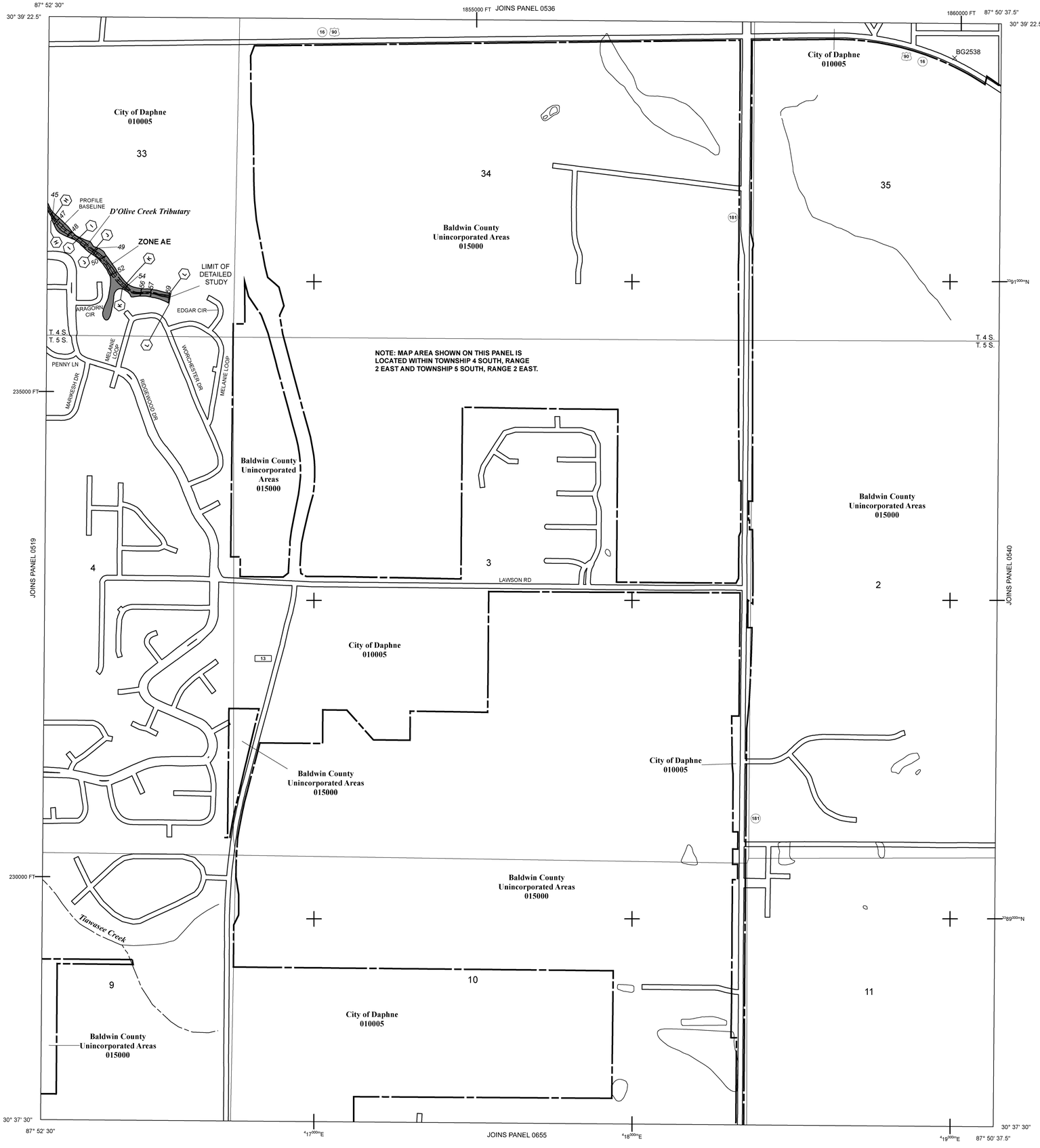
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
  * Referenced to the North American Vertical Datum of 1988
- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT — 5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ● M1.5 — River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge
- Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0538M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 538 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0538	M
DAPHNE, CITY OF	010005	0538	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0538M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management puiposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

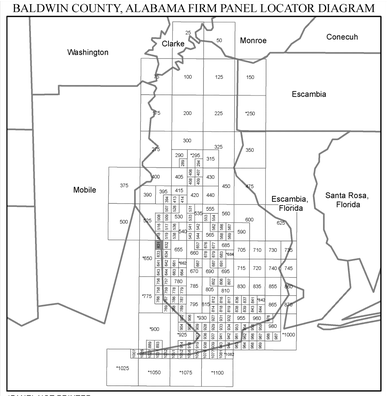
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

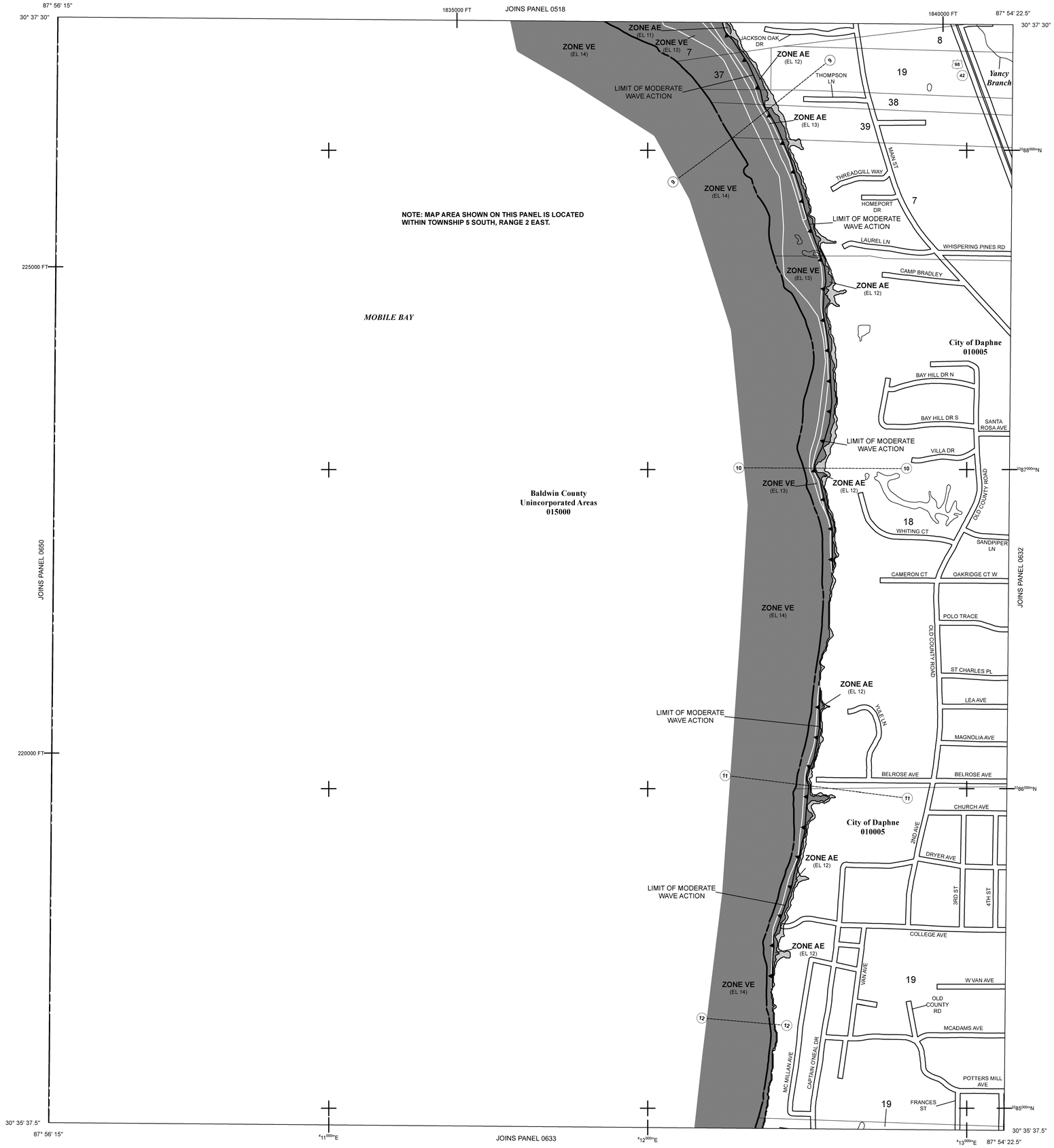
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
	CBRS and OPA boundary
	International, State, or County boundary
	Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
	Area Not Included boundary
	Military Reservation, Native American Lands boundary
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000mE	1000-meter Universal Transverse Mercator grid values, zone 16
600000 FT	5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile
	Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
	Road or Railroad Bridge
	Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0631M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 631 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0631	M
DAPHNE, CITY OF	010005	0631	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0631M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

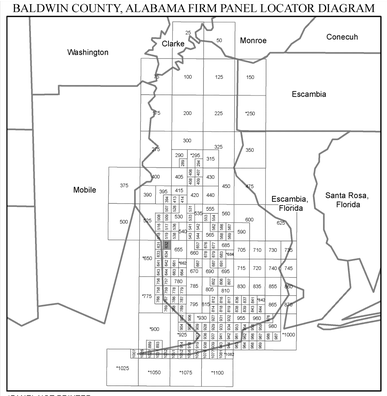
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

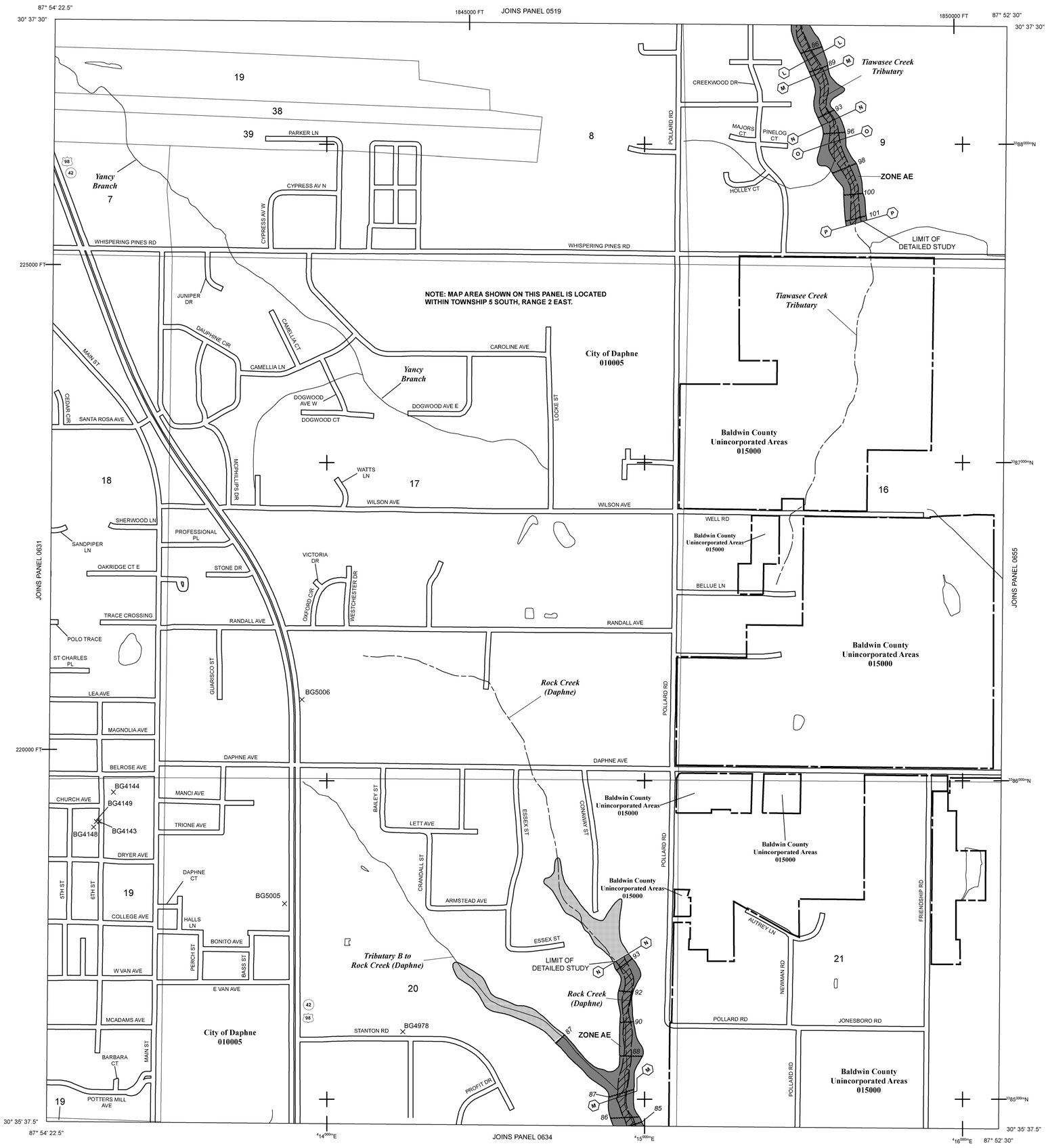
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
	CBRS and OPA boundary
	International, State, or County boundary
	Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
	Area Not Included boundary
	Military Reservation, Native American Lands boundary
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000mE	1000-meter Universal Transverse Mercator grid values, zone 16
600000 FT	5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile
	Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
	Road or Railroad Bridge
	Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0632M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 632 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0632	M
DAPHNE, CITY OF	010005	0632	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0632M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management puiposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

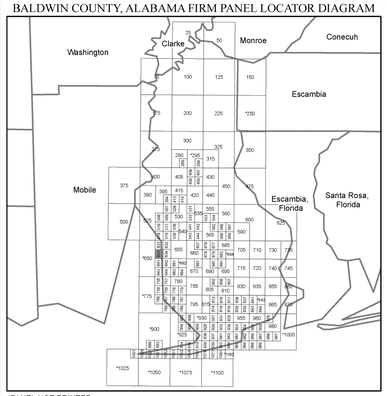
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

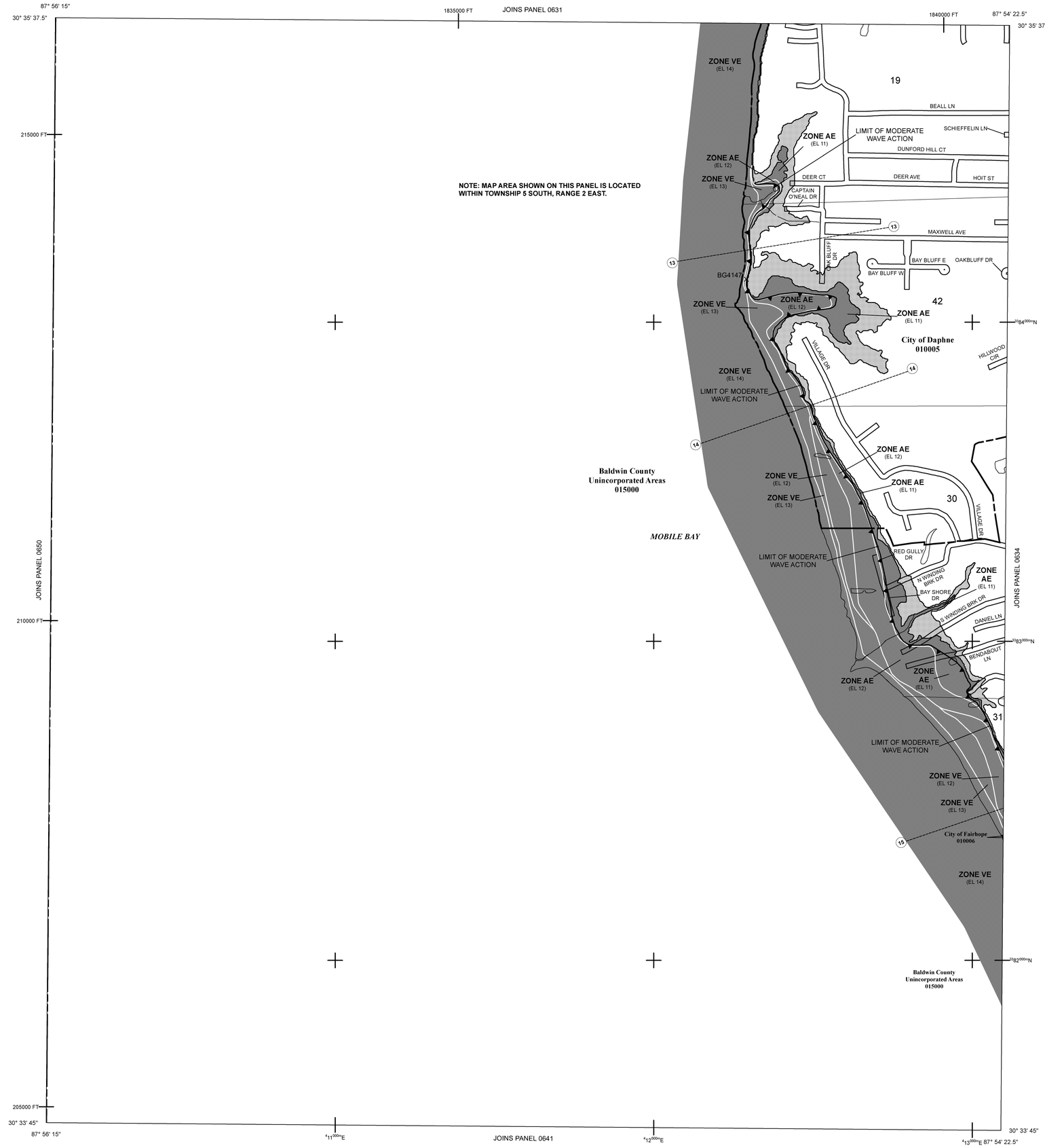
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT — 5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge
- Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0633M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 633 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0633	M
DAPHNE, CITY OF	010005	0633	M
FAIRHOPE, CITY OF	010006	0633	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0633M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

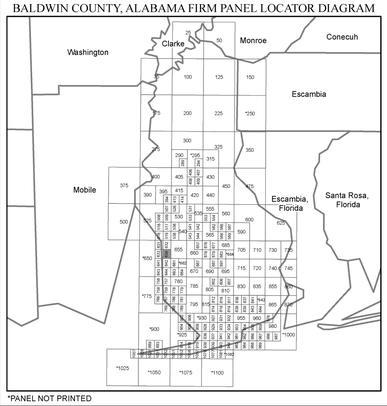
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

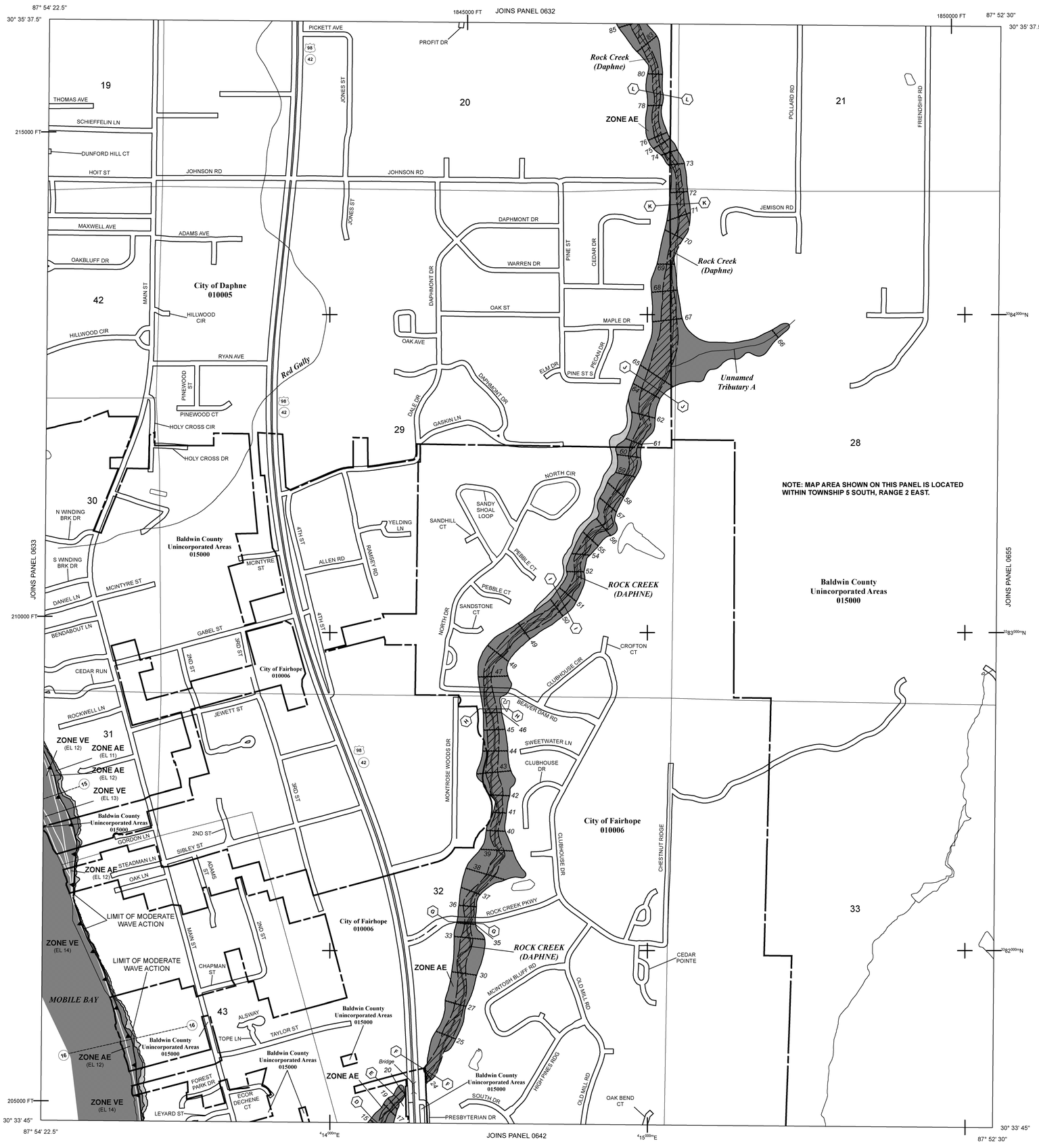
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mE — 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT — 5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge
- Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0634M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 634 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0634	M
DAPHNE, CITY OF	010005	0634	M
FAIRHOPE, CITY OF	010006	0634	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

MAP NUMBER
01003C0634M

State of Alabama
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater elevations table should be used for construcion and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 16N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources, but most of the base map files were provided by Baldwin County. Stream centerlines were downloaded from the National Hydrography Dataset provided by the US Geological Survey. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

The "**profile base lines**" depicted on this map represent the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the "profile base line" in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

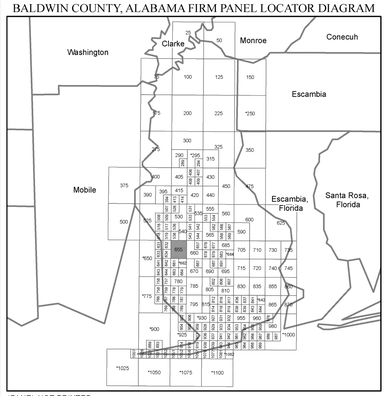
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **FEMA Map Service Center** website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

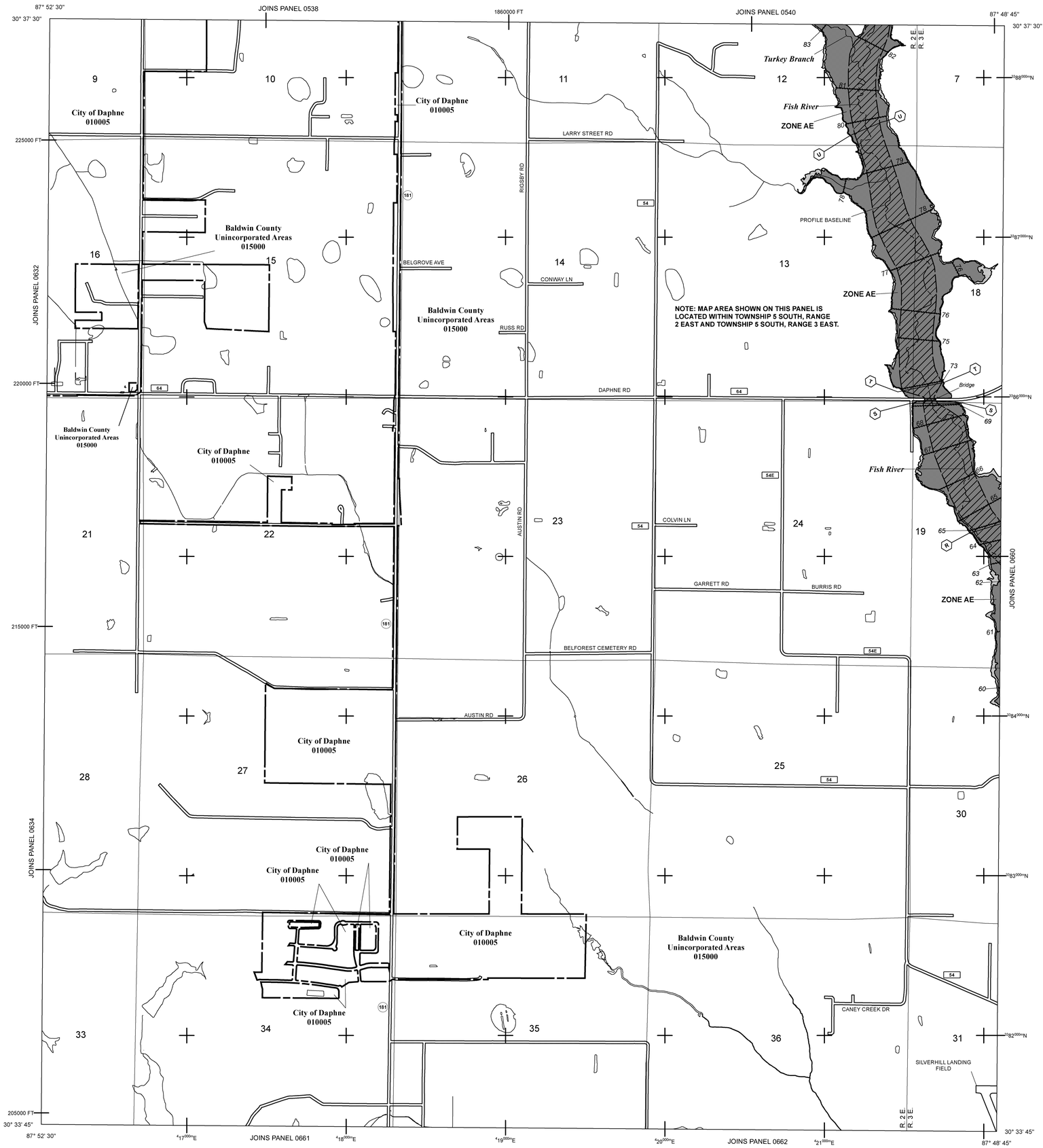
If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at https://www.fema.gov/.

BALDWIN COUNTY, ALABAMA FIRM PANEL LOCATOR DIAGRAM



*PANEL NOT PRINTED

In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Alabama, this Flood Insurance Rate Map was developed by the Alabama Office of Water Resources in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Alabama has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Alabama Office of Water Resources is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extraterritorial Jurisdiction, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- 513 Base Flood Elevation line and value; elevation in feet*
- (EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- A–A Cross section line
- 23–23 Transect line
- 87°07'45", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mE 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT 5000-foot grid ticks: Alabama West State Plane coordinate system (FIPS 0102), Lambert Conformal Conic projection
- DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge
- Limit of Moderate Wave Action

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 17, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
July 17, 2007
April 19, 2019

July 17, 2007 - To reflect updated topographic information, to add Special Flood Hazard Areas, to update roads and road names, and to update corporate limits.

April 19, 2019 - To update map format, to update Special Flood Hazard Areas and to update corporate limits.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0655M

FIRM
FLOOD INSURANCE RATE MAP

BALDWIN COUNTY, ALABAMA
AND INCORPORATED AREAS

PANEL 655 OF 1100
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BALDWIN COUNTY	015000	0655	M
DAPHNE, CITY OF	010005	0655	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP REVISED
APRIL 19, 2019

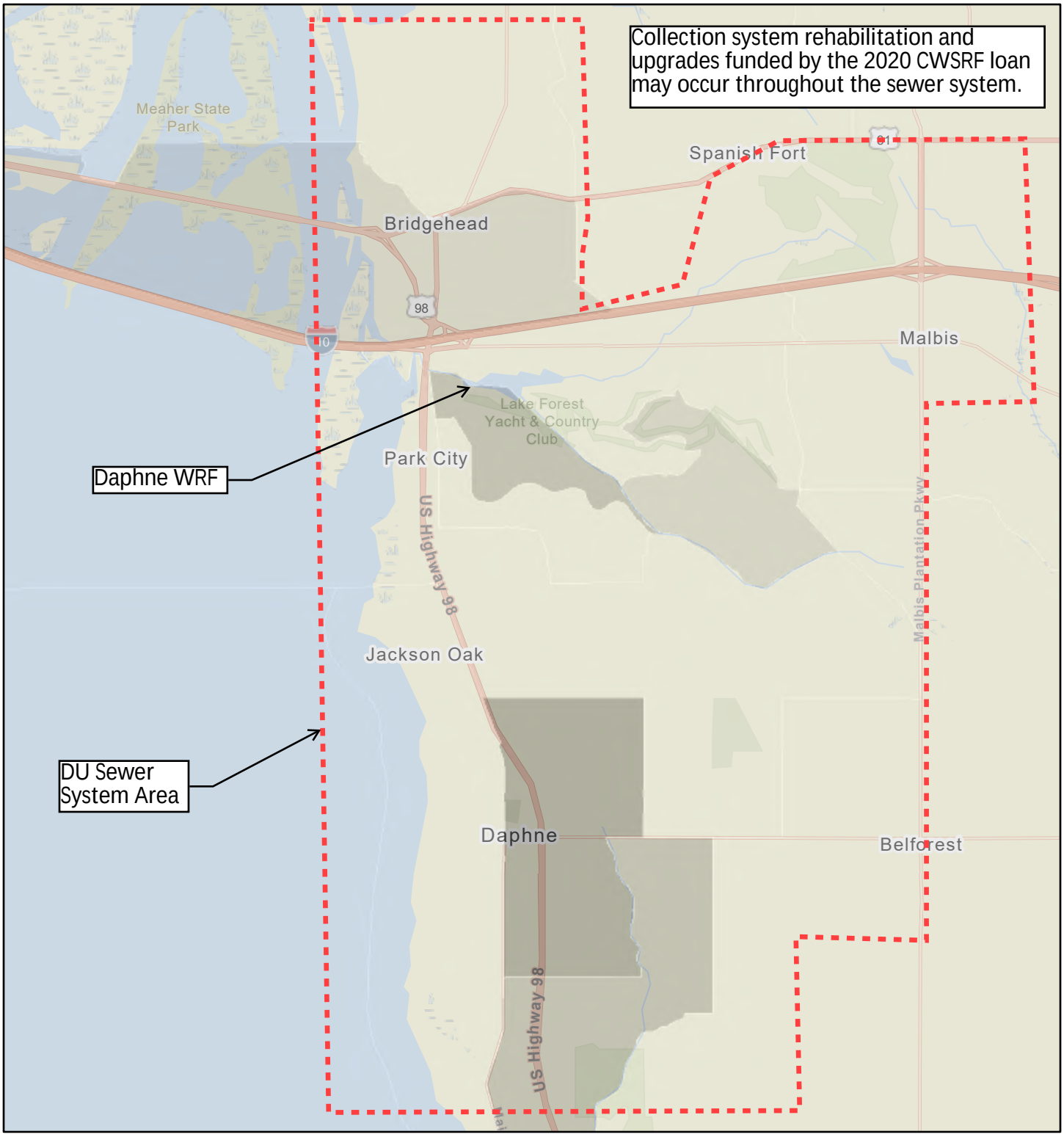
MAP NUMBER
01003C0655M

State of Alabama
Federal Emergency Management Agency

APPENDIX E

ENVIRONMENTAL JUSTICE MAP

Low Income Population



April 20, 2020

1:75,000

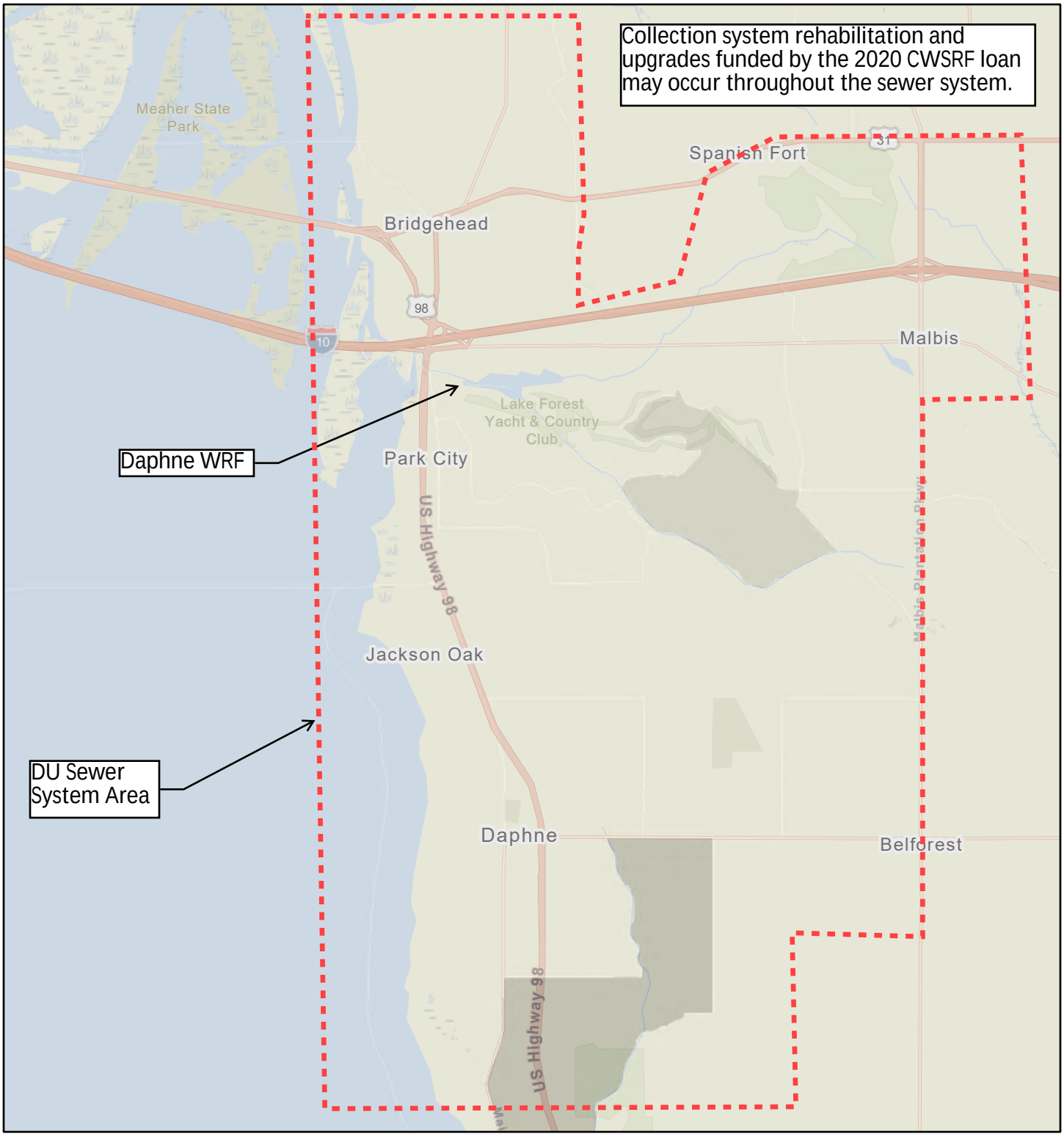
0 0.5 1 2 mi

0 0.75 1.5 3 km

Low Income Population (National Percentiles)

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

Minority Population



April 20, 2020

1:75,000

0 0.5 1 2 mi

0 0.75 1.5 3 km

Minority Population (National Percentiles)

- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile

APPENDIX F

CONCURRENCE REQUESTS

TA / WJP #2
2020-TA-0737

Received 04-06-2020 CDS

Volkert, Inc.
1110 Montlimar Dr., Suite 560
Mobile, AL 36609
(251) 342-1070
www.volkert.com

VOLKERT

April 6, 2020

2020 CWSRF Loan Application
(Contract No. 408219, Task No. 7)

Mr. Bill Pearson
Daphne ES Field Office
U.S. Fish and Wildlife Service
1208-B Main Street
Daphne, AL 36526

RE: 2020 CWSRF Loan Application Intergovernmental Review

Dear Mr. Pearson:

The Utilities Board of the City of Daphne, Alabama (Daphne Utilities) is proposing to submit a 2020 Clean Water State Revolving Fund (CWSRF) Loan Application. We are forwarding the project descriptions and quad maps prepared for this application for an intergovernmental review on behalf of Daphne Utilities. Four projects included in this application involve work at the Daphne Water Reclamation Facility (WRF). This work is currently proposed to be completed within the boundaries of the existing fence. One of the projects included in this application involves the rehabilitation and/or upgrades of aging infrastructure within the sanitary sewer collection system. This proposed work will either be completed from within the pipe and manhole or lift station structures, or within the existing roadway or easement.

In accordance with the application, we are requesting that a response from your agency be provided in writing including any comments and concurrence with the proposed loan. Please direct your response to Daphne Utilities, c/o Mrs. Melinda D. Immel, P.E., Volkert, Inc., 28588 U.S. 98, Suite 9, Daphne, AL 36526, or by email at melinda.immel@volkert.com.

Please call either Marcus Stacey or me at (251) 342-1070 should you have any questions or require any additional information.

Sincerely,

Melinda D. Immel, P.E.
Assistant Vice President

MS

Enclosures

c Mr. Scott Polk – Daphne Utilities

U.S. Fish and Wildlife Service
1208-B Main Street – Daphne, Alabama 36526
Phone: 251-441-5181 Fax: 251-441-6222

No endangered or threatened species or critical habitat are known to occur in the project area. As described, the project will have no significant impact on fish and wildlife resources. IF PROJECT DESIGN CHANGES ARE MADE, PLEASE SUBMIT NEW PLANS FOR REVIEW.

William J. Pearson, Field Supervisor Date # 2

Volkert, Inc.
1110 Montlimar Dr., Suite 560
Mobile, AL 36609
(251) 342-1070
www.volkert.com

April 6, 2020

2020 CWSRF Loan Application
(Contract No. 408219, Task No. 7)

Mr. Bill Pearson
Daphne ES Field Office
U.S. Fish and Wildlife Service
1208-B Main Street
Daphne, AL 36526

RE: 2020 CWSRF Loan Application Intergovernmental Review

Dear Mr. Pearson:

The Utilities Board of the City of Daphne, Alabama (Daphne Utilities) is proposing to submit a 2020 Clean Water State Revolving Fund (CWSRF) Loan Application. We are forwarding the project descriptions and quad maps prepared for this application for an intergovernmental review on behalf of Daphne Utilities. Four projects included in this application involve work at the Daphne Water Reclamation Facility (WRF). This work is currently proposed to be completed within the boundaries of the existing fence. One of the projects included in this application involves the rehabilitation and/or upgrades of aging infrastructure within the sanitary sewer collection system. This proposed work will either be completed from within the pipe and manhole or lift station structures, or within the existing roadway or easement.

In accordance with the application, we are requesting that a response from your agency be provided in writing including any comments and concurrence with the proposed loan. Please direct your response to Daphne Utilities, c/o Mrs. Melinda D. Immel, P.E., Volkert, Inc., 28588 U.S. 98, Suite 9, Daphne, AL 36526, or by email at melinda.immel@volkert.com.

Please call either Marcus Stacey or me at (251) 342-1070 should you have any questions or require any additional information.

Sincerely,

Melinda D. Immel, P.E.
Assistant Vice President

MS

Enclosures

c Mr. Scott Polk – Daphne Utilities

PROPOSED PROJECT DESCRIPTIONS

Project A: Replacement of Manual Bar Screen

Project B: UV Disinfection Upgrades

Project C: New Filtration Equipment

Project D: Vortex Grit System

Project E: Collection System Rehabilitation/Upgrades

Projects A – D: Various Improvements at the WRF

Projects A-D will be located at the WRF. These projects will replace aging infrastructure, add new infrastructure to provide a higher quality effluent, and provide additional process capabilities and redundancy. Daphne Utilities is committed to providing a high-quality effluent at the WRF and these identified projects will assist with this commitment and overall operation of the facility.

Replacement of the manual bar screen with a redundant mechanical bar screen will help ensure that screening at the headworks continues to perform at a high level during planned and unplanned outages of the existing mechanical bar screen. A consistent high level of initial screening allows for improved downstream treatment and maintenance.

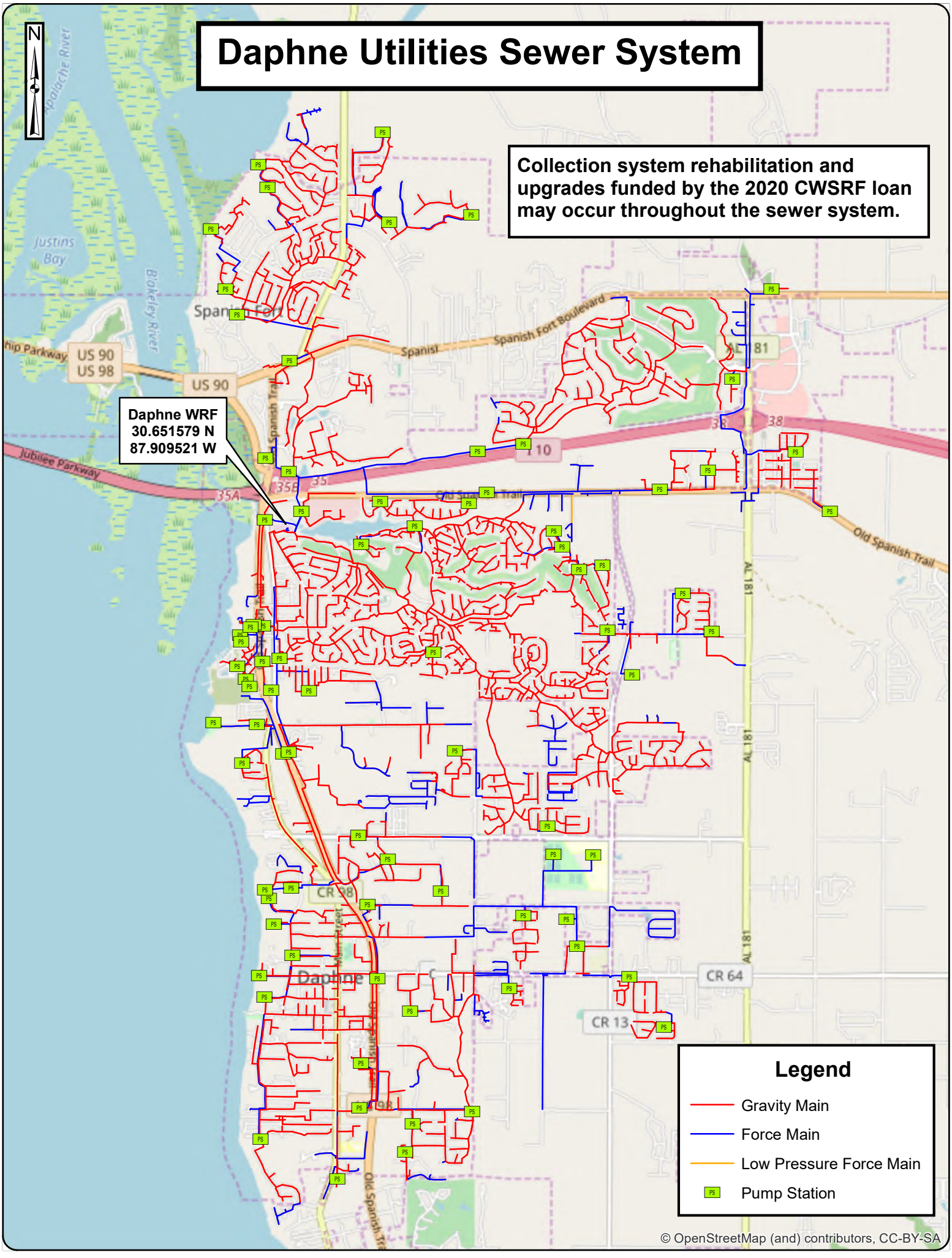
In order to improve the effluent quality, DU proposes to install a parallel UV system and add filtration equipment. The new UV system will be installed parallel to the existing system with a newer model that will improve operational efficiencies. The additional UV system will also allow for reducing reliance on the current back-up chlorination system. Immediately upstream of this process, a new filtration system will be installed providing tertiary filtration allowing for improved effluent quality for nutrients and TSS removal. The filter will also allow the UV system to operate at a higher efficiency and effectiveness by reducing solids in the water. The UV light transmission is improved resulted in improved target bacteria kill.

A new vortex grit removal system is planned to help provide additional removal of fine grit and sand that interferes with the treatment processes downstream and/or causes undue mechanical wear and increased maintenance on equipment.

Project E: Collection System Rehabilitation/Upgrades

This project proposes to rehabilitate and/or upgrade aging infrastructure within the existing sanitary sewer collection system to assist with reducing inflow/infiltration (I/I) and potentially related sanitary sewer overflows (SSOs) and improve overall operation and efficiency of the system. Since 2014, DU has been evaluating their system through closed circuit television (CCTV) and cleaning and manhole inspections. Supervisory Control and Data Acquisition (SCADA) is provided on all 82 lift stations. Data collected from SCADA has also been used to identify areas with higher inflow and infiltration experienced during rain events along with data collected from flow meters installed along gravity mains.

Since 2014, DU has initiated multiple contracts to rehabilitate the system including point repairs, cured in place piping (CIPP) lining of sewers, and manhole lining. Needs have been identified and prioritized and this project will aid in expediting critical areas in this ongoing work. Also, DU will continue to improve existing lift station sites through equipment replacement and modifications to provide greater energy efficiency and to protect the environment by accommodating surges experienced during peak flows, including wet weather events.


Daphne Utilities Sewer System
Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.
Daphne WRF
30.651579 N
87.909521 W
N
Legend
Gravity Main
Force Main
Low Pressure Force Main
Pump Station
US 90
US 98
I 10
CR 98
CR 64
CR 13
AL 181
Spanish Fort Boulevard
Old Spanish Trail
Jubilee Parkway
Daphne
Spanish Fort
Justins Bay
Blakeley River
© OpenStreetMap (and) contributors, CC-BY-SA

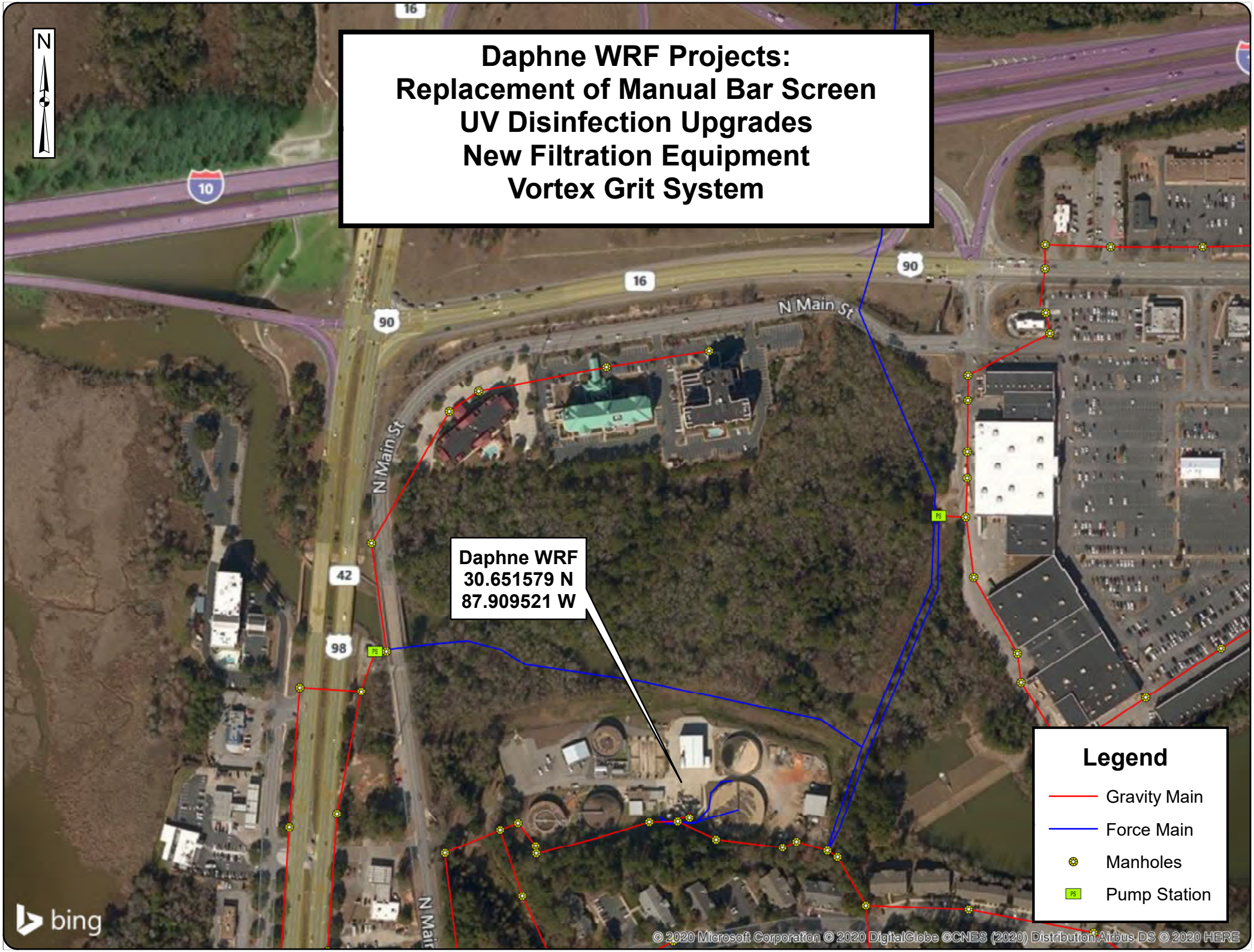
Daphne Utilities Sewer System

Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.

Daphne WRF
30.651579 N
87.909521 W

Legend

- Gravity Main
- Force Main
- Low Pressure Force Main
- PS Pump Station


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
10
16
90
N Main St
42
98
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Manholes
Pump Station
bing
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
Daphne WRF
30.651579 N
87.909521 W
PS
PS
Legend
Gravity Main
Force Main
Manholes
Pump Station
Copyright:© 2013 National Geographic Society, i-cubed

ALABAMA HISTORICAL COMMISSION

468 South Perry Street
P.O. Box 300900
Montgomery, Alabama 36130-0900
334-242-3184 / Fax: 334-240-3477

Lisa D. Jones
Executive Director
State Historic Preservation Officer

April 21, 2020

Melinda Immel
Volkert
28588 US 98 Suite 9
Daphne, AL 36526

Re: AHC 20-0701
Various WRF & Sanitary Sewer System Improvements
Baldwin County

Dear Ms. Immel:

Upon review of the above referenced project, we have determined that project activities will have no effect on cultural resources eligible for or listed on the National Register of Historic Places. Therefore, we concur with the proposed project activities.

Consultation with the State Historic Preservation Office does not constitute consultation with Tribal Historic Preservation Offices, other Native American tribes, local governments, or the public. If archaeological materials are encountered during construction, the procedures codified at 36 CFR 800.13(b) will apply. Archaeological materials consist of any items, fifty years old or older, which were made or used by man. These items include but are not limited to, stone projectile points (arrowheads), ceramic sherds, bricks, worked wood, bone and stone, metal, and glass objects. The federal agency or the applicant receiving federal assistance should contact our office immediately. If human remains are encountered, the provisions of the Alabama Burial Act (*Code of Alabama* 1975, §13A-7-23.1, as amended; Alabama Historical Commission Administrative Code Chapter 460-X-10 Burials) should be followed. This stipulation shall be placed on the construction plans to insure contractors are aware of it.

We appreciate your commitment to helping us preserve Alabama's historic archaeological and architectural resources. Should you have any questions, please contact Eric Sipes at 334.230.2667 or Eric.Sipes@ahc.alabama.gov. Have the AHC tracking number referenced above available and include it with any future correspondence.

Sincerely,

Lee Anne Wofford
Deputy State Historic Preservation Officer

LAW/EDS/law

Volkert, Inc.
1110 Montlimar Dr., Suite 560
Mobile, AL 36609
(251) 342-1070
www.volkert.com

April 6, 2020

2020 CWSRF Loan Application
(Contract No. 408219, Task No. 7)

Ms. Lee Anne Wofford
Deputy SHPO
Alabama Historical Commission
Attn: Section 106 Review
468 South Perry Street
Montgomery, Alabama 36130-0900

RE: 2020 CWSRF Loan Application Intergovernmental Review

Dear Ms. Wofford:

The Utilities Board of the City of Daphne, Alabama (Daphne Utilities) is proposing to submit a 2020 Clean Water State Revolving Fund (CWSRF) Loan Application. We are forwarding the project descriptions and quad maps prepared for this application for an intergovernmental review on behalf of Daphne Utilities. Four projects included in this application involve work at the Daphne Water Reclamation Facility (WRF). This work is currently proposed to be completed within the boundaries of the existing fence. One of the projects included in this application involves the rehabilitation and/or upgrades of aging infrastructure within the sanitary sewer collection system. This proposed work will either be completed from within the pipe and manhole or lift station structures, or within the existing roadway or easement.

In accordance with the application, we are requesting that a response from your agency be provided in writing including any comments and concurrence with the proposed loan. Please direct your response to Daphne Utilities, c/o Mrs. Melinda D. Immel, P.E., Volkert, Inc., 28588 U.S. 98, Suite 9, Daphne, AL 36526, or by email at melinda.immel@volkert.com.

Please call either Marcus Stacey or me at (251) 342-1070 should you have any questions or require any additional information.

Sincerely,

Melinda D. Immel, P.E.
Assistant Vice President

MS

Enclosures

c Mr. Scott Polk – Daphne Utilities

ALABAMA HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
SECTION 106 PROJECT REVIEW CONSULTATION FORM

Federal laws exist to ensure that federal agencies or their designated applicants carefully consider historic preservation in federally funded, licensed, or permitted projects. Section 106 of the National Historic Preservation Act of 1966, as amended directs this review. http://www.achp.gov/106summary.html. At a minimum, submission of this completed form and attachments constitutes a request for review by the Alabama Historical Commission, which is the Alabama State Historic Preservation Office (SHPO). **The responsibility for preparing documentation, including the identification of archaeological and architectural properties and the assessment of potential effects resulting from the project, rests with the federal or state agency, or its designated applicant.** The role of the Alabama SHPO is to review, comment, and consult with federal/state agencies or their designees. The Alabama SHPO's ability to complete a timely project review largely depends on the quality of the material submitted. Some applicants may find it advantageous to hire a professional consultant with expertise in archaeology, history and/or architectural history.

PROJECT NAME
Various WRF & Sanitary Sewer System Improvements

FEDERAL AGENCY PROVIDING FUNDS, LICENSE, OR PERMIT

FEDERAL PROJECT NUMBER

FEDERAL AGENCY CONTACT NAME AND E-MAIL/PHONE NUMBER

STATE AGENCY PROVIDING FUNDS, LICENSE, OR PERMIT (IF APPLICABLE)
ADEM

STATE AGENCY CONTACT NAME AND E-MAIL ADDRESS, PHONE NUMBER, MAILING ADDRESS
Kris Berry, kberry@adem.alabama.gov, 334-271-7871, 1400 Coliseum Blvd., Montgomery, AL 36110

AHC NUMBER (If project has been previously submitted)

APPLICANT NAME:
The Utilities Board of the City of Daphne, Alabama (Daphne Utilities)

APPLICANT MAILING ADDRESS:
900 Daphne Ave., Daphne, AL 36526

APPLICANT TELEPHONE:
251-626-2628

APPLICANT EMAIL:
scott@daphneutilities.com

CONTACT NAME (if different than applicant):
Melinda Immel, P.E.

CONTACT MAILING ADDRESS:
28588 US 98, Suite 9, Daphne AL 36526

CONTACT TELEPHONE:
251-680-9883

CONTACT EMAIL:
melinda.immel@volkert.com

CONTRACTOR TYPE: ☐ ARCHAEOLOGIST; ☐ARCHITECTURAL HISTORIAN; ☐NONE; ■OTHER:

CONTRACTOR NAME:
Unknown at this time. Projects will be bid at a later date to those with a General Contractor's Licence.

CONTRACTOR MAILING ADDRESS:

CONTRACTOR TELEPHONE:

CONTRACTOR EMAIL:

PROJECT LOCATION

STREET ADDRESS	CITY
Various locations. See attached maps.	Daphne

COUNTY	ZIP CODE
Baldwin	365226

LATITUDE / LONGITUDE: USE DECIMAL DEGREES EXAMPLE: 32.3722N, -86.3083W

See attached maps.

PROJECT DESCRIPTION

Describe the overall project in DETAIL. Be sure to note if the project involves new construction, if existing buildings will be altered (if so, provide the proposed work in detail), and / or if any buildings/structures will be demolished. Use additional pages if necessary.

See attached project descriptions. No new buildings will be constructed, and no existing buildings will be altered or demolished as part of the proposed work. For the water reclamation facility projects, the work is currently proposed to be completed within the boundaries of the existing fence. The remaining project involves rehabilitation or upgrades of sanitary sewer lines, manholes, and lift stations.

AREA OF POTENTIAL EFFECT (APE)

The APE varies with project types and can be direct or indirect (physical, visual, auditory, etc.). The APE is defined as "the geographic area or areas within which an undertaking may cause changes in the character of use of historic properties, if any such properties exist." Factors to consider when determining the APE include; topography, vegetation, existing development, orientation of an existing resource to the project, physical siting of a resource, and existing and planned future development. For example:

1) Rehabilitation, renovation, and/or demolition of a historic building or structure, or new construction: the APE might include the building itself and the adjacent setting.
2) Streetscapes: the APE might include the viewshed from the street.
3) Pedestrian/bicycle facilities: the APE might extend the length of the corridor and for some distance on both sides of the corridor.
4) Underground utilities: the APE would usually be limited to the area of ground disturbance.

Attach a map indicating the precise location of the project and the boundaries of the APE, preferably a clear color copy of a USGS topographic quadrangle map (7.5 minute). For projects in urban areas, also include a city map that shows more detail. USGS topographic maps can be printed from this website: https://ngmdb.usgs.gov/topoview/viewer/. City maps can be printed using www.google.com/maps.

Provide current, high resolution color photographs that illustrate the project area and the entire APE as defined above.

ARCHAEOLOGY (Ground Disturbing Activities)

Has the ground in the project area been disturbed other than by agriculture (i.e. grading, grubbing, clear cutting, filling, etc.)?
☒ Yes ☐ No ☐ Don't know ☐ N/A

If yes, describe in detail. Use additional pages as necessary. Photographs are helpful.

For the water reclamation facility projects, the work is currently proposed to be completed within the boundaries of the existing fence. The collection system rehabilitation and upgrades will take place in previously disturbed areas, including the roadway and easements.

Describe the present use and condition of the property. Use additional pages as necessary.

The water reclamation facility projects and the collection system rehabilitation and upgrades project will not change the existing use of the infrastructure which is for conveyance and treatment of wastewater. All projects will improve the overall condition of the infrastructure.

To your knowledge, has a Cultural Resource Assessment (CRA) been conducted in the proposed project area?
☐ Yes ☐ No ☒ Don't know ☐ N/A

If yes, attach a copy of the cultural resources assessment report.

ARCHITECTURAL INFORMATION

Background research for previously identified historic properties within an APE may be undertaken at the AHC main office in Montgomery. These files include the National Register of Historic Places, Alabama Register of Landmarks & Heritage, Alabama Historic Cemetery Register, county architectural surveys, and other files. To request a research appointment, contact Nicole Johnson at 334.230.2673 or Nicole.Johnson@ahc.alabama.gov. Alabama SHPO staff cannot perform the file research for your project. GIS Maps of known historic properties may be accessed here: TBD. The AHC's maps should function as a research tool, not an up-to-the-minute inventory about every historic and/or architecturally significant property in the state. This tool allows researchers to investigate and review potentially significant properties according to the best data that is available in the Alabama Historical Commission's files. The absence of a property from this database does not imply that an unidentified property lacks historic or architectural importance. Some applicants may find it advantageous to hire a historic preservation professional with expertise in history and/or architectural history to complete the identification and evaluation of historic properties.

1) Is the project located within or adjacent to a National Register of Historic Places (NRHP) listed or eligible historic district?
   ■YES ☐NO If yes, provide the name of the district: Malbis Plantation

2) Within the project APE, are there any above-ground properties that are 50 years old or older?
   ☐YES ■NO If yes, provide numbered photographs of each that have been keyed to a site map.

3) Does the project involve the rehabilitation, renovation, demolition, or addition to any above-ground property that is 50 years old or older?
   ☐YES ■NO If yes, provide rehabilitation plans and / or reasons for demolition.

4) Are any of the properties identified in questions #2 and #3 listed in or eligible for listing in the National Register?
   ☐YES ■NO

   If yes, identify the properties by name or photo number.

   If no, provide an explanation as to why properties identified are not eligible for the National Register. A discussion of the National Register seven aspects of integrity and the applicable National Register criteria must be included. Refer to the National Park Service's website: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf Use additional pages as necessary.

The uses of the buildings at the Water Reclamation Facility do not make them viable candidates for the NRHP. The material referenced in the above link does not provide any criteria which would qualify the Water Reclamation Facility or any of its buildings to be be considered for the NRHP.

The collection system rehabilitation and upgrades project may occur throughout the sewer collection system, to possibly include the Malbis Plantation historic district. The proposed project work would involve underground sewer lines and/or manholes, however, and the existing ground condition would be restored to its current state.

A note about photographs: Digital photos must be current, high resolution, and adequately show the resource. If you checked "yes" for #2 and #3 above, include photographs of those properties. Take photographs of the overall property and the exterior of each building on the property, including outbuildings. Include views of the overall setting, views of the building in its immediate surrounding showing the relationship of the building to neighboring buildings, and views of significant landscape features (i.e. tree lined approaches, stone walls, formal gardens, etc.). Exterior views of the building should include full views of each side (if possible) and views of important architectural details. Key all photographs to a site map.

If the project involves rehabilitation, include photographs of the building(s) involved and especially the areas of the building slated for rehab work. Label each exterior view to a site map and label all interior views. If the project involves new construction, include photographs of the surrounding area looking out from the project site. Include photographs of any buildings (more than 50 years old or older) that are located on the project property or on adjoining property.

EFFECTS DETERMINATION

An effect occurs when an action alters the characteristics of a property that may qualify it for the National Register of Historic Places or alters the features of a property's location, setting, or use that contributes to its significance. How will this project affect any of the properties identified in the previous section? Use additional pages as necessary.

1) Will the project take away or change anything within the apparent or existing boundary of any of the identified historic properties?
☐YES ■NO If yes, explain:_____

2) Will the project change the view from or the view of any of the identified historic properties?
☐YES ■NO If yes, explain:_____

3) Will the project introduce any audible or atmospheric elements to the setting of any of the identified historic properties?
☐YES ■NO If yes, explain:_____

4) Will the project result in the transfer, lease, or sale of any of the identified historic properties?
☐YES ■NO If yes, explain:_____

CHECKLIST: Did you provide the following information?	
■ Completed form.	☐ Photographs of current site conditions and all identified historic properties keyed to a site map.
■ Maps with project area, APE, and any historic properties marked and identified.	☐ For new construction, rehabilitations, etc., attach work plans, drawings, etc.
■ Other supporting documents (if necessary to explain the project).	■ Description of present use and condition of the project area.

NOTE: Section 106 regulations provide for a 30-day response time by the Alabama SHPO from the date of receipt. Project activities may not begin until our office has reviewed this information and issued comments.

Upon receipt, applications and attachments become the property of the State of Alabama.

For questions regarding this form or the Section 106 Review Process, contact Amanda McBride, Section 106 Coordinator, at 334.230.2692 or Amanda.McBride@ahc.alabama.gov.

All projects must be submitted digitally

E-mail this form and supporting documents to Section.106@ahc.alabama.gov This is the only approved e-mail address for project submission. Projects sent to any other e-mail address will not be accepted. The attachment size cannot exceed 19 MB. Alternatively, you may submit projects with larger attachments through an online system to be determined by the AHC.

Please limit your submission to cultural resources information only.

Contact Amanda McBride for any questions on digital submissions

PROPOSED PROJECT DESCRIPTIONS

Project A: Replacement of Manual Bar Screen

Project B: UV Disinfection Upgrades

Project C: New Filtration Equipment

Project D: Vortex Grit System

Project E: Collection System Rehabilitation/Upgrades

Projects A – D: Various Improvements at the WRF

Projects A-D will be located at the WRF. These projects will replace aging infrastructure, add new infrastructure to provide a higher quality effluent, and provide additional process capabilities and redundancy. Daphne Utilities is committed to providing a high-quality effluent at the WRF and these identified projects will assist with this commitment and overall operation of the facility.

Replacement of the manual bar screen with a redundant mechanical bar screen will help ensure that screening at the headworks continues to perform at a high level during planned and unplanned outages of the existing mechanical bar screen. A consistent high level of initial screening allows for improved downstream treatment and maintenance.

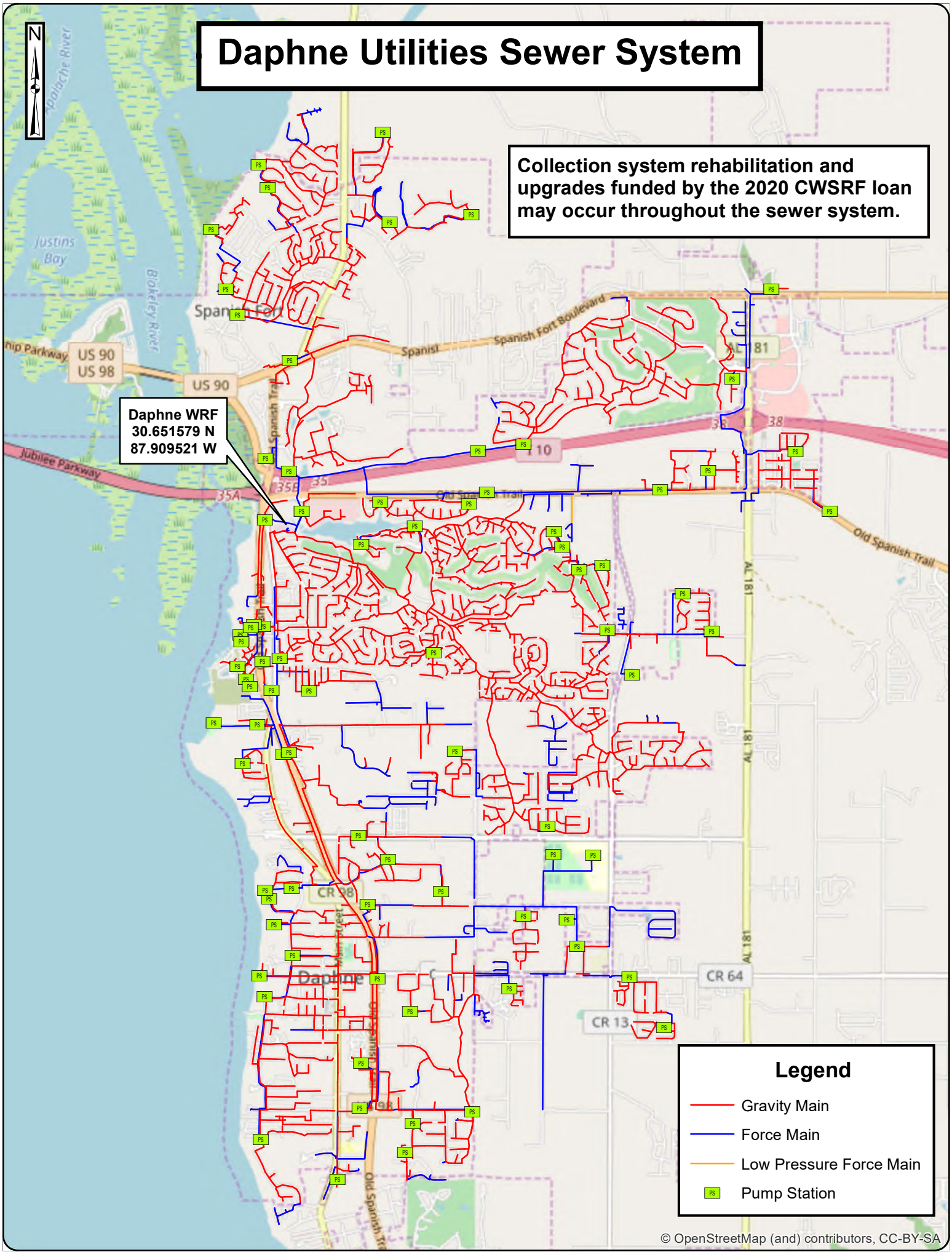
In order to improve the effluent quality, DU proposes to install a parallel UV system and add filtration equipment. The new UV system will be installed parallel to the existing system with a newer model that will improve operational efficiencies. The additional UV system will also allow for reducing reliance on the current back-up chlorination system. Immediately upstream of this process, a new filtration system will be installed providing tertiary filtration allowing for improved effluent quality for nutrients and TSS removal. The filter will also allow the UV system to operate at a higher efficiency and effectiveness by reducing solids in the water. The UV light transmission is improved resulted in improved target bacteria kill.

A new vortex grit removal system is planned to help provide additional removal of fine grit and sand that interferes with the treatment processes downstream and/or causes undue mechanical wear and increased maintenance on equipment.

Project E: Collection System Rehabilitation/Upgrades

This project proposes to rehabilitate and/or upgrade aging infrastructure within the existing sanitary sewer collection system to assist with reducing inflow/infiltration (I/I) and potentially related sanitary sewer overflows (SSOs) and improve overall operation and efficiency of the system. Since 2014, DU has been evaluating their system through closed circuit television (CCTV) and cleaning and manhole inspections. Supervisory Control and Data Acquisition (SCADA) is provided on all 82 lift stations. Data collected from SCADA has also been used to identify areas with higher inflow and infiltration experienced during rain events along with data collected from flow meters installed along gravity mains.

Since 2014, DU has initiated multiple contracts to rehabilitate the system including point repairs, cured in place piping (CIPP) lining of sewers, and manhole lining. Needs have been identified and prioritized and this project will aid in expediting critical areas in this ongoing work. Also, DU will continue to improve existing lift station sites through equipment replacement and modifications to provide greater energy efficiency and to protect the environment by accommodating surges experienced during peak flows, including wet weather events.


Daphne Utilities Sewer System
Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.
Daphne WRF
30.651579 N
87.909521 W
N
Legend
Gravity Main
Force Main
Low Pressure Force Main
Pump Station
Spanish Fort Boulevard
US 90
US 98
Jubilee Parkway
I 10
AL 181
CR 98
CR 64
CR 13
Daphne
Old Spanish Trail
Main Street
Justins Bay
Blakeley River
© OpenStreetMap (and) contributors, CC-BY-SA

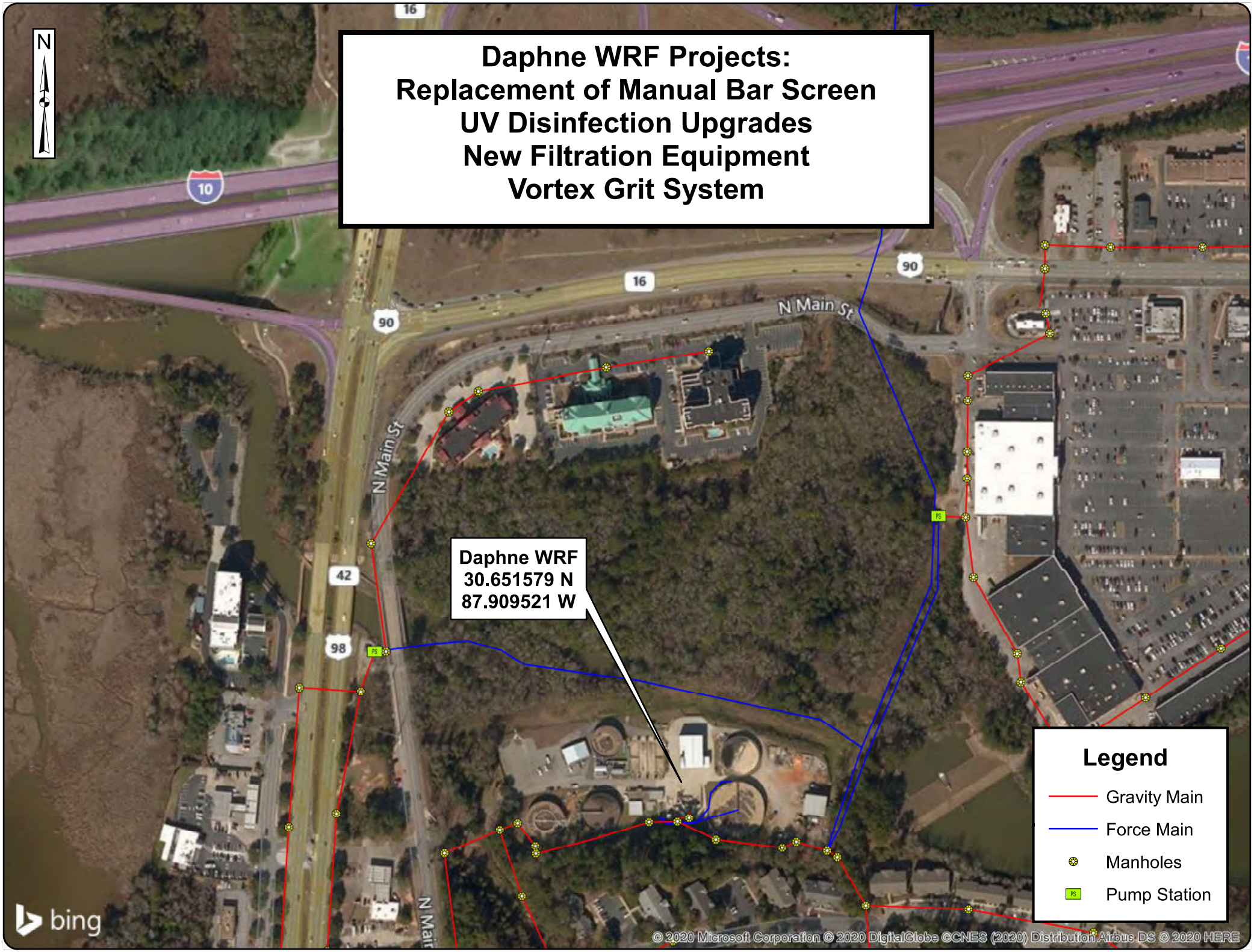
Daphne Utilities Sewer System

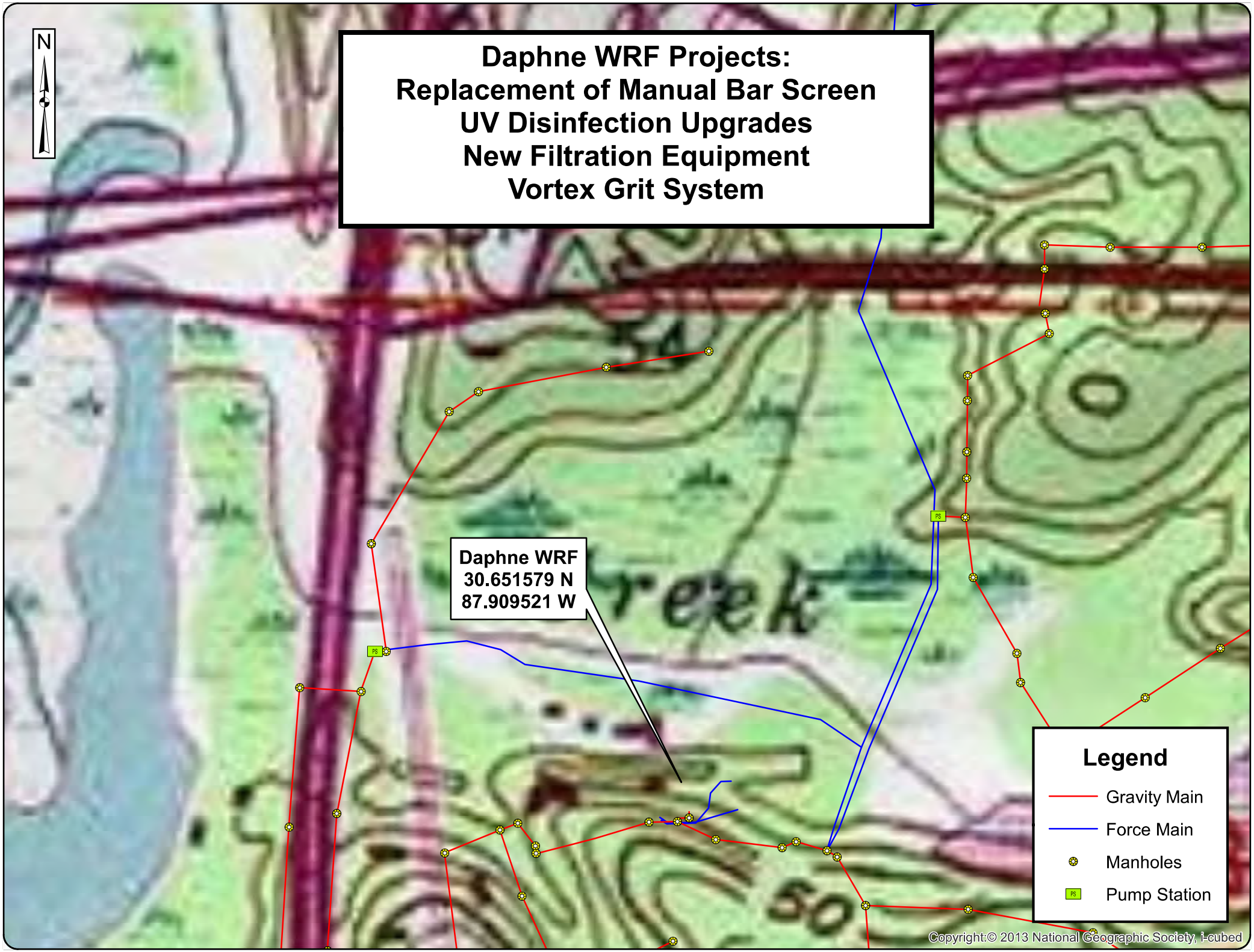
Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.

Daphne WRF
30.651579 N
87.909521 W

Legend

- Gravity Main
- Force Main
- Low Pressure Force Main
- PS Pump Station


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
16
10
90
16
N Main St
90
N Main St
42
98
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Manholes
Pump Station
bing
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Manholes
Pump Station
Copyright © 2013 National Geographic Society, i-cubed

Volkert, Inc.
1110 Montlimar Dr., Suite 560
Mobile, AL 36609
(251) 342-1070
www.volkert.com

April 6, 2020

2020 CWSRF Loan Application
(Contract No. 408219, Task No. 7)

Mr. John F. (Rickey) Rhodes
Executive Director
South Alabama Regional Planning Commission
P.O. Box 1665
Mobile, AL 36633

RE: 2020 CWSRF Loan Application Intergovernmental Review

Dear Mr. Rhodes:

The Utilities Board of the City of Daphne, Alabama (Daphne Utilities) is proposing to submit a 2020 Clean Water State Revolving Fund (CWSRF) Loan Application. We are forwarding the project descriptions and quad maps prepared for this application for an intergovernmental review on behalf of Daphne Utilities. Four projects included in this application involve work at the Daphne Water Reclamation Facility (WRF). This work is currently proposed to be completed within the boundaries of the existing fence. One of the projects included in this application involves the rehabilitation and/or upgrades of aging infrastructure within the sanitary sewer collection system. This proposed work will either be completed from within the pipe and manhole or lift station structures, or within the existing roadway or easement.

In accordance with the application, we are requesting that a response from your agency be provided in writing including any comments and concurrence with the proposed loan. Please direct your response to Daphne Utilities, c/o Mrs. Melinda D. Immel, P.E., Volkert, Inc., 28588 U.S. 98, Suite 9, Daphne, AL 36526, or by email at melinda.immel@volkert.com.

Please call either Marcus Stacey or me at (251) 342-1070 should you have any questions or require any additional information.

Sincerely,

Melinda D. Immel, P.E.
Assistant Vice President

MS

Enclosures

c Mr. Scott Polk – Daphne Utilities

Intergovernmental Review Procedures

Intergovernmental review of CWSRF funded projects is required pursuant to Executive Order 12372. To fulfill this requirement, the applicant is required to submit a copy of their CWSRF loan application to the following entity for review and comment. Responses from these entities indicating concurrence with the proposed project are required (in writing) and must be included with the CWSRF Loan Application:

Regional Planning Agency

Complete this form and transmit a copy of the CWSRF Application Form (Page 4 of this application) to your Regional Planning Agency.

A. Applicant Name and Address:

The Utilities Board of the
City of Daphne, Alabama
900 Daphne Avenue
Daphne, AL 36526

B. Catalog of Federal Domestic Assistance Number and Title:

No. 66.458 - State Revolving Loan Program

C. Date Application Sent to ADEM: _____

Authorized Representative: _____

(Signature)

PROPOSED PROJECT DESCRIPTIONS

Project A: Replacement of Manual Bar Screen

Project B: UV Disinfection Upgrades

Project C: New Filtration Equipment

Project D: Vortex Grit System

Project E: Collection System Rehabilitation/Upgrades

Projects A – D: Various Improvements at the WRF

Projects A-D will be located at the WRF. These projects will replace aging infrastructure, add new infrastructure to provide a higher quality effluent, and provide additional process capabilities and redundancy. Daphne Utilities is committed to providing a high-quality effluent at the WRF and these identified projects will assist with this commitment and overall operation of the facility.

Replacement of the manual bar screen with a redundant mechanical bar screen will help ensure that screening at the headworks continues to perform at a high level during planned and unplanned outages of the existing mechanical bar screen. A consistent high level of initial screening allows for improved downstream treatment and maintenance.

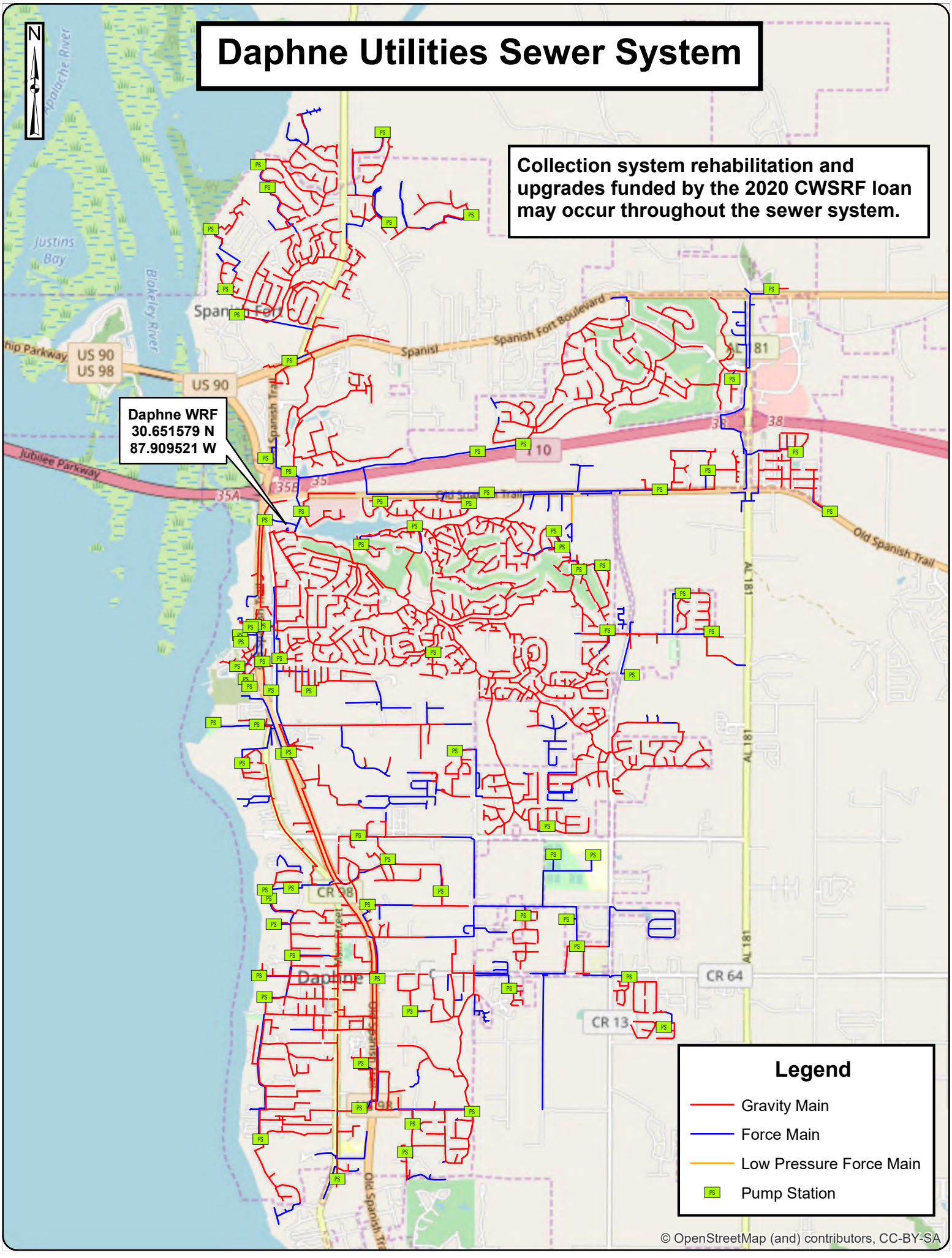
In order to improve the effluent quality, DU proposes to install a parallel UV system and add filtration equipment. The new UV system will be installed parallel to the existing system with a newer model that will improve operational efficiencies. The additional UV system will also allow for reducing reliance on the current back-up chlorination system. Immediately upstream of this process, a new filtration system will be installed providing tertiary filtration allowing for improved effluent quality for nutrients and TSS removal. The filter will also allow the UV system to operate at a higher efficiency and effectiveness by reducing solids in the water. The UV light transmission is improved resulted in improved target bacteria kill.

A new vortex grit removal system is planned to help provide additional removal of fine grit and sand that interferes with the treatment processes downstream and/or causes undue mechanical wear and increased maintenance on equipment.

Project E: Collection System Rehabilitation/Upgrades

This project proposes to rehabilitate and/or upgrade aging infrastructure within the existing sanitary sewer collection system to assist with reducing inflow/infiltration (I/I) and potentially related sanitary sewer overflows (SSOs) and improve overall operation and efficiency of the system. Since 2014, DU has been evaluating their system through closed circuit television (CCTV) and cleaning and manhole inspections. Supervisory Control and Data Acquisition (SCADA) is provided on all 82 lift stations. Data collected from SCADA has also been used to identify areas with higher inflow and infiltration experienced during rain events along with data collected from flow meters installed along gravity mains.

Since 2014, DU has initiated multiple contracts to rehabilitate the system including point repairs, cured in place piping (CIPP) lining of sewers, and manhole lining. Needs have been identified and prioritized and this project will aid in expediting critical areas in this ongoing work. Also, DU will continue to improve existing lift station sites through equipment replacement and modifications to provide greater energy efficiency and to protect the environment by accommodating surges experienced during peak flows, including wet weather events.


Daphne Utilities Sewer System
Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.
Daphne WRF
30.651579 N
87.909521 W
N
Legend
Gravity Main
Force Main
Low Pressure Force Main
Pump Station
US 90
US 98
I 10
CR 98
CR 64
CR 13
AL 181
Spanish Fort Boulevard
Old Spanish Trail
Jubilee Parkway
Daphne
Spanish Fort
Justins Bay
Blakeley River
© OpenStreetMap (and) contributors, CC-BY-SA

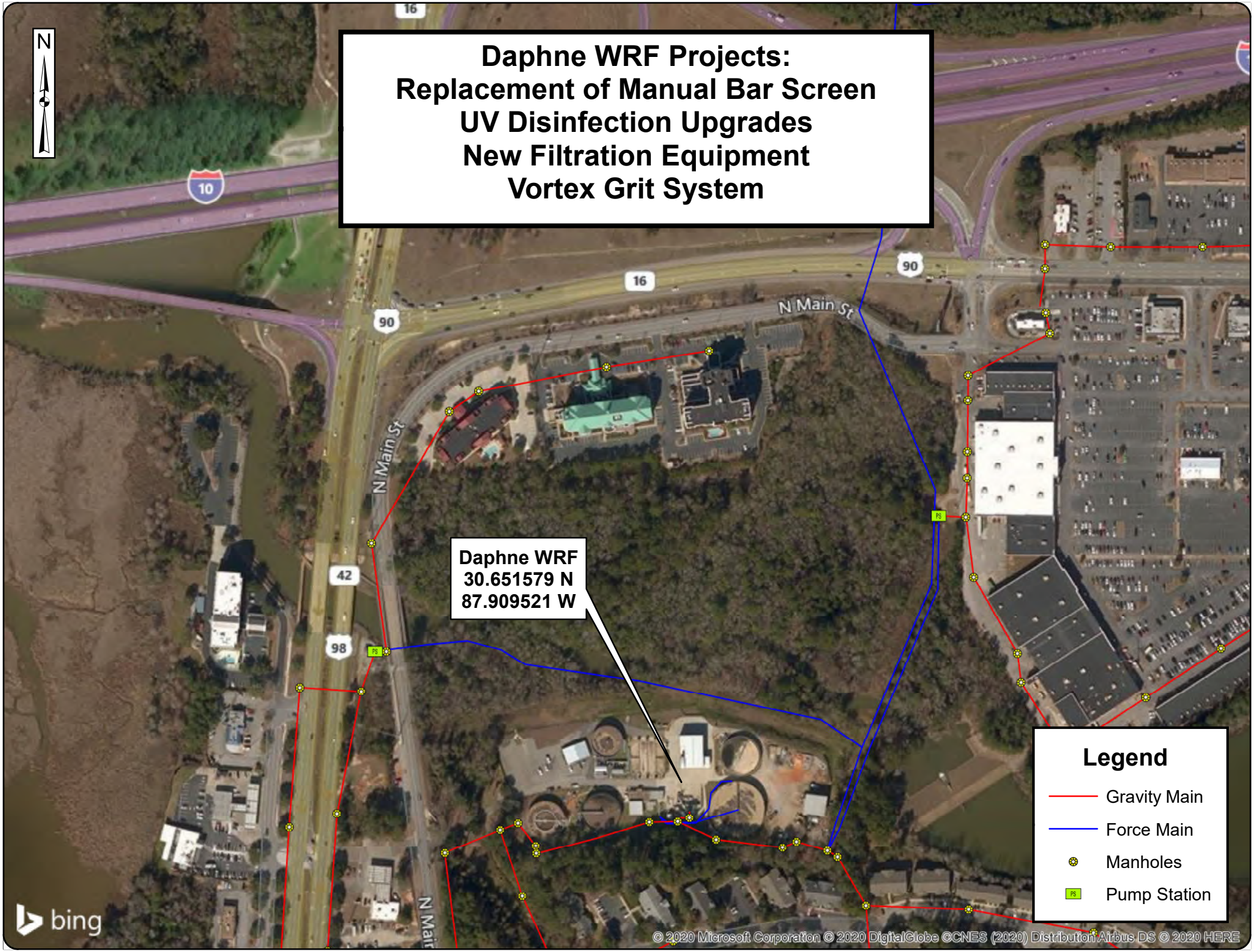
Daphne Utilities Sewer System

Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.

Daphne WRF
30.651579 N
87.909521 W

Legend

- Gravity Main
- Force Main
- Low Pressure Force Main
- PS Pump Station


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
10
16
90
N Main St
42
98
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Manholes
Pump Station
bing
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
Daphne WRF
30.651579 N
87.909521 W
PS
PS
Legend
Gravity Main
Force Main
Manholes
Pump Station
Copyright:© 2013 National Geographic Society, i-cubed

Stacey, Marcus

From: Stacey, Marcus
Sent: Monday, April 6, 2020 3:09 PM
To: cesam-rd@sam.usace.army.mil
Cc: scott@daphneutilities.com; Immel, Melinda
Subject: Concurrence Request for Daphne Utilities 2020 CWSRF Loan Application - WRF Projects
Attachments: Daphne Utilities 2020 CWSRF Loan Application - WRF Projects - Concurrence Request.pdf

The Utilities Board of the City of Daphne, Alabama (Daphne Utilities) is proposing to submit a 2020 Clean Water State Revolving Fund (CWSRF) Loan Application. Four projects included in this application involve work at the Daphne Water Reclamation Facility (WRF). We are forwarding the project descriptions and quad map prepared for this application for an intergovernmental review on behalf of Daphne Utilities. The work is currently proposed to be completed within the boundaries of the existing fence. It is not believed these projects include activities that would require a jurisdictional determination.

In accordance with the application, we are requesting that a response from your agency be provided in writing including any comments and concurrence with the proposed loan. Please direct your response to Daphne Utilities, c/o Mrs. Melinda D. Immel, P.E., Volkert, Inc., 28588 U.S. 98, Suite 9, Daphne, AL 36526, or by email at melinda.immel@volkert.com.

The contact information for Daphne Utilities is listed below:
Scott Polk
General Manager
900 Daphne Avenue
Daphne, AL 36526
scott@daphneutilities.com
251-626-2628

Please call either me or Melinda Immel at (251) 342-1070 should you have any questions or require any additional information.

Marcus Stacey
Utilities Department
Volkert, Inc.
Office Phone (251) 342-1070 Ext.1190
Cell Phone (251) 599-1974

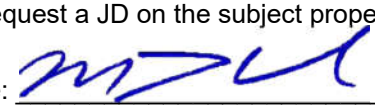
VOLKERT

Appendix 1 - REQUEST FOR CORPS JURISDICTIONAL DETERMINATION (JD)

To: U.S Army Corps of Engineers - Mobile District

- I am requesting a JD on property located at: 29280 N Main St, Daphne, AL 36526
  (Street Address)
  City/Township/Parish: Daphne County: Baldwin State: AL
  Acreage of Parcel/Review Area for JD: _____
  Section: _____ Township: _____ Range: _____
  Latitude (decimal degrees): 30.651579 N Longitude (decimal degrees): 87.909521 W
  (For linear projects, please include the center point of the proposed alignment.)
- Please attach a survey/plat map and vicinity map identifying location and review area for the JD.
- ☐ I currently own this property. ☐ I plan to purchase this property.
  ☑ I am an agent/consultant acting on behalf of the requestor.
  ☐ Other (please explain): _____.
- Reason for request: (check as many as applicable)
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.
  ☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.
  ☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.
  ☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.
  ☐ A Corps JD is required in order to obtain my local/state authorization.
  ☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.
  ☐ I believe that the site may be comprised entirely of dry land.
  ☑ Other: Corps concurrence is required by ADEM as part of the CWSRF loan application.
- Type of determination being requested:
  ☐ I am requesting an approved JD.
  ☐ I am requesting a preliminary JD.
  ☑ I am requesting a "no permit required" letter as I believe my proposed activity is not regulated.
  ☐ I am unclear as to which JD I would like to request and require additional information to inform my decision.

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the site if needed to perform the JD. Your signature shall be an affirmation that you possess the requisite property rights to request a JD on the subject property.

*Signature:  Date: 04/06/2020

- Typed or printed name: Melinda Immel

Company name: Volkert, Inc.

Address: 1110 Montlimar Dr. Suite 1050

Mobile, Alabama 36609

Daytime phone no.: 251-342-1070

Email address: melinda.immel@volkert.com

***Authorities:** Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

Please read below for additional information on requesting a Jurisdictional Determination (JD) from the U.S. Army Corps of Engineers:

If you have hired an environmental consultant to delineate the property, the wetland delineation should be sent to our office for verification. The wetland delineation should include a map showing the upland/wetland boundaries, the sample locations, and accompanying upland/wetland data sheets. The delineation can be provided to our office for verification in one of two ways: 1) You may request a Preliminary Jurisdictional Determination (PJD). We will review the delineation, visit the site, and provide a verification of the delineation, but the PJD does not assess whether the wetlands are jurisdictional or non-jurisdictional, the determination is not appealable, and the determination has no defined expiration. 2) You may request an Approved Jurisdictional Determination (AJD). We will review the delineation, visit the site, provide a verification of the delineation, and provide a definitive determination as to the jurisdictional status of the wetlands. An AJD is appealable and is valid for a period of five (5) years. The AJD will take longer to process and is typically useful for purchases of property where the owner/buyer has not yet planned how the property would be developed. The PJD can be processed much quicker than an AJD and is useful in situations where an individual elects to expedite the JD process by waiving the right to an AJD. If you request a PJD and based on the delineation you determine that you would need to apply for a permit to fill wetlands, the PJD would be valid for the length of the permit decision (not to exceed 5 years).

In summary, the delineation shows all the wetlands/waters on a property. The AJD is a lengthy review process that results in a definitive determination of which wetlands/waters are jurisdictional and would require a Corps permit to fill. The PJD is an expedited review process that results in a preliminary determination that assumes all wetlands/waters found onsite are jurisdictional and would require Corps permit to fill. If you intend to place fill material in jurisdictional wetlands, a Department of the Army permit would be required.

In order for us to evaluate your request, you will need to furnish the following information:

1) A letter requesting a jurisdictional determination. Please be sure to include your contact information (name, address, daytime phone number).

2) Your letter is to include permission for Corps personnel to access the site.

3) Vicinity map: A detailed road map to the site.

4) A copy of the property plat or survey showing the property boundaries and acreage of the parcel. Note: The corners of the parcel will have to be clearly marked.

5) If fill is proposed:
a) Show location of proposed fill on the plat or plan view drawing showing the dimensions (footprint) of the fill.
b) State the purpose for the fill.
c) Should an on-site visit be scheduled, you may be required to place several stakes to show the proposed fill area.

6) Complete as much as possible on the attached form, sign and return with your request package. Indicate the "Type of determination being requested" as appropriate

7) Requests should be emailed to cesam-rd@sam.usace.army.mil or may be mailed to the following address:

U.S. Army Corps of Engineers
Attention: Regulatory Division (RD-A)
P. O. Box 2288
Mobile, AL 36628-0001

PROPOSED PROJECT DESCRIPTIONS

Project A: Replacement of Manual Bar Screen

Project B: UV Disinfection Upgrades

Project C: New Filtration Equipment

Project D: Vortex Grit System

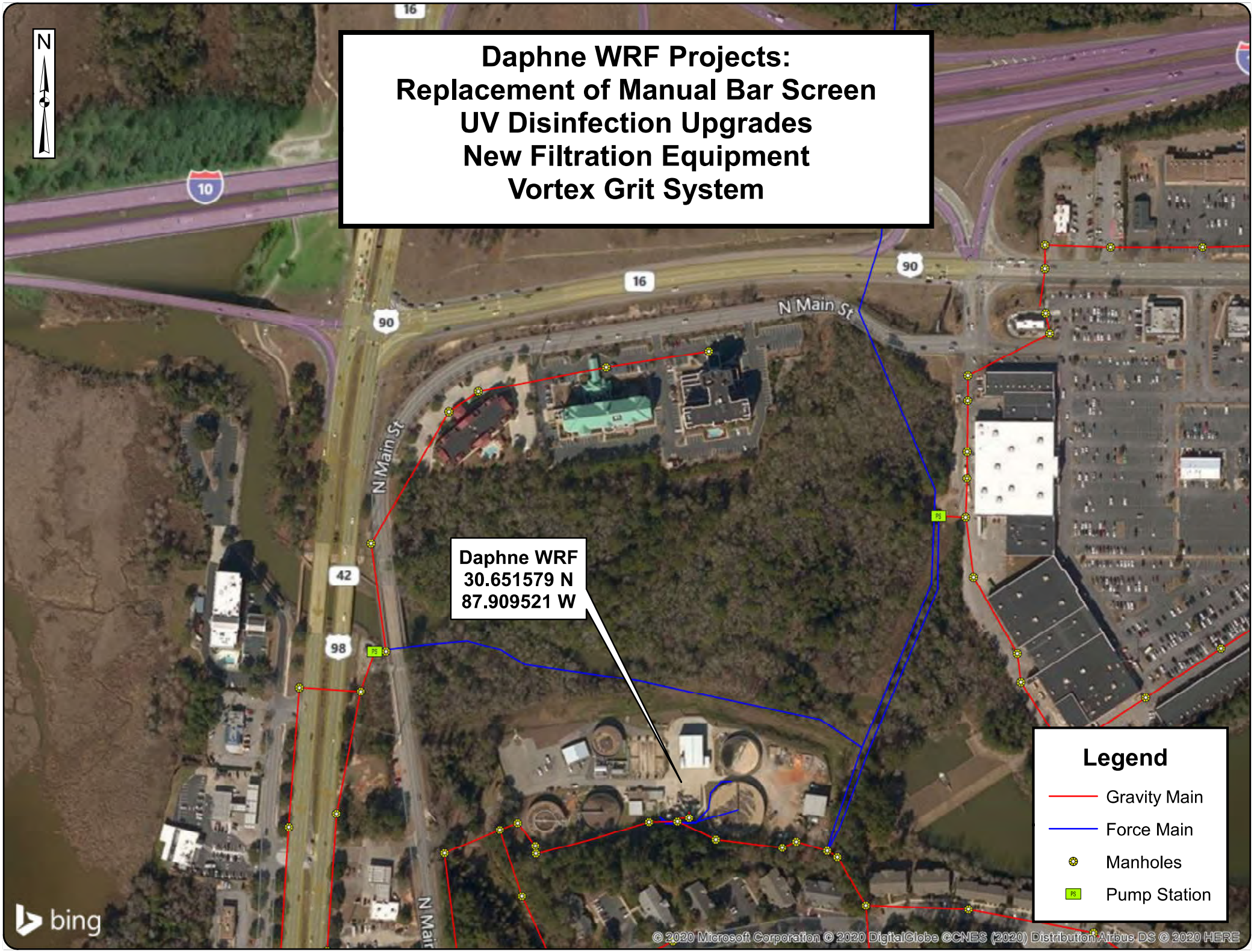
Projects A – D: Various Improvements at the WRF

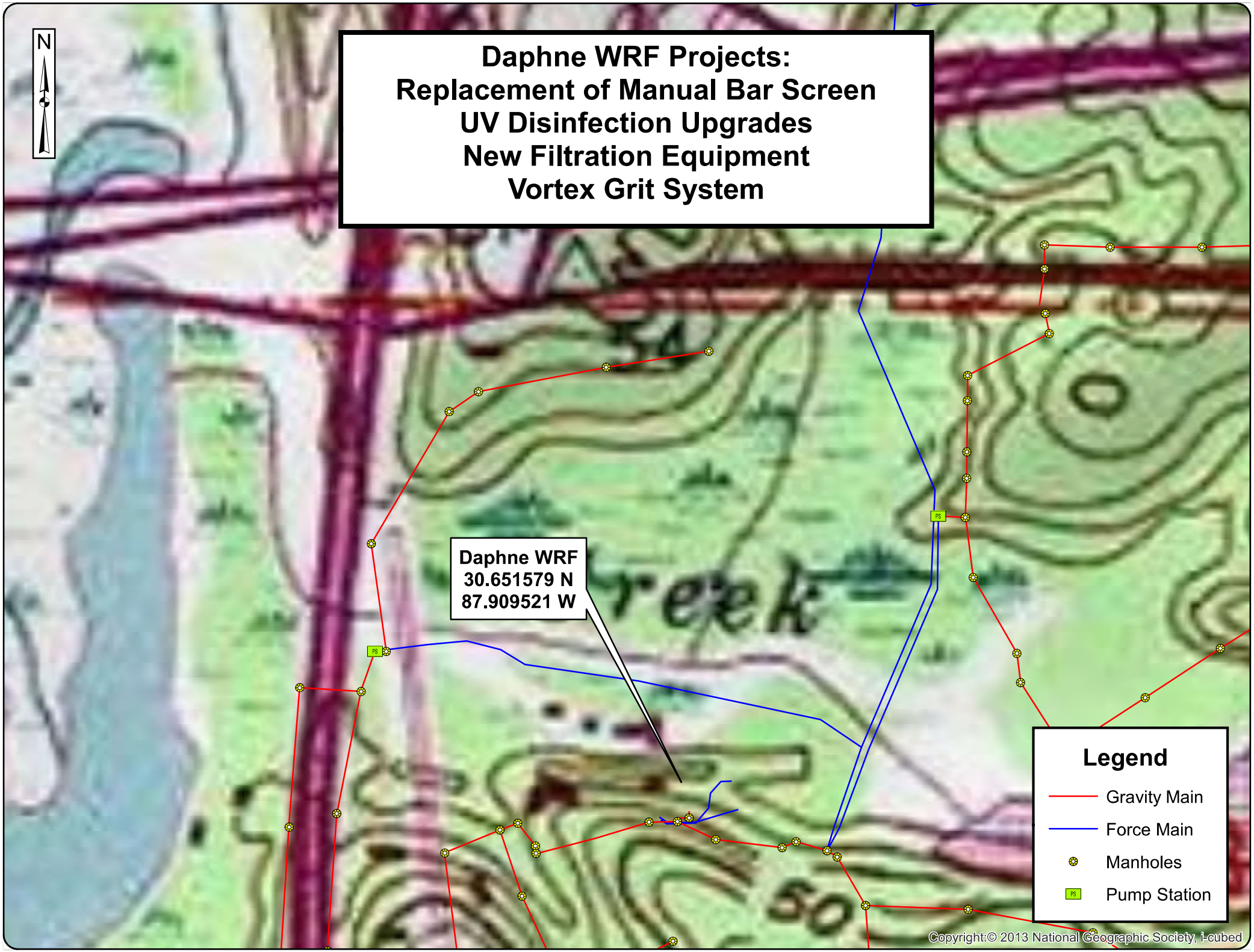
Projects A-D will be located at the WRF. These projects will replace aging infrastructure, add new infrastructure to provide a higher quality effluent, and provide additional process capabilities and redundancy. Daphne Utilities is committed to providing a high-quality effluent at the WRF and these identified projects will assist with this commitment and overall operation of the facility.

Replacement of the manual bar screen with a redundant mechanical bar screen will help ensure that screening at the headworks continues to perform at a high level during planned and unplanned outages of the existing mechanical bar screen. A consistent high level of initial screening allows for improved downstream treatment and maintenance.

In order to improve the effluent quality, DU proposes to install a parallel UV system and add filtration equipment. The new UV system will be installed parallel to the existing system with a newer model that will improve operational efficiencies. The additional UV system will also allow for reducing reliance on the current back-up chlorination system. Immediately upstream of this process, a new filtration system will be installed providing tertiary filtration allowing for improved effluent quality for nutrients and TSS removal. The filter will also allow the UV system to operate at a higher efficiency and effectiveness by reducing solids in the water. The UV light transmission is improved resulted in improved target bacteria kill.

A new vortex grit removal system is planned to help provide additional removal of fine grit and sand that interferes with the treatment processes downstream and/or causes undue mechanical wear and increased maintenance on equipment.


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
10
16
90
N Main St
42
98
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Manholes
Pump Station
bing
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Airbus DS © 2020 HERE


Daphne WRF Projects:
Replacement of Manual Bar Screen
UV Disinfection Upgrades
New Filtration Equipment
Vortex Grit System
N
Daphne WRF
30.651579 N
87.909521 W
Legend
Gravity Main
Force Main
Manholes
Pump Station
Copyright © 2013 National Geographic Society, i-cubed

Stacey, Marcus

From: Stacey, Marcus
Sent: Monday, April 6, 2020 3:22 PM
To: cesam-rd@sam.usace.army.mil
Cc: scott@daphneutilities.com; Immel, Melinda
Subject: Concurrence Request for Daphne Utilities 2020 CWSRF Loan Application - Collection System Rehabilitation and Upgrades
Attachments: Daphne Utilities 2020 CWSRF Loan Application - Collection System Rehabilitation and Upgrades - USACE Concurrence Request.pdf

The Utilities Board of the City of Daphne, Alabama (Daphne Utilities) is proposing to submit a 2020 Clean Water State Revolving Fund (CWSRF) Loan Application. One of the projects included in this application involves the rehabilitation and/or upgrades of aging infrastructure within the sanitary sewer collection system. We are forwarding the project description and quad map prepared for this application for an intergovernmental review on behalf of Daphne Utilities. The proposed work will either be completed from within the pipe and manhole or lift station structures, or within the existing roadway or easement. It is not believed this project includes activities that would require a jurisdictional determination.

In accordance with the application, we are requesting that a response from your agency be provided in writing including any comments and concurrence with the proposed loan. Please direct your response to Daphne Utilities, c/o Mrs. Melinda D. Immel, P.E., Volkert, Inc., 28588 U.S. 98, Suite 9, Daphne, AL 36526, or by email at melinda.immel@volkert.com.

The contact information for Daphne Utilities is listed below:
Scott Polk
General Manager
900 Daphne Avenue
Daphne, AL 36526
scott@daphneutilities.com
251-626-2628

Please call either me or Melinda Immel at (251) 342-1070 should you have any questions or require any additional information.

Marcus Stacey
Utilities Department
Volkert, Inc.
Office Phone (251) 342-1070 Ext.1190
Cell Phone (251) 599-1974

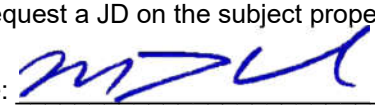
VOLKERT

Appendix 1 - REQUEST FOR CORPS JURISDICTIONAL DETERMINATION (JD)

To: U.S Army Corps of Engineers - Mobile District

- I am requesting a JD on property located at: Various locations. See attached map.
  (Street Address)
  City/Township/Parish: Daphne County: Baldwin State: AL
  Acreage of Parcel/Review Area for JD: _____
  Section: _____ Township: _____ Range: _____
  Latitude (decimal degrees):_____ Longitude (decimal degrees): _____
  (For linear projects, please include the center point of the proposed alignment.)
- Please attach a survey/plat map and vicinity map identifying location and review area for the JD.
- ☐ I currently own this property. ☐ I plan to purchase this property.
  ☑ I am an agent/consultant acting on behalf of the requestor.
  ☐ Other (please explain): _____.
- Reason for request: (check as many as applicable)
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.
  ☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.
  ☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.
  ☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.
  ☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 10 list and/or is subject to the ebb and flow of the tide.
  ☐ A Corps JD is required in order to obtain my local/state authorization.
  ☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.
  ☐ I believe that the site may be comprised entirely of dry land.
  ☑ Other: Corps concurrence is required by ADEM as part of the CWSRF loan application.
- Type of determination being requested:
  ☐ I am requesting an approved JD.
  ☐ I am requesting a preliminary JD.
  ☑ I am requesting a "no permit required" letter as I believe my proposed activity is not regulated.
  ☐ I am unclear as to which JD I would like to request and require additional information to inform my decision.

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the site if needed to perform the JD. Your signature shall be an affirmation that you possess the requisite property rights to request a JD on the subject property.

*Signature:  Date: 04/06/2020

- Typed or printed name: Melinda Immel

Company name: Volkert, Inc.

Address: 1110 Montlimar Dr. Suite 1050

Mobile, Alabama 36609

Daytime phone no.: 251-342-1070

Email address: melinda.immel@volkert.com

***Authorities:** Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

Please read below for additional information on requesting a Jurisdictional Determination (JD) from the U.S. Army Corps of Engineers:

If you have hired an environmental consultant to delineate the property, the wetland delineation should be sent to our office for verification. The wetland delineation should include a map showing the upland/wetland boundaries, the sample locations, and accompanying upland/wetland data sheets. The delineation can be provided to our office for verification in one of two ways: 1) You may request a Preliminary Jurisdictional Determination (PJD). We will review the delineation, visit the site, and provide a verification of the delineation, but the PJD does not assess whether the wetlands are jurisdictional or non-jurisdictional, the determination is not appealable, and the determination has no defined expiration. 2) You may request an Approved Jurisdictional Determination (AJD). We will review the delineation, visit the site, provide a verification of the delineation, and provide a definitive determination as to the jurisdictional status of the wetlands. An AJD is appealable and is valid for a period of five (5) years. The AJD will take longer to process and is typically useful for purchases of property where the owner/buyer has not yet planned how the property would be developed. The PJD can be processed much quicker than an AJD and is useful in situations where an individual elects to expedite the JD process by waiving the right to an AJD. If you request a PJD and based on the delineation you determine that you would need to apply for a permit to fill wetlands, the PJD would be valid for the length of the permit decision (not to exceed 5 years).

In summary, the delineation shows all the wetlands/waters on a property. The AJD is a lengthy review process that results in a definitive determination of which wetlands/waters are jurisdictional and would require a Corps permit to fill. The PJD is an expedited review process that results in a preliminary determination that assumes all wetlands/waters found onsite are jurisdictional and would require Corps permit to fill. If you intend to place fill material in jurisdictional wetlands, a Department of the Army permit would be required.

In order for us to evaluate your request, you will need to furnish the following information:

1) A letter requesting a jurisdictional determination. Please be sure to include your contact information (name, address, daytime phone number).

2) Your letter is to include permission for Corps personnel to access the site.

3) Vicinity map: A detailed road map to the site.

4) A copy of the property plat or survey showing the property boundaries and acreage of the parcel. Note: The corners of the parcel will have to be clearly marked.

5) If fill is proposed:
a) Show location of proposed fill on the plat or plan view drawing showing the dimensions (footprint) of the fill.
b) State the purpose for the fill.
c) Should an on-site visit be scheduled, you may be required to place several stakes to show the proposed fill area.

6) Complete as much as possible on the attached form, sign and return with your request package. Indicate the "Type of determination being requested" as appropriate

7) Requests should be emailed to cesam-rd@sam.usace.army.mil or may be mailed to the following address:

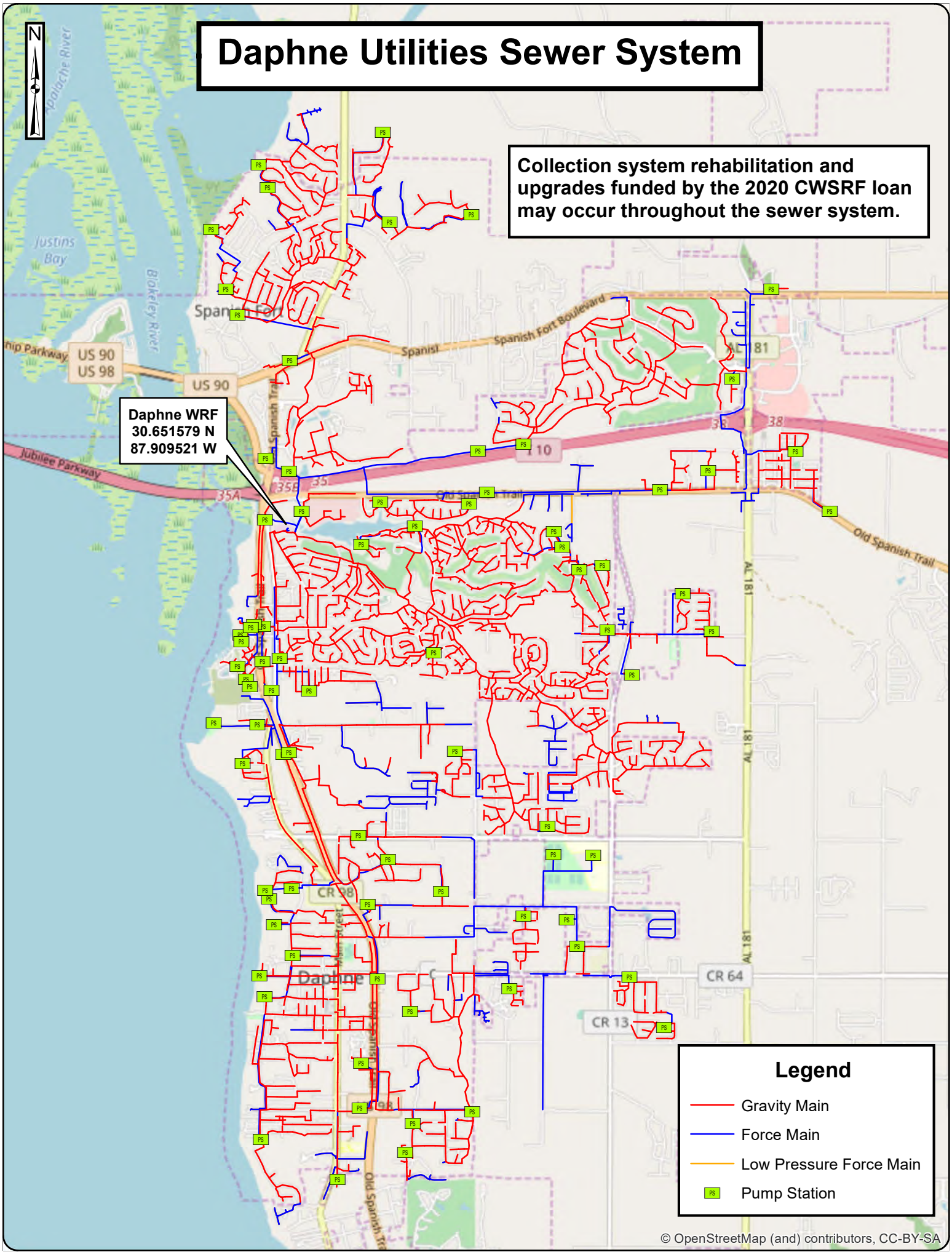
U.S. Army Corps of Engineers
Attention: Regulatory Division (RD-A)
P. O. Box 2288
Mobile, AL 36628-0001

PROPOSED PROJECT DESCRIPTION

Collection System Rehabilitation/Upgrades

This project proposes to rehabilitate and/or upgrade aging infrastructure within the existing sanitary sewer collection system to assist with reducing inflow/infiltration (I/I) and potentially related sanitary sewer overflows (SSOs) and improve overall operation and efficiency of the system. Since 2014, DU has been evaluating their system through closed circuit television (CCTV) and cleaning and manhole inspections. Supervisory Control and Data Acquisition (SCADA) is provided on all 82 lift stations. Data collected from SCADA has also been used to identify areas with higher inflow and infiltration experienced during rain events along with data collected from flow meters installed along gravity mains.

Since 2014, DU has initiated multiple contracts to rehabilitate the system including point repairs, cured in place piping (CIPP) lining of sewers, and manhole lining. Needs have been identified and prioritized and this project will aid in expediting critical areas in this ongoing work. Also, DU will continue to improve existing lift station sites through equipment replacement and modifications to provide greater energy efficiency and to protect the environment by accommodating surges experienced during peak flows, including wet weather events.


Daphne Utilities Sewer System
Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.
Daphne WRF
30.651579 N
87.909521 W
N
Legend
Gravity Main
Force Main
Low Pressure Force Main
Pump Station
Spanish Fort Boulevard
US 90
US 98
Jubilee Parkway
I 10
AL 181
CR 98
CR 64
CR 13
Daphne
Old Spanish Trail
Main Street
Justins Bay
Blakeley River
© OpenStreetMap (and) contributors, CC-BY-SA

Daphne Utilities Sewer System

Collection system rehabilitation and upgrades funded by the 2020 CWSRF loan may occur throughout the sewer system.

Daphne WRF
30.651579 N
87.909521 W

Legend

- Gravity Main
- Force Main
- Low Pressure Force Main
- PS Pump Station

APPENDIX G

PUBLIC PARTICIPATION

Stacey, Marcus

From: Doherty, Keturah
Sent: Wednesday, April 29, 2020 1:24 PM
To: MPR - Legal Ads Dept.
Cc: DU - Scott Polk; 'DU - Bobby Purvis (bobby@daphneutilities.com)'; DU - Teresa Logiotatos
Subject: LEGAL NOTICE FOR PUBLIC MEETING: 2020 C&DWSRF Loans (Volkert Proj. #0408219 Task 7)

Please publish this Legal Notice for Public Meeting on the dates listed below:

Daphne Utilities Holding Public Meeting Via Conference Call on Proposed SRF Loan Applications

Daphne Utilities (DU) will hold a public meeting via a conference call on June 1, 2020, at noon, 12:00 p.m., central time, to answer questions and review project descriptions for both a potential 2020 Clean Water State Revolving Fund (CWSRF) loan and a 2020 Drinking Water State Revolving Fund (DWSRF) loan. The loans would be used for various improvements to the DU wastewater collection and treatment systems and water distribution and treatment systems. A summary of the projects proposed to be included in both applications, along with the related Environmental Information Documents is available on line at www.daphneutilities.com.

Please contact Daphne Utilities during normal business hours at 251-626-2628 M- F 7:30 – 4:30 to receive the conference call phone number and access code for the public meeting.

Sunday, May 3, 2020
Sunday, May 10, 2020
Sunday, May 17, 2020
Sunday, May 24, 2020

Your bill for this service should be directed to:

Ms. Teresa Logiotatos
Utilities Board of the City of Daphne, Alabama
P.O. Box 2550
Daphne, AL 36526
(251) 626-2628

Please call or email should you have any questions or require additional information.

Keturah V. Doherty
Administrative Assistant | Utilities Department | Volkert, Inc.
1110 Montlimar Drive, Suite 560 | Mobile, AL 36609 | www.volkert.com
Office: 251.342.1070 x1297 |Cell: 251.648.0862