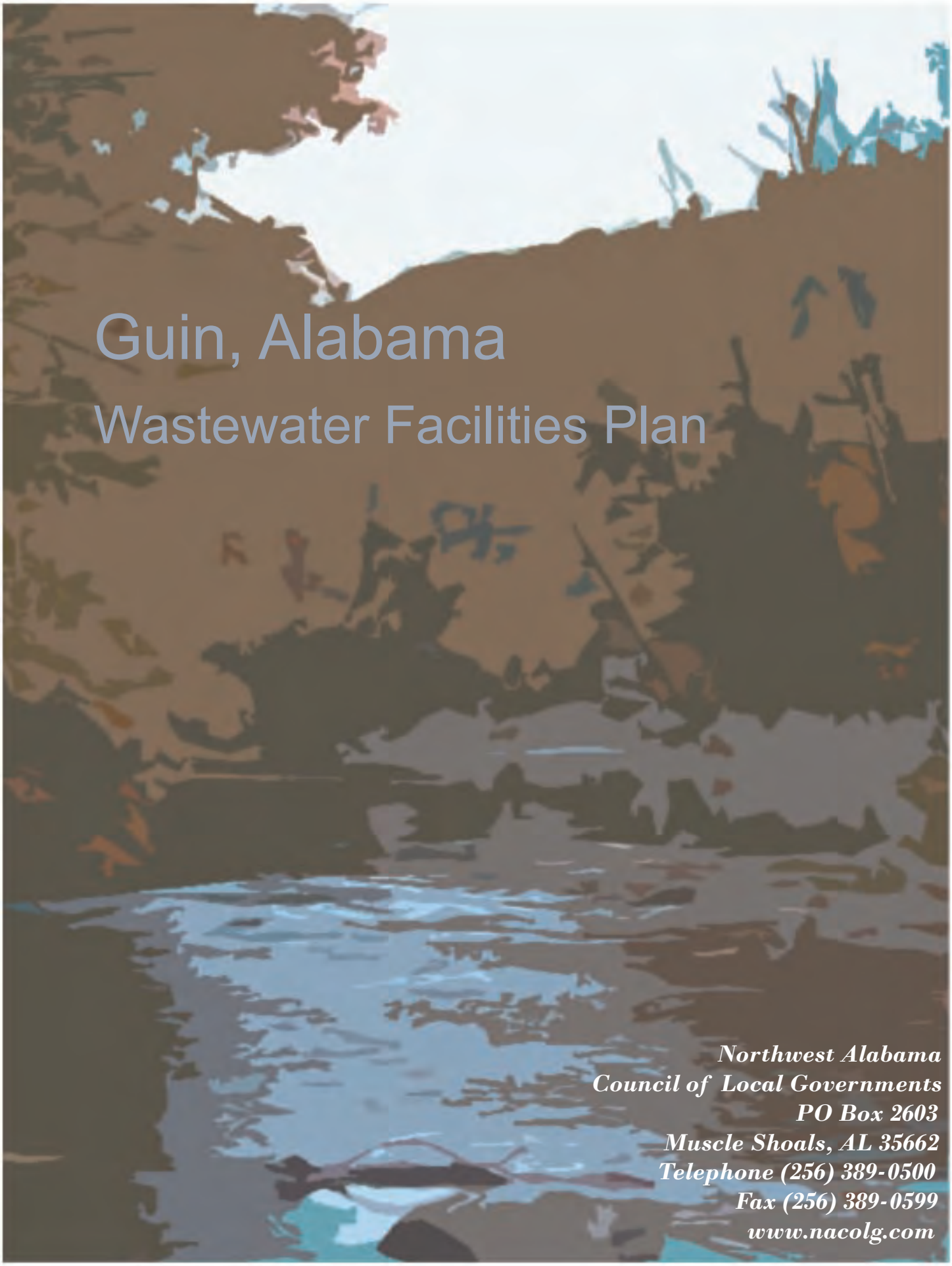


Guin, Alabama

Wastewater Facilities Plan

Northwest Alabama
Council of Local Governments
PO Box 2603
Muscle Shoals, AL 35662
Telephone (256) 389-0500
Fax (256) 389-0599
www.nacolg.com

GUIN, ALABAMA

WASTEWATER FACILITIES PLAN

Guin, Alabama

Mayor, Phil Segraves

Marion County Commission,

Chairman, Kenny Jackson
Bobby Boyett
Bobby E. Burleson
Don Barnwell
Mike Davis

Guin City Council:

Roger Agnew
Clarence Atkinson
Bobby Bellew
Phillip Garrison
Randall Guin
Elaine Junkin
Wade Peoples

Executive Director, Marion County Industrial Development Authority:

David Graham

This Project was funded or partially funded by the U.S. Environmental Protection Agency and the Alabama Department of Environmental Management

Jointly Prepared by:

Northwest Alabama Council of Local Governments (NACOLG)
103 Student Drive
Muscle Shoals, Alabama 35661
&
Hankins and Reed Engineering
P.O. Box 527
Vernon, Alabama 35592

September, 2005

Table of Contents

1.0 EXECUTIVE SUMMARY

The purpose of the Wastewater Facilities Plan was to analyze the existing characteristics of the City of Guin and the proposed Commercial and Industrial Parks and to present alternatives for the present and future sanitary sewer wastes. Characteristics including population trends, economy, housing and land use were evaluated to determine alternatives that would fit the city. A proposed wastewater system including collection and treatment alternatives for the proposed parks was studied and alternatives were evaluated.

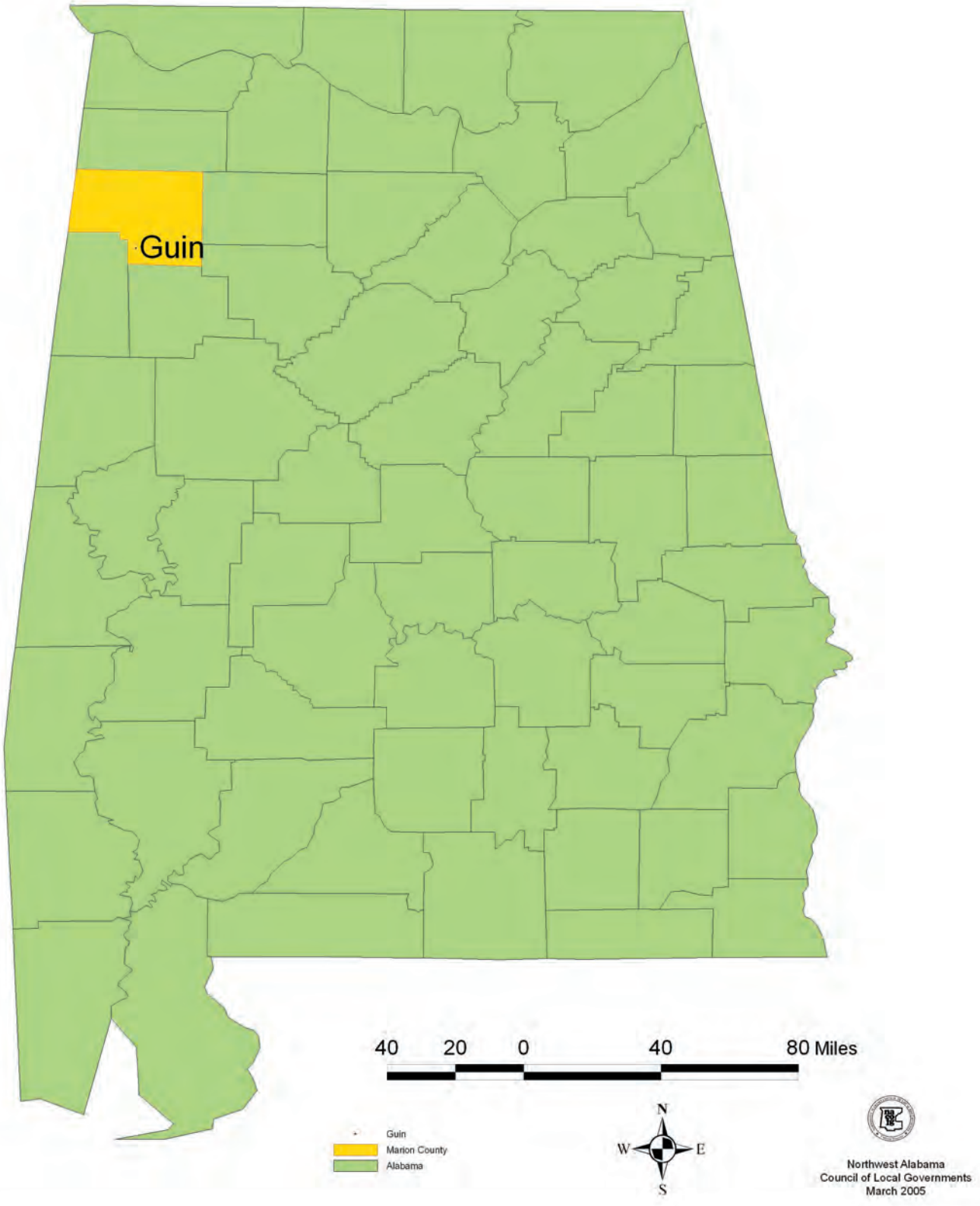
The first step was to establish wastewater flow rates that the city and proposed parks could potentially produce. Currently the system treats approximately 350,000 gallons per day of waste. Utilizing historical growth rate date, the system is projected to treat 975,000 to 1.2 million gallons per day at the end of the 20-year study period. Estimates were also compiled for flows from the proposed commercial and industrial parks. The initial projection for both parks is 20,000 gallons per day, with an expected growth to 35,000 to 45,000 gallons per day in 20 years.

Next, characteristics of the study area were evaluated to establish criteria for the sewer system. Data that is unique to the City of Guin including natural resources and infrastructure were compiled and analyzed. The local population, economy, and housing were researched and future projections were made as to how the city could expect to change in these areas. The existing land use of the area was studied and plans for future developments were shown.

Next, various treatment alternatives for wastewater were looked at to determine possible solutions for the city to use. Alternates including treating the waste on-site at the park location and pumping the waste to the city's existing system were discussed and cost estimates for each was compiled. Alternates were also discussed for disposing of the treated effluent from an on-site treatment facility. A preliminary cost estimate of $500,000 was presented for treating wastewater on site and disposing through a spray irrigation method at the site of the parks. A preliminary estimate of $572,000 was presented for pumping the waste to the city's existing system. Potential funding sources were listed through which the town could finance the activities described.

Based on the findings of the wastewater facilities plan, recommendations can be made to the city as to steps that should be taken. In the initial development of the commercial and industrial parks, on-site sewage treatment and disposal will be the most economical alternative. This can be accomplished by installing individual treatment systems on each site or through a combined system inside the industrial park property. At a point when multiple industries and commercial establishments have located in the park, producing combined flows of 20,000 gallons per day and greater, the city will need to consider the construction of a treatment facility. A collection and treatment system could be constructed in phases to accommodate growth as users increase. The recommendation for treatment includes a packaged mechanical treatment plant with disposal through on-site spray irrigation.

Guin Wastewater Facility Study
Location Map



2.0 GENERAL SCOPE OF THE WORK

This study analyzes land use, economic, and growth patterns of the Town of Guin and surrounding community areas of South Marion County. These analyses were completed to assist in developing a long-range wastewater facilities plan for the Town of Guin. This study is a joint venture of the Northwest Alabama Council of Local Governments (NACOLG) and Hankins and Reed Civil Engineers & Land Surveyors pursuant to the agreement made and entered January 18th, 2005.

NACOLG prepared the physical analysis, demographic evaluations, economic data, housing assessment and land use abstract sections of the document (sections 3.0, 4.0, 5.0, 6.0, 7.0). Hankins and Reed Civil Engineers & Land Surveyors compiled the sections describing estimates for wastewater flow rates and treatment alternatives, recommendations, discussions of potential funding sources, scope and summary (sections 1.0, 2.0, 8.0, 9.0, 10.0, and 11.0)

The study area is located in the lower Southern portion of Marion County, Alabama and is delineated by a circumference of 5 miles from the city center. The city center is demarcated by the City Hall of Guin and is defined by the coordinates 33°57'57.19" North, 87°54'51.26" West. The projection period for the study is twenty years. The population and flow rate projections were extended to 40 years. The objectives of the sewer facilities study were as follows:

- Provide preliminary estimates for potential sewage flow rates from the study area.
- Provide preliminary sizes and locations for potential collection and treatment facilities.
- Evaluate alternative collection, treatment and disposal options.
- Provide preliminary recommendations and cost estimates for the most feasible alternatives.

3.0 CHARACTERISTICS OF STUDY AREA

3.1 General

The City of Guin Planning Study Area is located within a 5-mile radius of the city hall, which is understood in this study as the heart of the Guin community. The study area encompasses the Guin incorporated boundary **(Figure 3.1)**.

The Planning Study Area (PSA) is rural with traditional characteristics of agricultural communities. The Guin City Hall combined with a cluster of residential and commercial structures compose the core of the Guin community **(Figure 3.2)**. Guin City Hall sits on Main Street near the intersection of Alabama State Highway 171 and Alabama State Highway 107. The regional terrain is flat to slopping with the lowest elevation at 371 feet and the highest elevation being 810 feet within the planning study area **(Figure 3.3)**. The Town of Guin Water System serves the city of Guin proper and is linked into the Marion County Water System providing additional capacity. The City of Guin operates a residential and commercial sanitary sewer treatment facility that has capacity of .5 million gallons per day. This system is currently operating at 70% capacity.

3.2 Climate

The Planning Study Area has a moderate climate. The climate on an annual basis varies from hot summers of long duration with sporadic precipitation to mild winters with abrupt periods of extreme cold. Consistent and sufficient precipitation is prevalent throughout the region.

The average summer temperature is 76 degrees Fahrenheit (F°) and average daily maximum is 89.7 F°. In the winter the average temperature is 27.8 F°. Typically, initial freezing temperatures are encountered each year during the latter part of November and continue on a sporadic basis until mid-March. Average annual rainfall is approximately 60.7 inches per year

with 45 percent typically falling between April through September. The average number of frost-free days exceeds 200 days annually. Annual Snowfall is negligible for the Planning Study Area (PSA).

3.3 Topography

The topography in the planning study area is flat to moderately sloping. Elevations within the incorporated boundary are from 430 feet to 710 feet above mean sea level with the collection of urban structures resting on a rise at 455 feet above sea level.

3.4 Soils

The 1976 Soil Survey of Marion County, published by the Soil Conservation Service, provides a detailed assessment of the soils, their properties, and how those properties may potentially affect development, and therefore the need for sanitary sewer services. For the purpose of this study, the impact of soil properties on the use of on-site septic tank fields is the most important issue. Unsatisfactory performance of septic absorption fields, including excessively slow absorption of effluent, surfacing or effluent, and hillside seepage, can affect public health. Sufficient unsaturated soil material must be found beneath the absorption field to filter the effluent effectively.

The soils in the PSA are most commonly composed of the Savannah-Urban Land Complex association with nearly level and gently sloping and moderately well drained areas with slopes of 0 to 6 percent. In addition to the Savannah soils are the Iuka Manatachie-Stough association and the Smithe-Dale-Luverne-Flomaton association soil types. The Iuka – Manatahcie – Stough association is deep, moderately well drained to poorly drained soils. An extremely high groundwater table is associated with the soil association. Slopes range from 0 to 2 percent. The Smithe – Dale – Luverne – Flomaton Association is well drained to excessively drained, gravelly soils occurring on steep hillsides. Since these soils are shallow and well drained, groundwater has negligible effect on the collectors lying within this association.

Slopes range from 15 to 35 percent. Most of the areas of the Savannah-Urban Land Complex are artificially drained with sewer systems, gutters, drainage tiles and to a lesser extent, surface ditches. The Savannah soil has a seasonal high perched water table at a depth of 18 to 36 inches late in winter and in spring. The Savannah soil is low in natural fertility and in organic matter content. Permeability is moderate in the upper part of the subsoil and moderately slow in the fragipan. Available water capacity is moderate.

3.5 Geologic Characteristics

The geologic formations in the planning study area are of sedimentary origin and range in age from Cretaceous to Mississippian. The parent material consists of limestone, sandstone and shale. Geologic units include the Tuscaloosa formation with undifferentiated gravel, sand and clay within the study area. The physiography of the Planning Study Area is within the Gulf Coastal Plain and is found to be characteristically rolling to flat with slopes of 0 to 6 percent.

3.6 Groundwater Availability

Precipitation is the source of groundwater in the area. Part of the precipitation seeps into the zone of saturation to become groundwater. Groundwater will be slowly modulated over a period of days after a rainfall. Thus, a delayed infiltration or perched water infiltration effect is associated with Guin soils.

3.7 Natural Resources

The primary natural resources are created by the underlying geologic formations. The PSA contains large amounts of forested land with quality timber resources. In addition are mineral resources within Marion County and the PSA with a reduced amount of overburden for greater economic efficiency in harvesting. Sand and gravel resources are predominating within the Planning Study Area and the surrounding region.

3.8 Critical Sites Within Planning Study Area

3.8.1 Historical Sites:

Previous contact with the Alabama Historical Commission, State Historic Preservation Officer (SHPO), has indicated that there is no need of a formal request be submitted for a routine document search for the planning study area. The SHPO has indicated that prior to the development of detailed plans a submittal should be forwarded for the specific site to be utilized and a resource assessment to be conducted by a professional archeologist. Prior to the commencement of any wastewater collection and/or treatment system a more specific site evaluation should be submitted to the SHPO and clearance received for the specific site and project.

3.8.2 Landfill and Solid Waste Disposal(s):

The City of Guin operates a house to house collection service that serves residential, commercial and industrial customers. The residential commercial customers are picked up approximately once per week and the industrial customers are served on demand. The town operates a yard waste collection on demand. Residential solid waste collection is provided by the City of Guin Solid Waste Department. Local solid waste companies provide for commercial and industrial container service and transportation. Solid waste disposal is available at a nearby transfer facility and landfills. BFI operates a transfer station for non-hazardous waste approximately three miles from Guin. A construction and demolition landfill is located near Guin that can accept nonhazardous/no pesticidal waste. There is currently one collection point for inert materials in Marion County. The site is located between Guin and Hamilton, Alabama all other materials are transferred by BFI to their Summerton, Alabama site.

3.9 Planning Study Area Hydrological Cycle

Basic atmospheric processes account for the hydrologic cycles of the planning area. The basic cycles consist of the evaporation of water from the Gulf of Mexico and lesser bodies of surface water in the region. This vapor moisture is then transported by regional air currents and eventually deposited as precipitation primarily as rainfall and the uncommon accumulation of snow. This precipitation then either collects as surface drainage in one of the numerous watercourses or bodies of water, or infiltrates into the groundwater system. Small quantities of rainfall are directly intercepted by vegetation. Surface waters either impound and evaporate to return as precipitation or traverse via discrete channels to the Gulf of Mexico where the evaporation process reoccurs thereby completing the hydrologic cycle.

3.10 Flood Prone Areas Within Planning Study Area

The City of Guin Planning Study Area has isolated areas of localized flooding due to local drainage patterns. The major areas subject to a one hundred year flood are along Reedy Branch, Little Creek, Purgatory Creek, Wickett Creek and Beaver Creek. A copy of the flood hazard map as developed by FEMA accompanies this report. **(Figure 3.4)** The enclosed map is derived from the Flood Insurance Rate Map and shows the flood hazard area around the Guin Planning Study Area.

3.11 Prime Farmland

The Guin Planning Study Area contains a significant number of small farms broken up by scattered residential and commercial development. This area has historically been a producer of common agricultural products with minimal limitations caused by slope conditions. Cotton, soybeans, poultry and cattle are the major agricultural income producers to the local agricultural economy of Guin.

3.12 Planning Study Area Air Quality

The Tennessee Valley Authority (TVA) has performed air quality studies on several counties within the Northwest Alabama region. An air quality assessment was performed for surrounding counties around Marion County. Air quality monitoring showed good air quality within those counties and qualitative analysis by the NACOLG staff indicates no reason this would be of a different circumstance within the planning study area for this report.

3.13 Water Systems Analysis

3.13.1 Existing System

Public water in the planning study area is provided by the Town of Guin, which operates the distribution center for this part of the county. The City of Guin provides clean water to the local citizens and industry through the 1 million gallons per day treatment plant. The treatment plant is currently operating at 50% capacity while exceeding the regulatory requirements of the Alabama Department of Environmental Management. The City of Guin and Marion County water supply systems are linked together providing additional capacity to both the city/county residents and industry.

Water pressure is generally adequate for the current customer load, but the expected increase of industrial and residential use due to Appalachian Regional Commission's Appalachian Development Highway System (ADHS) is seeing development changes. The ADHS route Corridor X future I-22 that traces the U.S. Highway 78 North of the planning study area will affect consumption rates as economic development opportunities arise.

3.14 Transportation System

Surface transportation in the planning study area is good and is currently under construction for improvements within the downtown of Guin and heading east to

Winfield. The community is served by a series of roads and streets generally following the topographic relief of the terrain. Major access to the region from the North is by way of State Route 43(US 78/278/SR 17) running North and South and US 278 (SR 118) running from the West into downtown Guin. From downtown US 43 (US 278) / SR 118/SR 1 picks up and continues Eastward into the Town of Winfield. Just North of the Planning Study Area sets U.S. Highway 78 or Future I-22. This new interstate is expected to expand development opportunities just North of Guin. The town has had the foresight to purchase property along the corridor.

3.15 Drainage

The area has relatively good drainage characteristics due to the sloping topography and system of ditches and small streams. Runoff for the planning study area is predominately southwestern to the Tombigbee River in Mississippi via Purgatory Creek into Beaver Creek flowing southwest into Lamar County.

3.16 Recreation

Recreational programs for the incorporated area are associated with the local school system as well as Hayden Riley Park which contains three softball and baseball fields, tennis courts, swimming pool and Water Park. In addition to the active recreational opportunities are many areas within the park for passive recreation such as the picnic areas.

Privately held tracts of forested and agricultural land have offered recreational activities to outdoor enthusiast for present and future generations. The northwest side of the state is considered an outdoor tourist's paradise with rural and urban communities forming partnerships to achieve regional goals in tourism and recreation.

4.0 Incorporated Boundary Population Trends

4.1 Population Trends

The City of Guin has experienced marginal growth over the past decade with a population estimate of 2,418 in the United States Census Bureau Report of 1980. The 1990 Census saw an influx of 46 persons for a total of 2,464 people within the city boundary. The census data for the year 2000 reported and decrease of population for a total of 2,389 residents. Comparatively Marion County's population in the 1990 census accounted for 29,830 persons with the 2000 census estimates of 31,214. Marion County has seen an estimated increase of 1,384 people with 2000 population evaluations.

4.2 Population Projections

Traditional population projection methodology will result in acceptable projections for the fifty-year estimate. However the accuracy of population projections is directly proportional to the size of the existing population and the historical rate of growth and inversely proportional to the length of the time projected. Therefore it is difficult to accurately predict in long-range projections a small population with marginal growth or reduction in population. The following projections are based on the previous two decades of census data. Using the 1980, 1990 and 2000 census the rate of change is -1.45. This rate of change is based on the reduction in population seen from 1990 to the year 2000. With a small population to be used in the projections, a reduction can appear to result in a continued loss of population. This is under the assumption that population trends do not have in outside influences that can cause major population fluctuations. In the case of Guin the negative rate of change has been caused by an outside influence in manufacturing employment. A similar but positive influence in population change will most likely occur with the completion of Corridor X or Interstate 22. The linear growth projection methodology was applied and the projected populations do not take into account possible population expansion based upon the opening of the new transportation corridor in the region.

Table 4.1
Town of Guin Incorporated Area
Population Projections

Year	Base Population/Projected
2000	2,389
2025	2,352
2050	2,316

Source: NACOLG Linear Projections

4.3 Population Profile 2000 Census

Females compose 54.3 percent of the Guin population while males makeup 45.7 percent of the population in 2000. The largest age group in the 2000 census is the 35 to 44 year olds. The working population 16 years and over make up 1,876 of the of the 2,389 persons in the census data at 78% while 65 years and over is 54 persons at 19.7%. School age children represent 22 % of the population. **(Table 4.2)** shows the population by sexes and age.

Table 4.2 Sex and Age Population Profile 2000 Census

Subject	Number	Percent
Male	1,092	45.7%
Female	1,297	54.3%
Under 5 Years	147	6.2%
10 to 14 Years	163	6.8%
15 to 19 Years	155	6.5%
20 to 24 Years	123	5.1%
25 to 34 Years	297	12.4%
35 to 44 Years	314	13.1%
45 to 54 Years	292	12.2%
55 to 59 Years	131	5.5%
60 to 64 Years	152	6.4%
65 to 74 Years	234	9.8%
75 to 84 Years	146	6.1%
85 Years And Over	91	3.8%
Median Age (Years)	40.4	NA
18 Years And Over	1,840	77%
Male	817	34.2%
Female	1,023	42.8%
21 Years And Over	1,751	73.3%
62 Years And Over	558	23.4%
65 Years And Over	471	19.7%
Male	155	6.5%
Female	316	13.2%

4.4 Academic Institutions and Educational Attainment

Youth in and around the City of Guin attend Guin Elementary and Marion County Public Schools. Both School systems consistently score above average on achievement tests. Private academies within the area are Liberty Christian Academy that has been serving Marion County since 1977. The Guin Elementary School serves students through the grades K-12 and is located at 7980 U.S. Highway 43 Guin, Alabama 35563. Enrollment for the 2000 – 2001 academic year at Guin Elementary was 272 students. Marion County High School is located at 8115 U.S. Highway 43 Guin, Alabama 35563. Enrollment for the 2000 – 2001 academic year at Marion County High School was 250 students.

Educational statistics based on the 2000 census for the city of Guin are derived from the population 25 and over (1,636 persons), which show 12% completing educational classes less than 9th grade. The high school graduation rate for 25 years of age and over is 34.4%. The percentage of residents completing a bachelor's degree is 8.1 percent with 4.6 percent completing a graduate or professional degree.

5.0 Economy

5.1 Major Employers of Guin:

Industry	Product	Number of Employees
Alexander Heating/Cooling	Retail Maintenance Service	6
All Occasions Specialty	Retail Service	3
Associated Products		4
Beauty Control Cosmetics	Retail Service Cosmetics	1
Black's Hardware	Retail Service	3
Cheryl's Beauty Shop	Retail Service	1
Citgo Convenience Store	Retial Service	10
Country corner	Retail Service	3
Custom Designs	Retail Service	2
David Beaty's Body Shop	Retail/Light Industrial	3
Electrolysis Clinic	Retail Service Cosmetics	1
Falcon Oil	Wholesale Delivery Service	4
Fred's Discount Store	Retail Service	12
Frosty Front	Retail Service	7
Gateway Advantage		150
Gateway Homes	Industrial Manufacturing	250
Guin Accounting	Professional Service	2
Guin City Hall	Government Service	11
Guin Elementary School	Government Service	15
Guin Family Clinic	Professional Service	4
Guin Fire Department	Government Service	25
Guin Police Department	Government Service	7
Hall's Dental Clinic	Professional Service	8
Hair Affair Beauty Salon	Retail Service	2
Hester Law Office	Professional Service	1
Hightower's Amoco	Retail Service	2
Housing Authority of Guin	Government Service	8
Kathy's Flower Shop	Retail Service	2
Kyle Wholesale Furniture	Retail Service	2
Lawrence Barber Shop	Retail Service	2
Leroy's Locksmith Shop	Specialty Service	2
Liberty Christian Academy	Educational/Academic Private	12
Lindley's Repair Shop	Automotive Service	1
Lynn's Amoco	Retail Service	3
Mac's Used Cars	Retail Service	1
Marion County High School	Government	12
Marshall Arts Web Design	Professional Service	1
Mark Kay Cosmetics	Retail Service	1
McDonald Signs	Retail Service	3
Minter Court Reporting	Professional Service	1
McGuire Drug Store	Retail Service	4
Modern Beauty Shop	Retail Service	2
Norwood Funeral Home	Professional Service	4
Patsy's Beauty Salon	Retail Service	2
Pioneer Insurance Agency	Commercial Service	2
Plaza B-B-Q	Retail Service	8
Plaza Laundry	Commercial Service	1
Randolph Chiropractic Clinic	Professional Service	6
Reese Plumbing & Electrical	Professional Service	2
Salvation Army	Retail Service	2
Silas 10-8 CB Shop	Retail Service	2
South Trust Bank	Commercial Service	6
State Bank & Trust	Commercial Service	8
Guin Group Facility	Specialty Service	8
Texaco Food Mart	Retail Service	6
Tombigbee Electrical Cooperative	Commercial Service	40
Travel Inn	Retail Service	4
Tri- County Concrete	Commercial Service	100
Unique Expressions	Retail Service	2
Webster's Market Inc.	Retail Service	10
Wood Perfect Ltd.		75
Wright Advertising	Professional Service	2
3M Manufacturing	Industrial Manufacturing	375
Deer Valley Homes	Industrial Manufacturing	200
Sunset Manor Retirement Center	Specialty Service	110

5.2 Labor Force

The City of Guin has a labor force of 1,876 individuals. Labor force is here defined as persons 16 years of age and older residing within the incorporated limits of the City of Guin. The major employers within the planning study area are 3M Manufacturing and Gateway Homes. Businesses with a small number of employees are scattered throughout the community with an active retail service center undergoing an economic and urban revitalization. Small businesses employing fewer than 10 persons are along the county and state highways within the PSA.

5.3 Income

Median Family Income Marion County

Year	Income
1990	$22,394
2000	$34,359

Median Family Income Guin, Alabama

Year	Income
1990	$21,128
2000	$35,174

6.0 Housing

6.1 General

The total number of Housing Units within the Guin incorporated boundary for 1990 was 1,072. For the year 2000 census, the total number of estimated housing units was 1,177 units.

Table 6.1
Structural Characteristics of Housing Units in the Guin Incorporated Area

Units In Structure	1990	2000	Percent Of Total In 2000
1 Unit Detached	NA	677	57.5%
1 Unit Attached	NA	21	1.8%
2 Units	NA	125	10.6%
3 or 4 Units	NA	69	5.9%
5 to 9 Units	NA	38	3.2%
10 to 19 Units	NA	47	4%
20 or more Units	NA	40	3.4%
Mobile Home	NA	160	13.6%

6.2 Age of Structures

Table 6.2
Year-Round Housing Units By Year of Construction

Age of Structure	Number of Units	Percent Of Total
1999 to March 2000	27	2.3%
1995 to 1998	55	4.7%
1990 to 1994	43	3.7%
1980 to 1989	221	18.8%
1970 to 1979	464	39.4%
1960 to 1969	150	12.7%
1940 to 1959	155	13.2%
1939 or earlier	62	5.3%

The largest percentage of current housing stock was built between 1970 and 1979.

6.3 Condition of Housing Stock

A total of twenty-one occupied housing units in the City of Guin are overcrowded. Units with 1.01 persons or more per room represent 2.0% percent of the total occupied units. This compares to the state average in 2000 of 2.94 percent.

One of the most widely recognized methods for determining substandard housing conditions involves classifying those housing units as substandard which lack complete plumbing facilities. When employing this method in the City of Guin there were only 16 units in the town that did not have complete plumbing facilities in 2000. This accounts for only 1.6% percent of the total housing units. This figure is slightly above the statewide average of .56 percent.

In 2000, the median value of an owner-occupied housing unit was $65,000.00. In comparison, the average value of an owner-occupied unit statewide was $85,100. The median contract rent in Guin was $298.00 per month as compared to the state average of 447.00 per month.

6.4 Subsidized Housing

The Housing Authority of Guin provides 181 units of subsidized housing to the low and moderate-income residents of Guin.

Table 6.4
Number of Subsidized Housing Units
By Number of Bedrooms

Housing Type	Number of Units
One Bedroom	47
Two Bedroom	76
Three Bedroom	46
Four Bedroom	10
Five Bedroom	2
Total Number of Units	**181**

6.5 Housing Trends:

Table 6.5
Housing Trends

Year	Housing Units Per Year
Prior Years	367
Year 1970-1979	464
Year 1980-1989	221
Year 1990-2000	125
Totals	1,177

Table 6.5 illustrates the housing trends in the Guin area.

7.0 Land Use

7.1 Existing Land Use

The predominant land use in the Planning Study Area is forested/agricultural, being primarily pastured and timberlands. Scattered patches of woodlands and several streams bounded by county roads break up this pattern. The City of Guin is a historic Railroad settlement serving the surrounding agricultural areas and acts as the urban hub and commercial center.

Throughout the planning study area, roads and highways tend to have single-family residences spread along them, many on large lots. Virtually all of the residential development is on single lots with some subdivision development and traditional neighborhood layouts. The resulting overall pattern is one of a focused urban core with a rural hinter land. Several older neighborhoods within the central area of Guin appear to have been planned and initially developed as a residential subdivision. Due in part to the economic growth, Guin housing developments and housing starts have continued to increase at a moderate pace.

7.2 Future Land Use

In the study area, as in the remainder of Marion County, there is no formal land use or planning process that enacts or guides land use regulations. Development of any type and intensity may occur virtually anywhere. As long as the development (residential, commercial, and industrial) can safely use septic tanks, and the site is not in a FEMA identified flood zone the development has no land use restrictions.

The land use pattern that is expected to develop during the planning period is driven essentially by the construction and development of Appalachian Regional Commission's Corridor X or Future I-22. Planning for future economic development opportunities, the citizens of Guin have allotted and set aside acreage north of the city hall to be the new Guin Industrial Park and mixed use development. The creation of this development is dependent on the City of Guin being able to provide services that would make the property more attractive to new businesses, which would include a sanitary sewer collection and treatment system. A discouraging effect on future growth and development will result from the lack of centralized wastewater collection and treatment system.

8.0 Wastewater Flow Rates

The Guin Water and Sewer Board currently operates a sanitary sewer collection and treatment system generally within the city limits of the City of Guin. The system currently serves approximately 55% of the city's residences and approximately 80% of the city's industries. The collection system consists of 8" to 16" gravity flow lines and pump stations. Sanitary sewer treatment consists of a lagoon system located west of the city. The lagoon is presently permitted to treat up to 472,000 gallons per day.

Sanitary sewer service is not currently available at the city's access point to Interstate 22, along Alabama Hwy 44. The city is currently in the planning stage of developing both an industrial and commercial park on this property. The lack of an adequate sanitary sewer system will limit the city's ability to grow and recruit new industries and commercial establishments. The city must explore various sewer collection and treatment alternatives in order to determine the best possible solution for serving this area.

This plan must address both the existing wastewater flow rates within the City of Guin, as well as flow rates that are expected with the development of the industrial and commercial parks. As a part of the plan, an analysis will be made of Guin's existing system, and recommendations made for handling the anticipated growth over the next 20 years. Alternates included in the analysis will include treating the waste from the new development using an on-site treatment and disposal system, and pumping the waste to Guin's existing treatment facility. In order to complete this analysis, flow rates must be projected with the anticipated growth and cost estimates developed for each alternate.

In order to determine the required collection and treatment capacities for a new system, the amount, timing and characteristics of the waste generated must be established. Flows must be considered from residential, commercial and industrial establishments in the proposed service area. The time variation of flows is also important in determining the expected minimum and peak flows for designing a system. Since most collection systems are gravity-flow, they must be able to sustain minimum volumes for self-cleansing as well as peak flows. In addition, consideration must be given to potential inflow and infiltration of groundwater into the system, which will affect treatment processes.

The amount of sewage flows from an area depends greatly upon population. Domestic wastewater flows vary greatly throughout the day, and usually include peaks in the morning and evening. A hydrograph, **(Figure 6.1)**, shows an example of water use versus wastewater flow from a subdivision in Baltimore County Maryland. Two distinctive peaks can be seen on the hydrograph. J.J. Lentz of John Hopkins University performed a study in 1963 in which wastewater flows from communities in California, Florida, Missouri, and Maryland were observed. The study found that, without the influence of lawn sprinkling and inflow/infiltration, wastewater flow rates are basically equal to water use. As a general rule, water usage for residential customers is approximately 150 to 200 gallons per day.

Inflow and infiltration are two factors that must also be considered in the design of a sewer collection system. Inflow is the flow of storm water runoff into the collection system, usually through a manhole, pump station opening, or through the connection of illicit roof drains connected to the sewer system. Storm water flows of 20-70-gpm can enter through a leaking manhole cover under only 1" of water. Roof drainage from a typical 1,000-ft^2 house tied to a system can add flows in excess of 10-gpm. Infiltration is the flow of groundwater into the system through the pipe joints or manhole wall. Depending on the location of the sewer, type and tightness of the joint, and soil characteristics, infiltration will typically range from 3,500-5,000 gpd/mi/24 hr for an 8 in. pipe and could reach flows as high as 60,000 gpd/mi in extreme cases.

An ideal sanitary sewer collection system consists of all gravity flow sewers with no pump stations. Pump stations create an added maintenance issue and added operating costs to the system. Due to elevation changes, it is not always possible to install such a system. Care should be taken to locate gravity sewers in the low areas and along creeks to maximize the number of service connections that can be made. The depth of gravity flow sewers also plays an important role in the overall cost of a new system. Gravity flow lines must be installed deep enough to allow the majority of the houses to connect, without having an extreme effect on the cost.

The Guin Water and Sewer Board produced an average of 20.2 million gallons of water per month, or 675,000 gallons per day over the past 12-month period. Approximately 20%, or about 4 million gallons per month is sold to the Marion County Public Water Authority and to the Town of

Beaverton. This amount will be excluded from analysis in this study because it is not used in the Guin sewer service area. Approximately 10% to 20% of the water sold by the board is to 3M, a large industry located in the town. The remaining 70% to 80% is used by residential, commercial and industrial users within the town. The existing water usage that will be considered for this study is 540,000 gallons per day. Approximately 60%, or 350,000 gallons per day is presently treated at the lagoon.

Flows from the proposed industrial park must be estimated and consideration given to the continued development of the park. Water usage from an industry will vary greatly, depending on the type of operation, number of employees and number of shifts. Consideration must be given to the waste generated by employees as well as that generated as a part of the manufacturing process. Industries will generate approximately 20 gallons per day per employee as a general rule. For initial calculation purposes, an employment of 600 people will be considered, with a total water usage of 12,000 gallons per day.

Flows from the proposed commercial park will depend greatly on the type of establishments occupying the park. Hotels will generally produce 50 gallons per patron per day. Restaurants will generally produce 10-15 gallons per day per meal served. Retail outlets will generally produce 300 gallons per day per public toilet. For initial calculation purposes, this study will assume 60 hotel occupants per day, 200 meals served per day, and 10 retail stores with public toilets. The resulting expected flows from the commercial park will be approximately 8,000 gallons per day.

This plan will analyze the wastewater flows from the City of Guin and the proposed industrial and commercial parks as separate flows that will be treated and discharged at different locations, and as combined flows that will be treated at the city's lagoon facility. In planning for a new or existing sanitary sewer treatment facility, expected growth factors must be included. Using the existing water usage for the town of approximately 540,000 gallons per day and a growth factor of 3% to 4% over the next 20 years, the resulting flow would be approximately 975,000 to 1.2 million gallons per day. Using the same growth factors over the next 20 years, flows from the parks would be approximately 35,000 to 45,000 gallons per day. Combining the anticipated flows from the industrial and commercial parks, the total flow into the new system would be approximately 1.0 million to 1.3 million gallons per day.

9.0 Wastewater Treatment Alternatives

Several wastewater treatment alternatives for the proposed commercial and industrial parks will be analyzed as a part of this study. Alternates will include on-site treatment as well as utilizing the existing treatment facility in Guin by pumping the waste from the parks. Several on-site treatment methods will be evaluated including those with and without a discharge into a receiving stream. The amount and characteristics of the flows from the parks will help to determine the best alternative for the city to choose. In addition, the existing lagoon treatment facility will be evaluated and any required improvements will be recommended.

Wastewater systems typically have one or more discharge points, which ultimately flow to a public watercourse. The purpose of treating the wastewater is to prevent the pollution of the receiving stream. Treatment alternatives involve various physical, chemical, biological, and sludge treatment methods. The degree of treatment required is based on the characteristics of the receiving stream including flow rates and use, such as recreation, fish and wildlife, drinking water, etc. Other factors in determining the required treatment for wastewater involve the type of waste including municipal and industrial and the expected quantity to be received.

The expected quantity of wastewater to be treated must be carefully considered in planning for a new treatment facility. The facility must be designed to handle the present residential volumes as well as projected for an established period of time. In addition, the facility must be capable of treating waste from existing and future industries. Inflow and infiltration into the system must also be factored in to prevent overflows from the facility into the receiving water. Due to certain treatment processes, the facility must not be oversized, which could cause detention times greater than the design criteria.

Wastes generated from an industrial facility can be treated by one of three methods. The waste may be treated in a separate industrial treatment plant, discharged to the municipal treatment facility for complete treatment, or pre-treated at the facility site prior to discharge into the municipal system. Municipal wastes must be closely monitored due to the effect certain materials could have on the municipal treatment

processes. Certain wastes should not be included in the municipal system, including materials that could create a fire or explosion hazard, materials that could interrupt the hydraulic flow, and hazardous materials that could cause harm to people or the treatment process.

Treatment of wastewater typically consists of a combination of preliminary treatment, primary settling, biological treatment, secondary settling and disinfection. All processes are not required for all wastewater flows. In certain circumstances with minimal flows and large receiving waters, primary treatment may achieve the desired results. In environmentally sensitive areas, addition secondary treatment as well as disinfection may be needed to reach the same results. The required parameters for the effluent flow are normally established by the governing agency based on the characteristics of the receiving water.

Preliminary process can include pumping, screening, shredding of solids, flow measuring and preaeration. Most wastewater treatment facilities are gravity flow systems and often require pump or lift stations at the beginning. Screening of the wastewater is primarily used for the protection of the mechanical components of the plant from sand and other debris. Flow measuring is generally required by discharge permits as a tool to compute percentage of removal. Preaeration can be used in preliminary treatment to add oxygen to the wastewater and to aid in later treatment processes.

Primary treatment, the most commonly used form of wastewater treatment, involves sedimentation. Sedimentation, also called clarification, is the removal of solid particles from suspension by gravity. A large percentage of pollutants in the influent can be settled out by using a sedimentation basin or lagoon. Primary sedimentation usually removes 30%-50% of the suspended solids in typical municipal wastewater. This process usually involves minimal maintenance due to the lack of mechanical components. This process of removing solids may be accelerated by the addition of a flocculent, which causes the particles to bond together and settle from the water at a faster rate.

Secondary or advance treatment is a biological process to remove additional organics from the wastewater. Secondary treatment alternatives include activated sludge processes, trickling filters, or rotating biological contactors. All process use microorganisms to synthesize the organics. The resultant from this type of treatment is a sludge that must be periodically removed and disposed of. The advantages

to secondary treatment include a high percentage of suspended solid and BOD removal. On the other hand, these processes often require a high degree of operation and maintenance to ensure proper working conditions.

Both primary and secondary treatment processes produce a concentrated sludge, which, over a period of time must be disposed of. Disposal of this accumulated waste sludge can be a major economic factor in wastewater treatment. The sludge is often returned to the influent of the treatment plant for continued processing and solid removal. The sludge must be dewatered by thickening in a holding tank, belt filter pressing or by centrifugation. The resulting sludge material can then be disposed of by a number of methods including application as a fertilizer/soil conditioner for agricultural use or in a landfill along with municipal solid waste. In both cases, the sludge must be covered with soil the same day it is applied to the land. The dewatered sludge may also be disposed of by incineration, although costs prohibit this in most cases.

Other forms of advanced treatment may also be required, depending on the characteristics of the influent and receiving stream and the limits of the discharge permit. Filtration is used to separate solids from wastewater that were not removed in previous processes by passing through a porous medium. Filter media usually includes granular material such as sand, and anthracite coal. Disinfection of wastewater prior to discharge is used in certain circumstances where the receiving stream has a critical use or in the direct reuse of the effluent. Methods for disinfection include chlorination and the use of ultraviolet rays. Other forms of advanced treatment used on a limited basis include taste and odor control, fluoridation, corrosion control, and removal of chemicals.

In addition to these treatment alternatives, which require discharge into a receiving stream, various on-site treatment methods may be utilized. On-site sewage treatment and disposal are typically reserved for areas with small flow volumes and little or no industrial wastes. On-site treatment methods include many of the same physical and chemical processes previously mentioned. On-site methods, however, involve disposing of the effluent waste within the existing environment, without discharging to a receiving stream.

10.0 Selected Alternatives

In selecting a preferred method of wastewater treatment for the Guin industrial and commercial parks, consideration must be given to the existing conditions as well as conditions associated with future growth. The City of Guin currently owns 340 acres, 220 of which are designated for commercial/retail development, and 120 of which is designated for industrial use. Presently, the property consists mainly of wooded areas with very little development. The topography is rolling hills with slopes generally around 10%. Initial projections show a flow of approximately 20,000 gallons per day with growth to 45,000 gallons per day over the next 20 years. A method for wastewater treatment and disposal must be planned to handle the flows generated from the parks. The system must be designed to be economically feasible to construct and operate, and also have the potential to be enlarged to accommodate growth and new industrial users.

One alternate for sanitary sewer treatment and disposal is for each commercial or industrial establishment to construct an individual system to meet its needs. With small flow volumes, the individual systems could consist of one or more septic tanks to provide sedimentation and sludge disposal, and a disposal field for treating and disposing of the effluent. As a general rule, each system would require approximately 2 square feet of disposal field for each gallon per day of waste produced. Certain establishments could be required to provide pre-treatment such as grease traps and sedimentation basins prior to the individual system. This alternate will be beneficial during the preliminary development of the property, when flows are minimal. Although costs will vary with each system, individual systems can generally be installed for $5,000 to $10,000 for flows less than 1,000 gallons per day. Permitting for the individual systems will be by the Alabama Department of Public Health through the local office.

A second alternate for treatment of sanitary wastes for the parks is a centralized collection and treatment system. The waste would be collected by gravity sewer lines installed throughout the property, and then treated and disposed of at a centralized location. Treatment methods could vary depending on the type of waste generated. A mechanical plant with aeration and sedimentation could be constructed to treat the expected flows from the park. Given the estimated initial flow of 20,000 gallons per day, the mechanical plant would have a cost of approximately $175,000.

Effluent from the packaged treatment plant would require some type of disposal method. One alternate for disposal would be to discharge the waste to a receiving stream near the property. This would require a permit from the Alabama Department of Environmental Management with certain effluent parameters and required monitoring. The receiving stream would be required to have a flow rate large enough to support the sewer effluent and maintain a minimum flow year round. A second alternate would be to utilize a spray irrigation system. The effluent from the plant would be pumped into a piping system and periodically sprayed into an open area not scheduled for immediate development. A spray irrigation system would allow the city to dispose of the waste in a way that is environmentally friendly to the surroundings. Spray irrigation is a preferred alternative due to the fact that there is no discharge point or required discharge permit. A cost estimate for this alternative is shown **(Figure 8.1)**.

A third alternate is to collect the waste within the park and pump it to the existing system in Guin. The property is located approximately 4 miles from Guin's existing collection system. The high costs associated with installing and maintaining the required pumps and force main do not make this a viable alternative with the initial projected flows. As the park continues to develop and produce additional wastewater flows, this alternate could become a more realistic solution. A cost estimate for this alternative is shown **(Figure 8.2)**.

Figure 8.1
Package Plant / Spray Irrigation
Preliminary Cost Estimate

ITEM NO.	QUANTITY	UNIT	ITEM	UNIT COST	TOTAL COST
1	5,000	LF	8” SDR 35 Sewer Pipe	$25.00	$125,000.00
2	14	EA	Manholes w/ Ring & Cover	$1,500.00	$21,000.00
3	1	EA	Spray Irrigation System	$75,000.00	$75,000.00
4	1	EA	Package Treatment Plant (20,000 gpd)	$175,000.00	$175,000.00
5	320	LF	12” Steel Casing (Open Cut)	$25.00	$8,000.00
			A. Total Construction Cost		**$404,000.00**
			B. Engineering		
			Design	$32,000.00	
			Inspection	$19,000.00	
					$51,000.00
			C. Administration		$45,000.00
			D. Total Project Cost		**$500,000.00**

Figure 8.2
Pump Station / Force main

Preliminary Cost Estimate

ITEM NO.	QUANTITY	UNIT	ITEM	UNIT COST	TOTAL COST
1	5,000	LF	8” SDR 35 Sewer Pipe	$25.00	$125,000.00
2	14	EA	Manholes w/ Ring & Cover	$1,500.00	$21,000.00
3	1	EA	Duplex Pump Station	$100,000.00	$100,000.00
4	25,000	LF	4” PVC Force Main	$8.00	$200,000.00
5	320	LF	12” Steel Casing (Open Cut)	$25.00	$8,000.00
6	5	EA	Road Bores	$5,000.00	$25,000.00
			A. Total Construction Cost		**$479,000.00**
			B. Engineering		
			Design	$37,500.00	
			Inspection	$22,200.00	
					$59,700.00
			C. Administration		$54,000.00
			D. Total Project Cost		**$592,700.00**

11. Potential Funding Sources

Construction of a sanitary sewer collection and treatment system based on expected revenues from the system would be cost prohibitive. The City of Guin must seek sources of funding to finance the construction of the system. Revenues that will be generated by commercial occupants of the property through sales taxes, and an increased economy by newly created jobs can be pledged by the city to recover the initial capital costs. The city must also pursue grants and low interest loans that are available from various agencies.

Funding for construction of sanitary sewer facilities is available from a number of government agencies. The Alabama Department of Environmental Management offers a revolving loan program in which

municipalities can borrow funds at a reduced interest rate. The Alabama Department of Community Affairs offers grant programs such as the Community Development Block Grant, which grant municipalities a certain percentage of funding for a project. These grants are awarded based on a number of factors including median household income and on the project's ability to influence the economy through the creation of new jobs. The federal government also offers grant and loan programs through the United States Department of Agriculture and the United States Environmental Protection Agency. The City of Guin could also secure private funding through loans and bond issues. The repayment of this money would be secured by future revenues from the system as well as anticipated growth to the economy by the creation of jobs.

Appendix

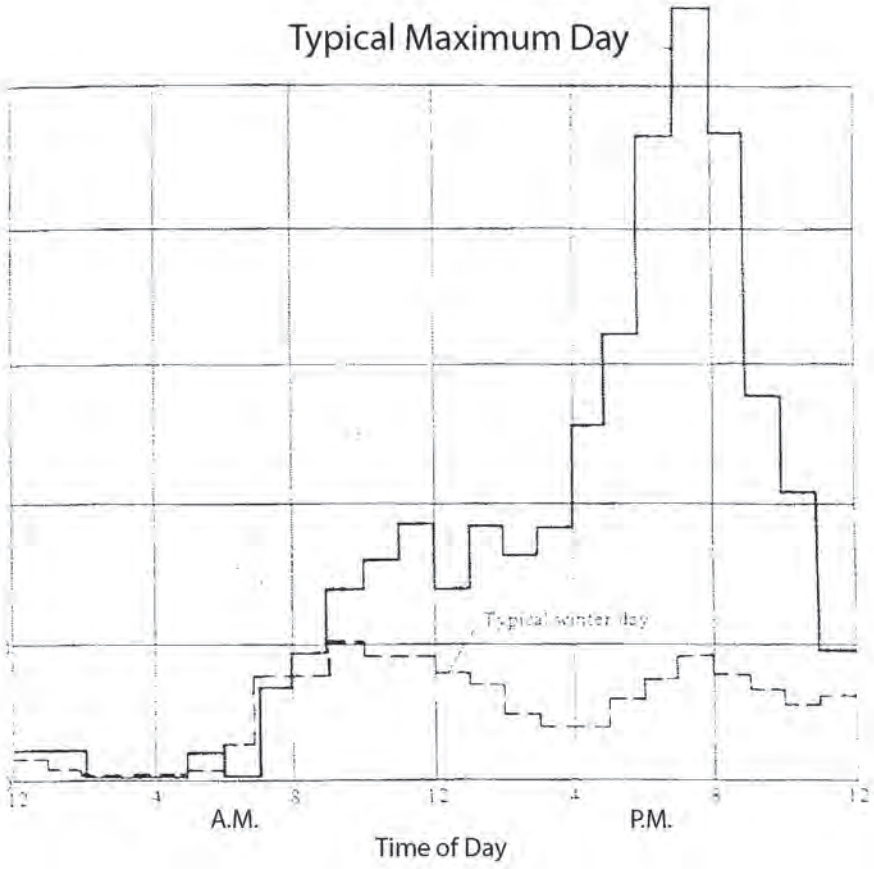


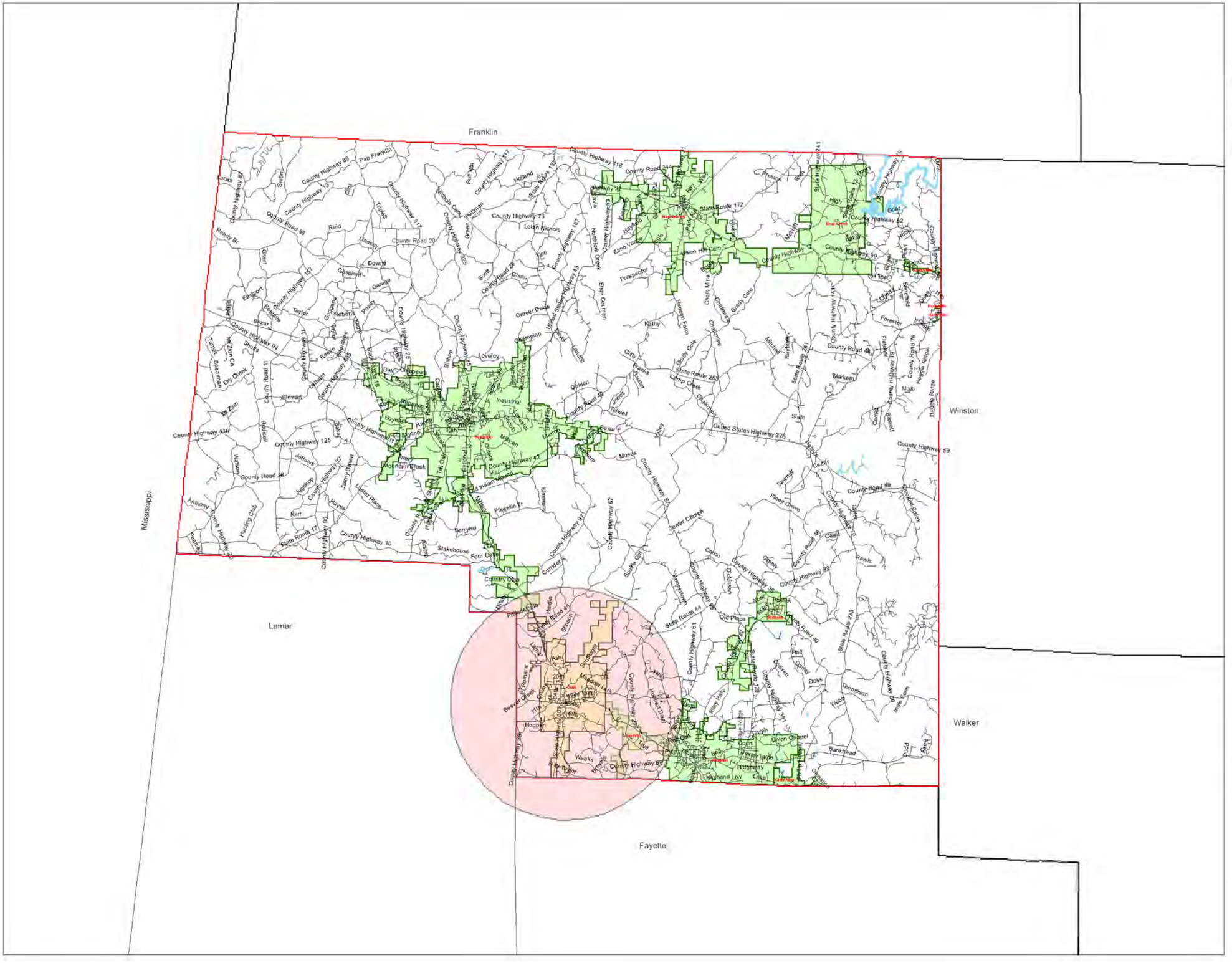
Figure 4.2 Daily water use patterns, maximum day and winter day. (From Residential Water-Use Research Project, John Hopkins University and Federal Housing Administration, 1963.)

Figure 3.1

Marion County

Waste Water Facilities Study

Location Map



Northwest Alabama
Council of Local Governments
March 2005

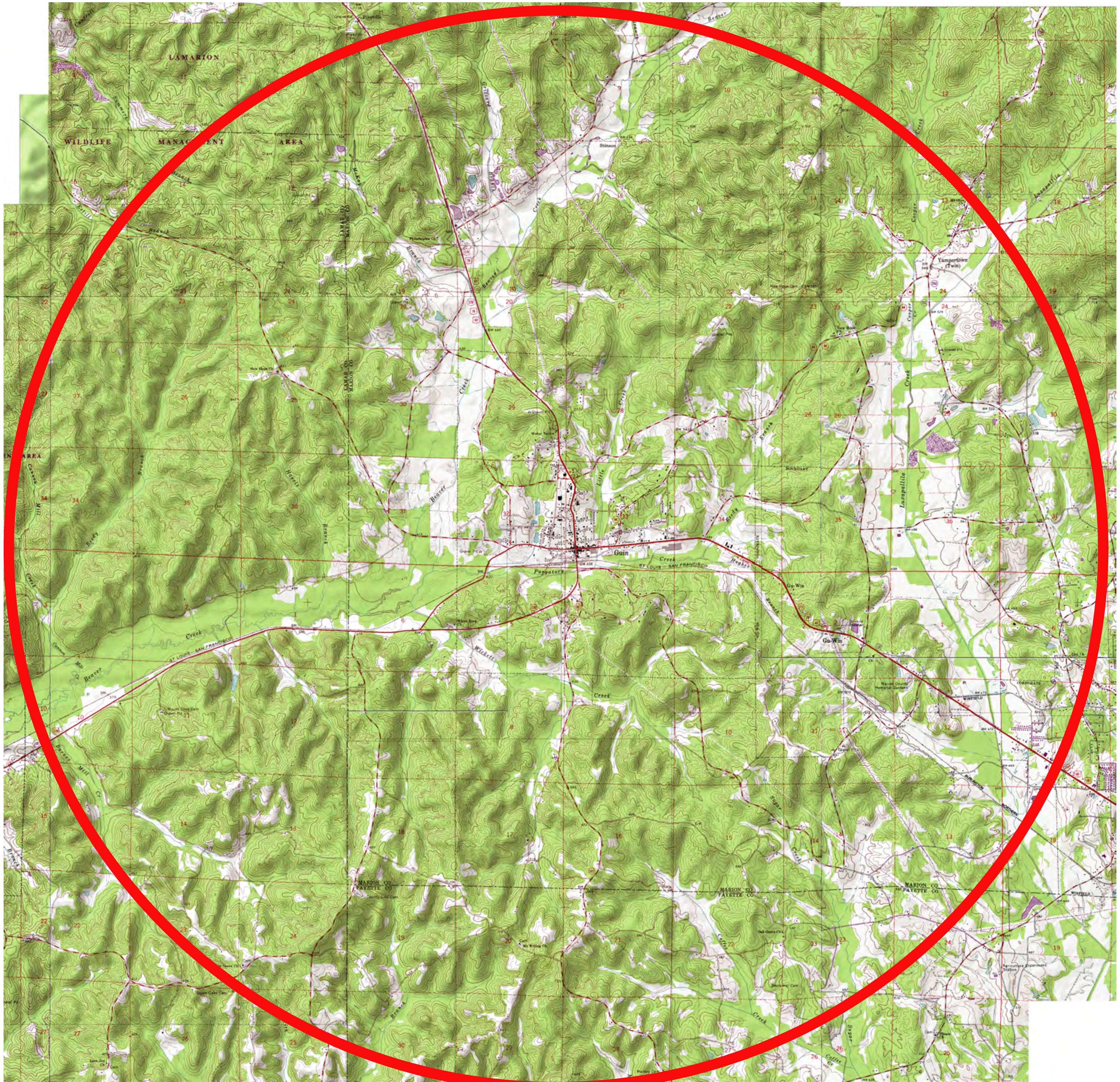


Figure 3.2

Guin Area

Waste Water Facilities Study

Topography

5 Mile Study Area

N
W E
S

0 0.1250.25 0.5 0.75 1
Miles

Northwest Alabama
Council of Local Governments
March 2005

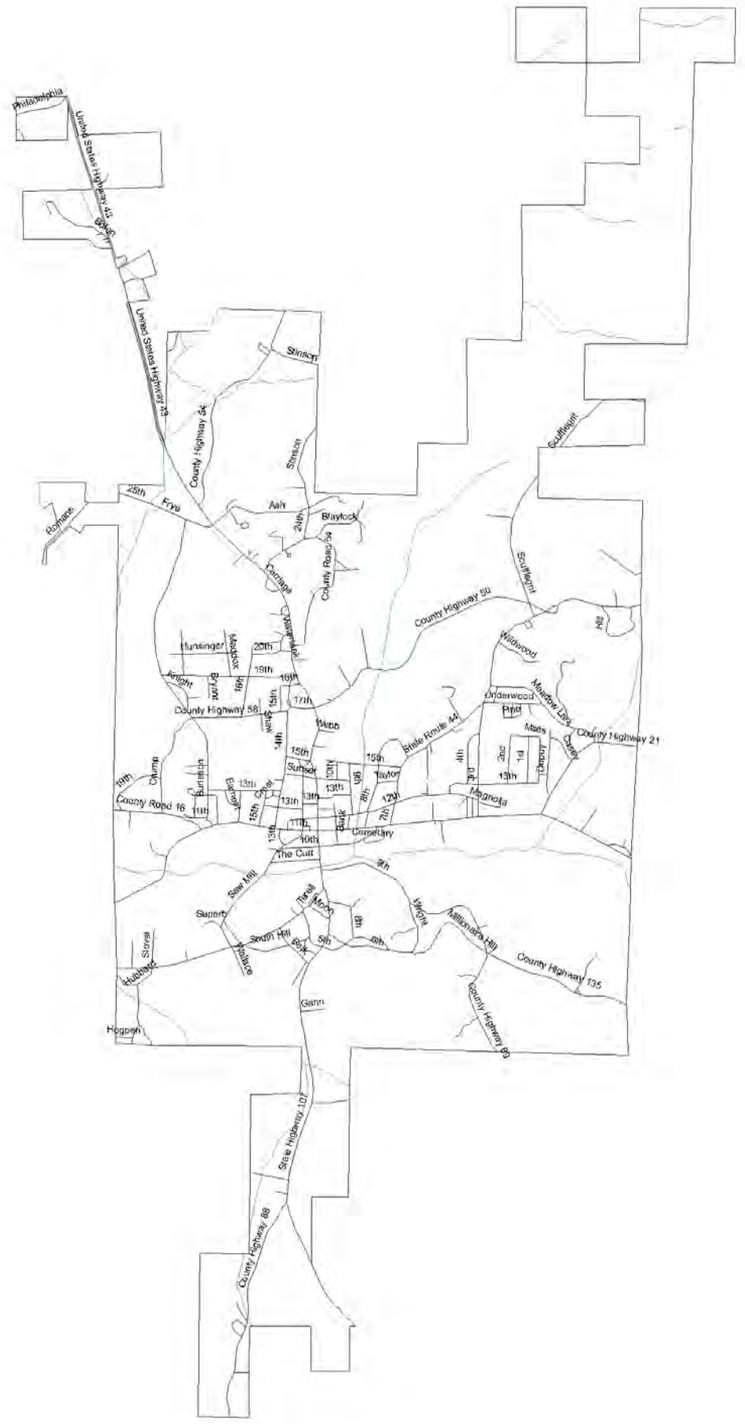


Figure 3.3

Guin Area

Waste Water Facilities Study

Roads

Streams

Guin City Limits

N

W E

S

0 0.25 0.5 1 1.5 2 Miles

Northwest Alabama Council of Local Governments

Northwest Alabama
Council of Local Governments
March 2005

Figure 3.4

Guin Area

Waste Water Facilities Study

Flood Zone Areas

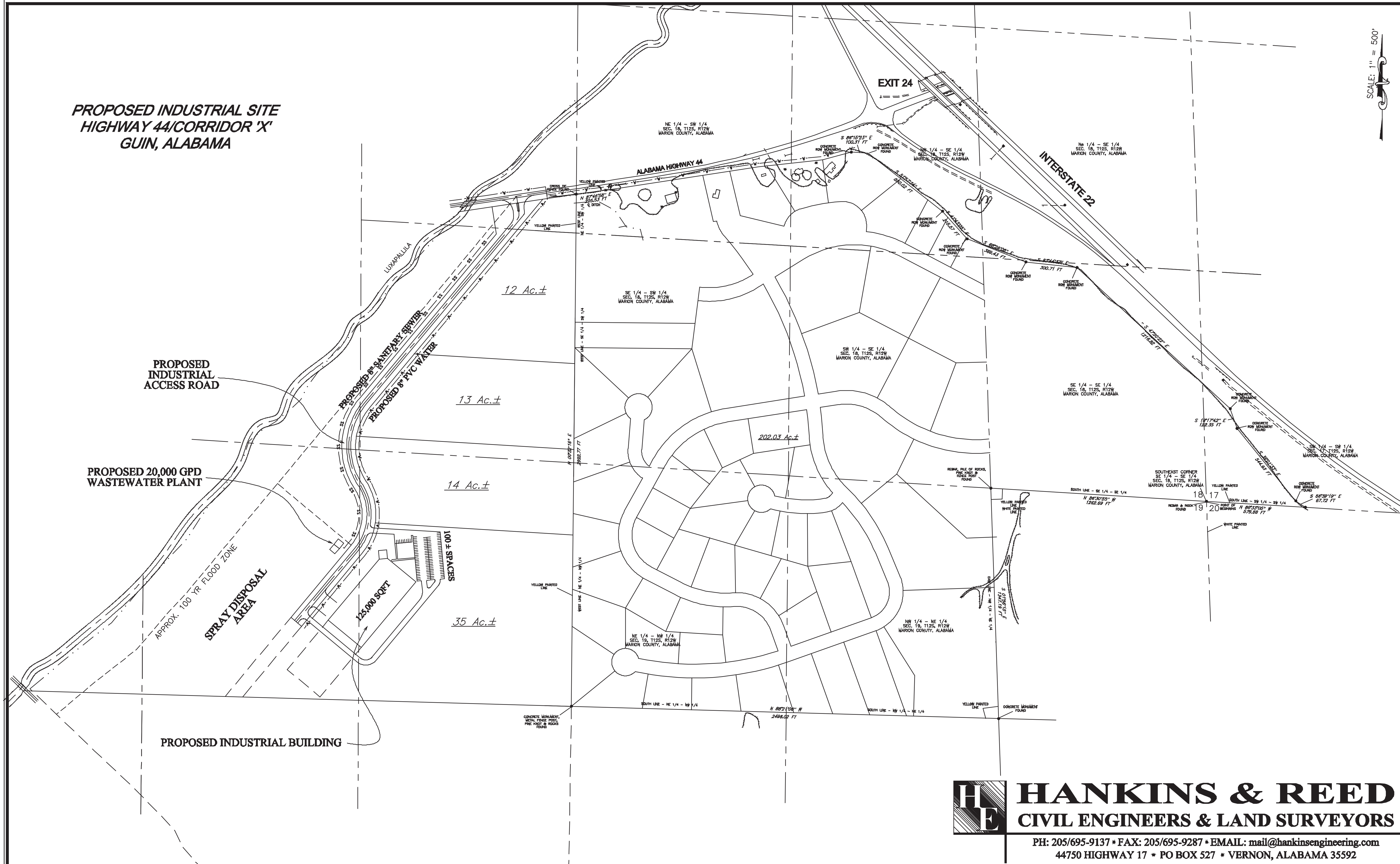
- Roads
- Streams
- Guin City Limits
- 100 Year Flood Plain
- 500 Year Flood Plain (No Data Shown)
- 5 Mile Study Area

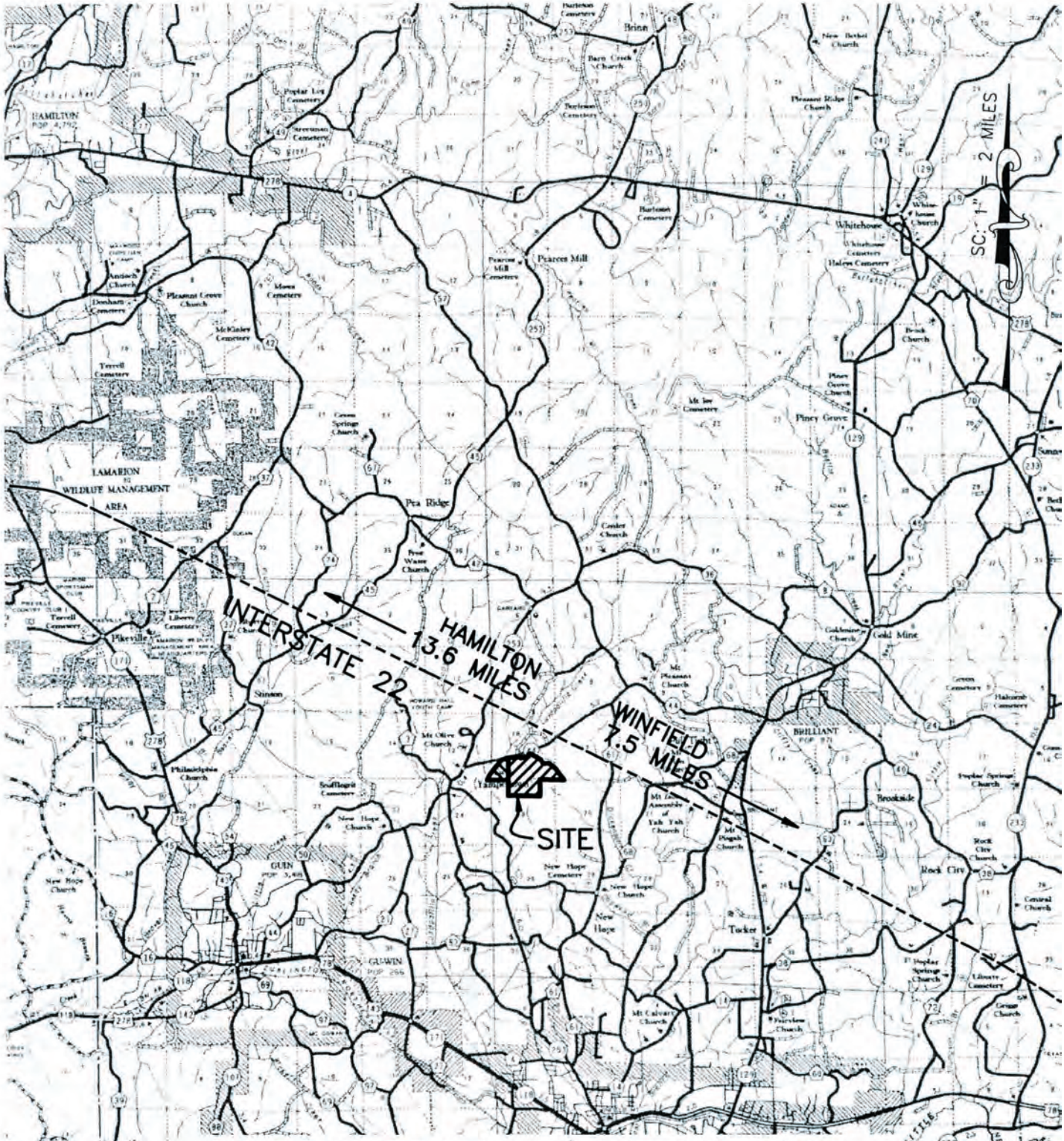
N
W E
S

0 0.250.5 1 1.5 2 Miles

NORTHWEST ALABAMA COUNCIL OF LOCAL GOVERNMENTS
naco lg
Unity for Progress

Northwest Alabama
Council of Local Governments
March 2005

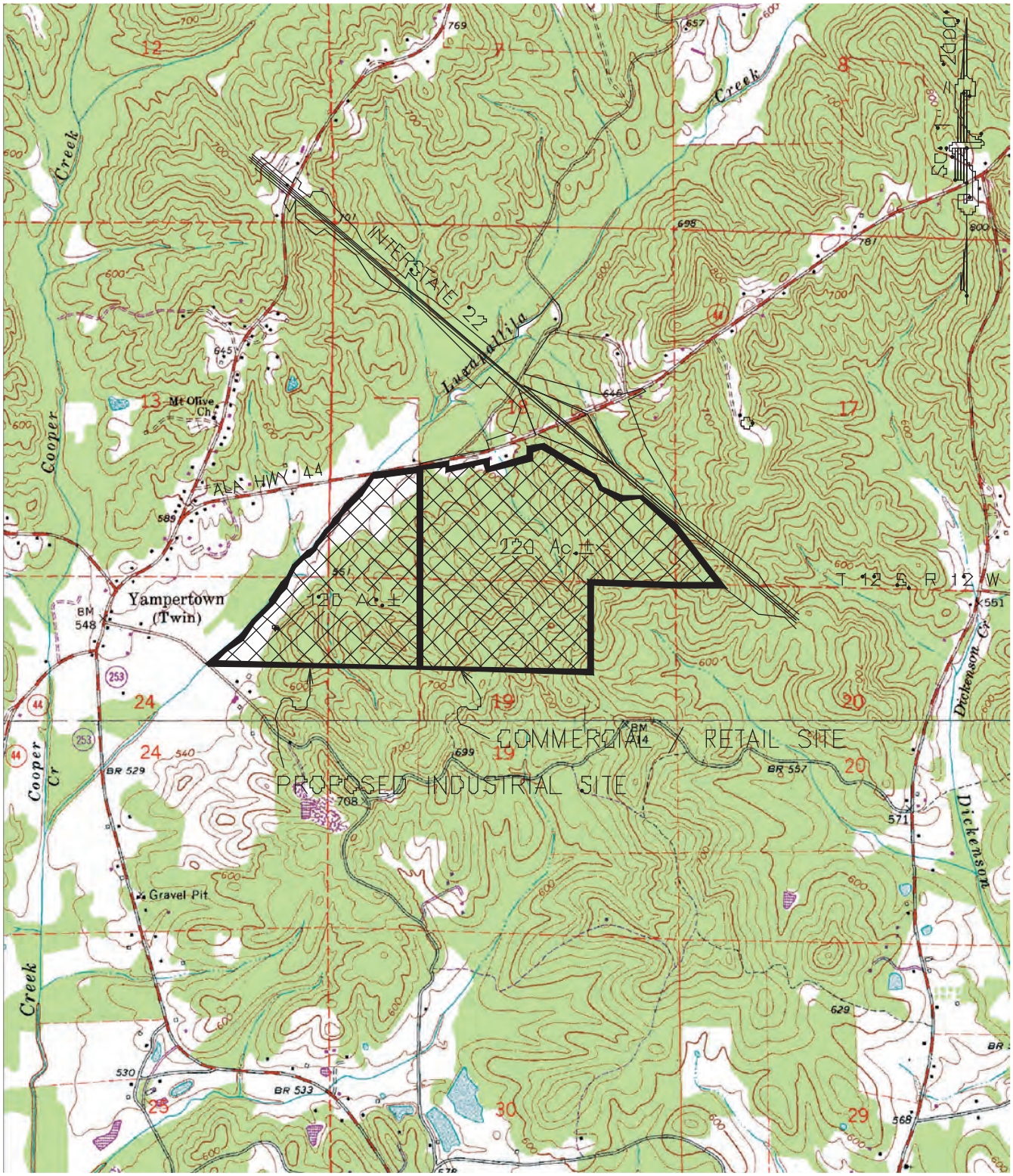

PROPOSED INDUSTRIAL SITE
HIGHWAY 44/CORRIDOR 'X'
GUIN, ALABAMA
SCALE: 1" = 500'
EXIT 24
INTERSTATE 22
ALABAMA HIGHWAY 44
LUXAPALLILA
12 Ac.±
13 Ac.±
14 Ac.±
35 Ac.±
202.03 Ac.±
PROPOSED INDUSTRIAL ACCESS ROAD
PROPOSED 8" SANITARY SEWER
PROPOSED 8" PVC WATER
PROPOSED 20,000 GPD WASTEWATER PLANT
100 ± SPACES
125,000 SQFT
SPRAY DISPOSAL AREA
APPROX. 100 YR FLOOD ZONE
PROPOSED INDUSTRIAL BUILDING
HANKINS & REED
CIVIL ENGINEERS & LAND SURVEYORS
PH: 205/695-9137 • FAX: 205/695-9287 • EMAIL: mail@hankinsengineering.com
44750 HIGHWAY 17 • PO BOX 527 • VERNON, ALABAMA 35592



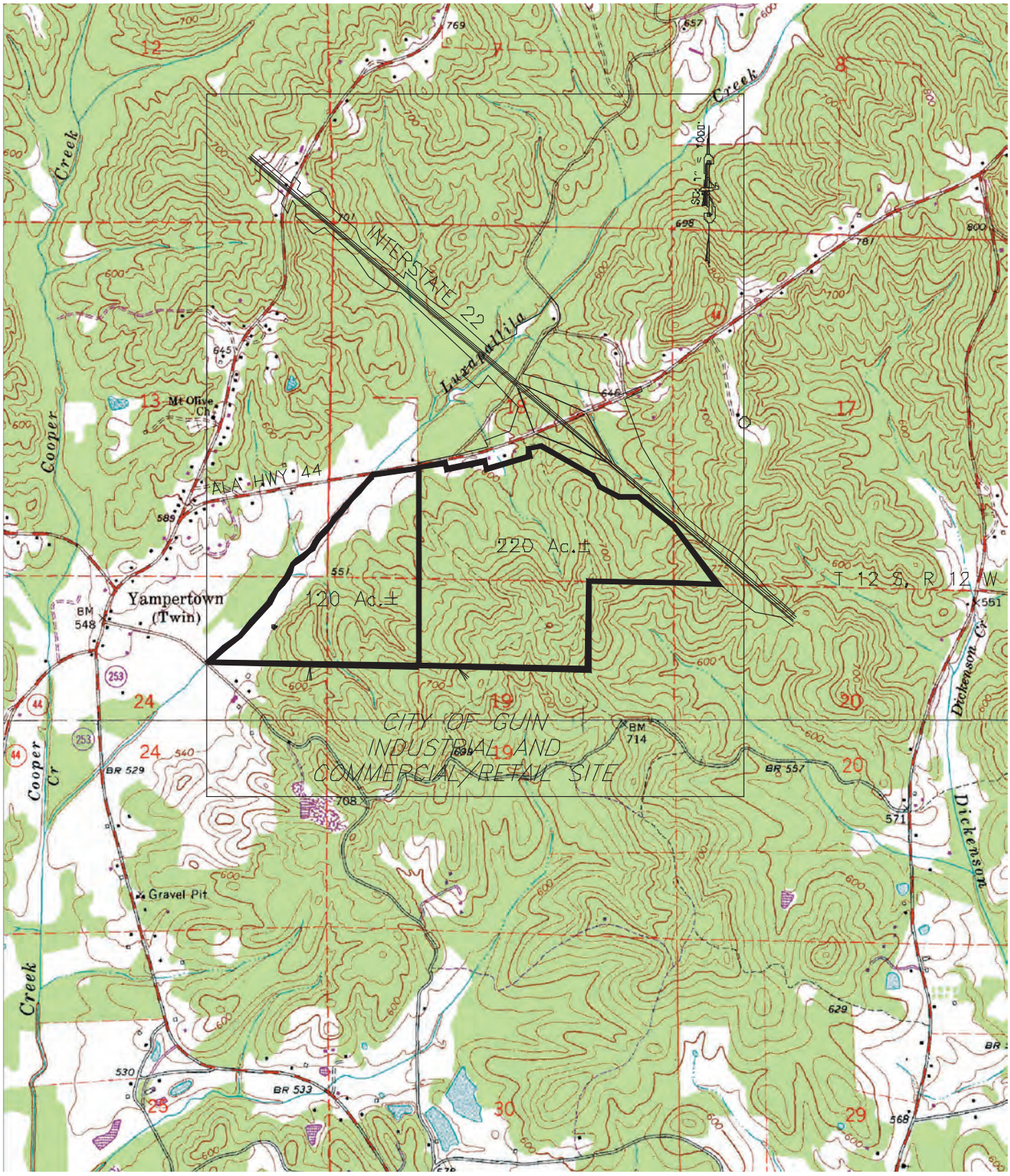
COMMERCIAL / RETAIL SITE
INTERSTATE 22 – HIGHWAY 44
CITY OF GUIN

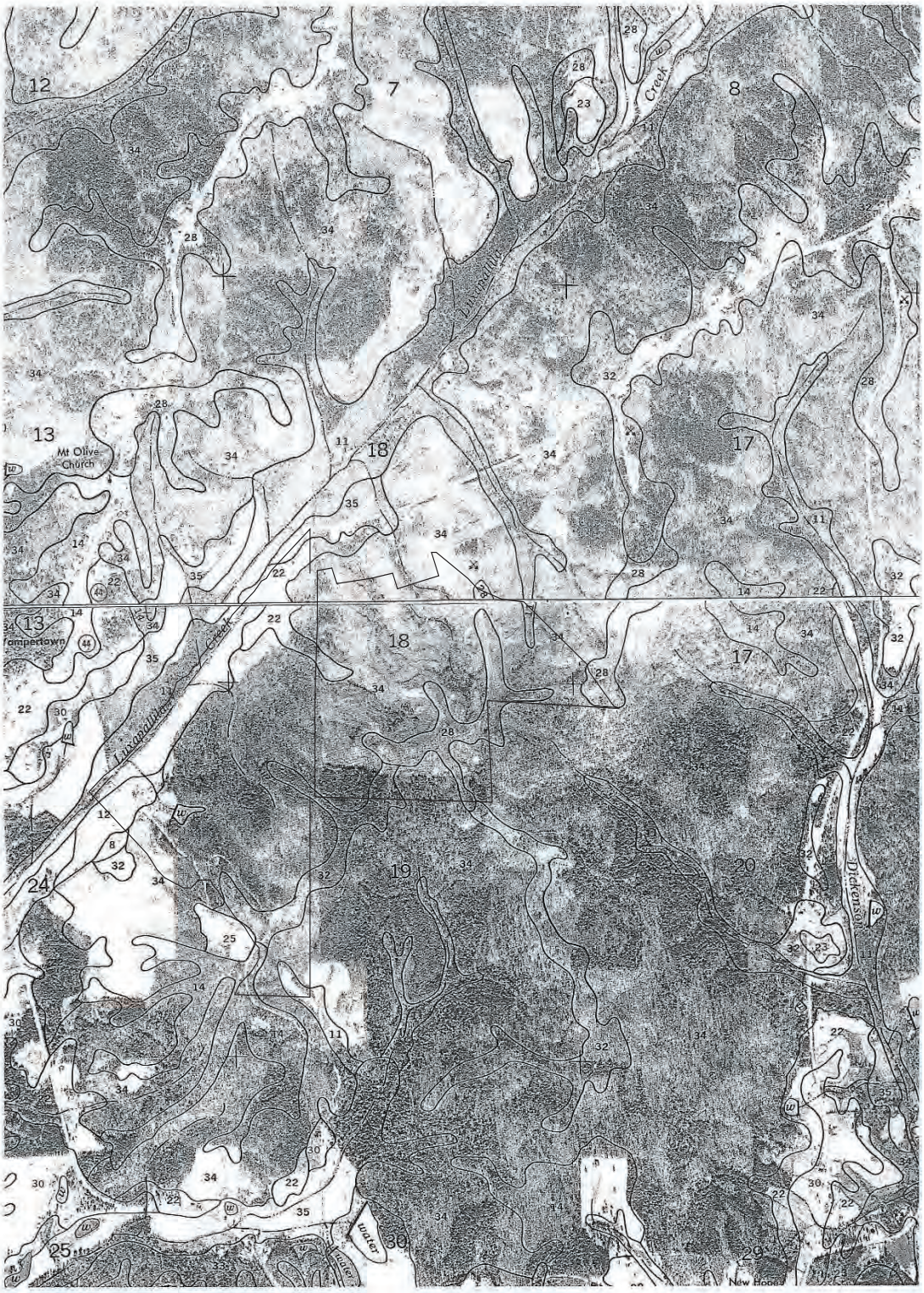
HANKINS AND REED
CIVIL ENGINEERS & LAND SURVEYORS

PROJECT:	----
CAD: ----	COGO: ----
FIELD BOOK:	---
PAGE:	---



CITY OF GUIN
INDUSTRIAL AND
COMMERCIAL/RETAIL SITE


INTERSTATE 22
Luxapallila Creek
Cooper Creek
ALA. HWY. 44
Mt Olive Ch
Yampertown (Twin)
BM 548
BM 714
220 Ac.±
120 Ac.±
CITY OF GUIN
INDUSTRIAL AND
COMMERCIAL/RETAIL SITE
T 12 S, R 12 W
Dickenson Cr
Gravel Pit
BR 529
BR 533
BR 557
Cooper Cr
Creek
Dickenson
12
13
18
17
19
20
24
25
30
29

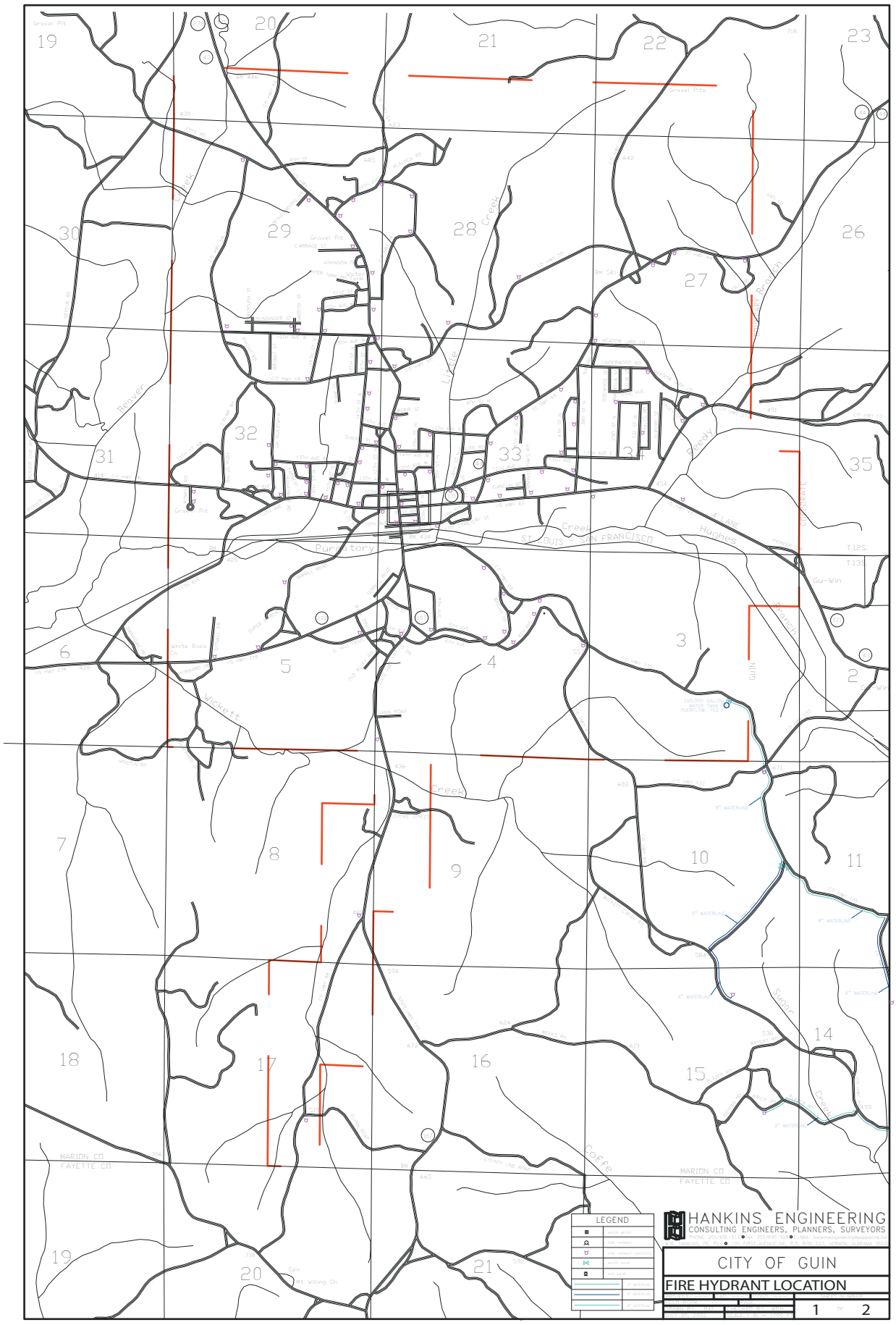


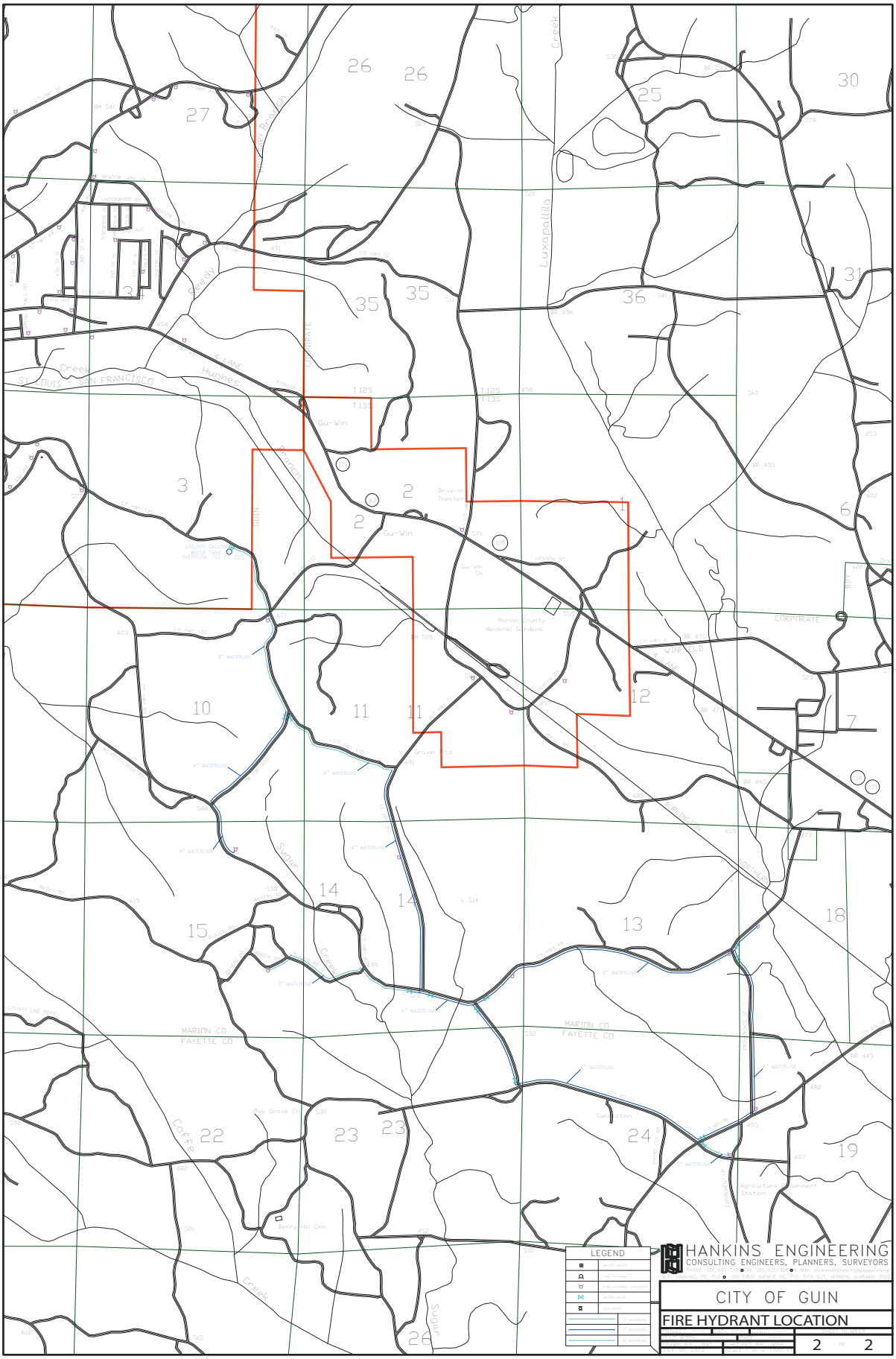
SOILS MAP
SCALE 1" = 2000'

HANKINS AND REED
CIVIL ENGINEERS & LAND SURVEYORS

PH: 205/695-9137 · FAX: 205/695-9287 · EMAIL: mail@hankinsreed.com
44750 HIGHWAY 17 · PO BOX 527 · VERNON, ALABAMA 35592

PROJECT:	--
CAD: ---	COGO: --
FIELD BOOK:	--
PAGE:	--
DRAWN: BAT	CHECKED: WBH
REVISED:	--


LEGEND
HANKINS ENGINEERING
CONSULTING ENGINEERS, PLANNERS, SURVEYORS
CITY OF GUIN
FIRE HYDRANT LOCATION
1 OF 2


LEGEND
HANKINS ENGINEERING
CONSULTING ENGINEERS, PLANNERS, SURVEYORS
CITY OF GUIN
FIRE HYDRANT LOCATION
2 OF 2