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# GEOPHYSICAL SURVEY AT GRANDSTAND, TABERNACLE AND HOTEL AT LOGOLY STATE PARK, PHASE I

*PREPARED FOR:*

FINAL REPORT ♦ JUNE 2022

Cover image: Gradiometer survey in progress at the Tabernacle locus, view northwest (2-36-46).

FINAL REPORT

# GEOPHYSICAL SURVEY AT GRANDSTAND, TABERNACLE AND HOTEL AT LOGOLY STATE PARK, PHASE I

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## ABSTRACT

At the request of the Arkansas Department of Parks, Heritage and Tourism, Commonwealth Heritage Group, Inc.'s Memphis office conducted a geophysical survey of three locations within Logoly State Park in Columbia County, Arkansas as the first step in an attempt to archaeologically locate three nineteenth century structures associated with the former Magnesia Springs Resort: the Bandstand and Tabernacle near the Bathhouse foundation (3CO64), and a possible Hotel on the ridge above. The geophysical survey was conducted by a two-person crew from May 4 to 12, 2022. The three gradiometer survey grids covered 0.367 ac. (0.149 ha) and LiDAR data was collected from a 395.4 ac. (160 ha) area.

The survey resulted in the identification of multiple magnetic anomalies at all three locations, and a selection of these are recommended for ground-truthing (i.e., excavations) to verify that these are structural remains and if so to recover additional information about the former buildings and the activities conducted there. The Hotel locus exhibited the strongest archaeological and geophysical signature for a former structure, which was not surprising given that it contains surface features including a deep circular depression, an upright terra cotta pipe, a set of concrete steps and brick and concrete scatters. The Hotel is tentatively thought to measure roughly 12-x-6 m (39-x-52 ft., or 2,028 $ft.^2$). At the Tabernacle the magnetic anomalies were interpreted as probable footings associated with a structure about 12-x-19 m (39-x-62 ft., or 2,418 $ft.^2$) in size. The Bandstand was a small, elevated platform built on tall posts, and exhibited a weaker signature. However, the findings here are consistent with a cluster of postmolds.

## ACKNOWLEDGEMENTS

Commonwealth Heritage Group, Inc. appreciates the opportunity to have provided Arkansas State Parks with our services. Shalya Albey our primary contact in Little Rock. At the park, we thank the Superintendent Corbin Merriott for his cooperation during the survey.

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# 1. INTRODUCTION

Under PO No. 4502071132 with the Arkansas Department of Parks, Heritage and Tourism-State Parks Division, Commonwealth Heritage Group, Inc.'s Memphis office conducted a geophysical survey of three locations within Logoly State Park in Columbia County, Arkansas. The geophysical survey is the first step in an attempt to archaeologically locate three former late nineteenth century structures associated with the Magnesia Springs Resort.

The investigations complied with the following professional standards and guidelines:

a) National Park Service (NPS) National Register Bulletin 15 "How to Apply the National Register Criteria for Evaluation," and Bulletin 36 "Guidelines for Evaluating and Registering Historical Archeological Sites and Districts).
b) Secretary of Interior's "Standards and Guidelines for Archaeology and Historic Preservation" as published in the *Federal Register*, September 29, 1983.
c) The Advisory Council on Historic Preservation (ACHP) guidelines are set forth in 36 CFR 800, "Protection of Historic Properties."
d) Appendix B of the Arkansas State Plan: *Guidelines for Archeological Fieldwork and Report Writing in Arkansas* (Revised Version in effect as of 1 January 2010).

### *PROJECT BACKGROUND & LOCATION*

Logoly State Park is located in southwest Arkansas, near the community of McNeil. It contains Magnesia Springs, which started being used by locals and tourists during the late 1800s for healthy mineral baths and drinking (Encyclopedia of Arkansas 2014). Two hotels eventually were developed at the so-called Magnesia Springs Resort, which was accessible from a stop on the St. Louis Southwestern Railway in McNeil. Additionally, as early as 1888, Methodists used Magnesia Springs as a campground, and a Tabernacle (i.e., pavilion) and bandstand were built near the Magnesia Springs. The Methodists continued to congregate at Magnesia Springs into the 1930s, but the resort fell into disuse. Boy Scout Camp Logoly occupied the Magnesia Springs site from 1940 to 1967. Logology State Park opened in 1978 and was Arkansas' first environmental education park.

The locations of the three geophysical survey areas are found within Section 16 of Township 16 South Range 20 West (T16S R20W), and can be identified on the Magnolia, AR 7.5-min. quad (Figure 1-01 and 1-02).

The goal of this investigation is to archaeologically locate three structures that formerly stood at the Magnesia Springs Resort. These structures include:

- The Bandstand near the Bathing Reservoir feature at Magnesia Spring
- The Tabernacle near the Bathing Reservoir feature at Magnesia Spring
- A possible Hotel on a ridgetop ≈220 m to the south-southeast of Magnesia Spring

The approximate locations of the Bandstand and Tabernacle are known from historic photos and from their spatial relationships to the former Bathing Reservoir foundation, which was refurbished in 1979. The possible Hotel locus exhibits surface features including a deep depression, an upright terra cotta pipe and a set of concrete steps. The geophysical survey needed to be conducted to assist in determining the locations to excavate (i.e., archaeologically ground-truth) during a second phase of the project.

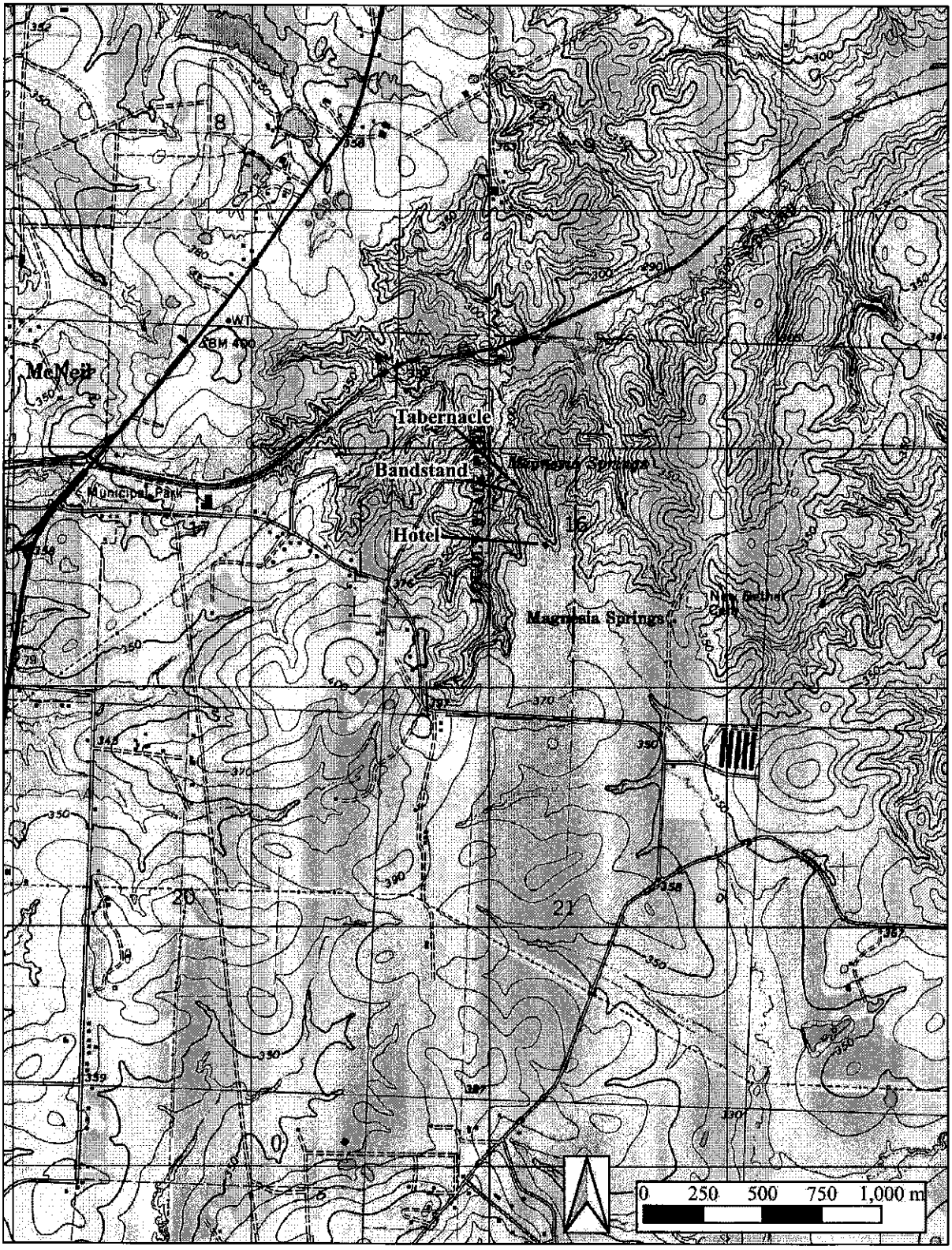


**Figure 1-01. The three geophysical survey locations shown on the 2000 Magnolia, AR 7.5-min. quad.**

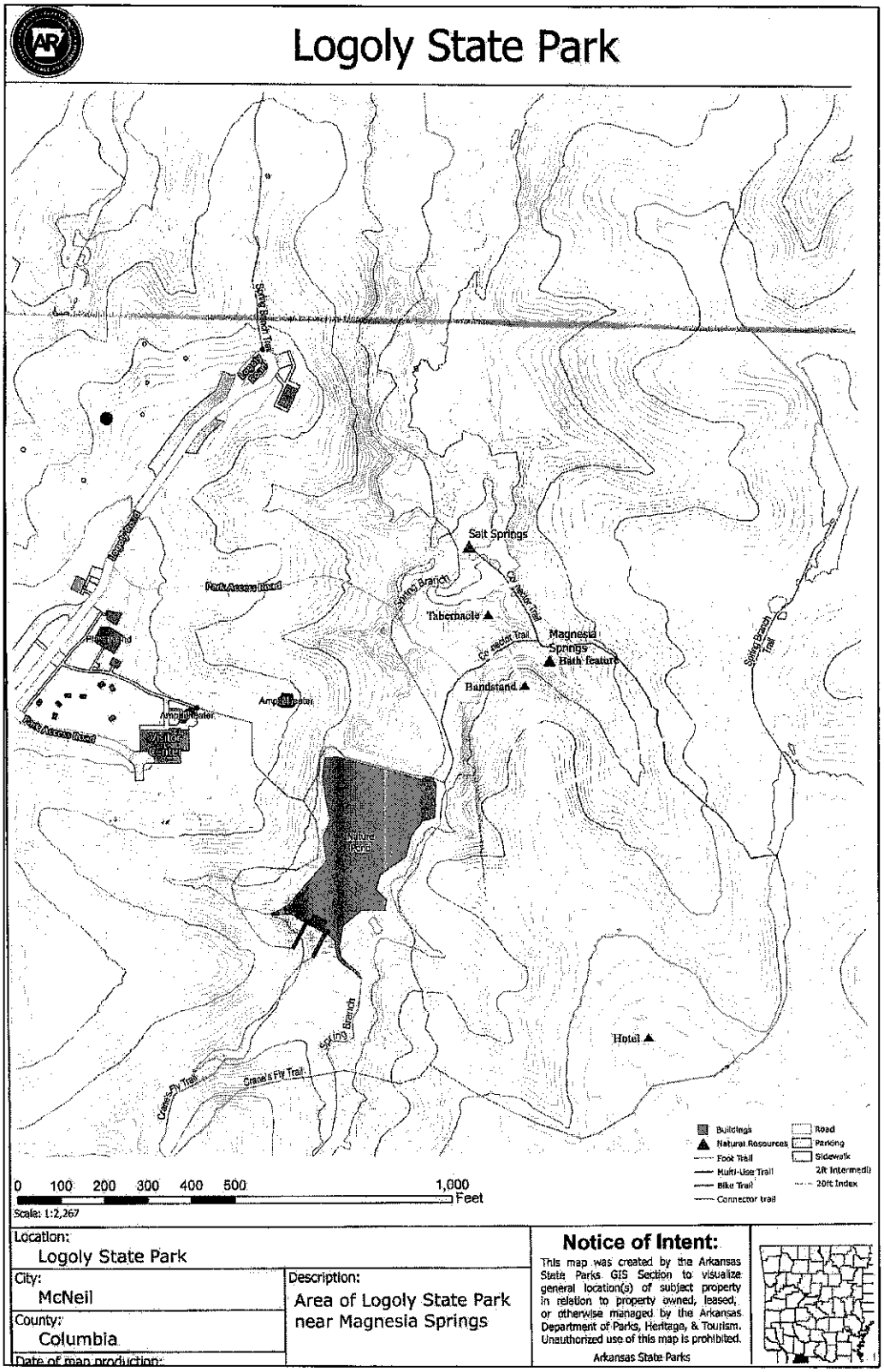


**Figure 1-02. Logoly State Park map with the three geophysical survey locations added (Map courtesy of Arkansas State Parks).**

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**Figure 1-05. Bandstand locus with the Bathing Reservoir feature in the distance, view northeast (SAU20220190; courtesy of Carl Drexler).**

**Figure 1-06. Bandstand locus (left) and old road (right), view southeast (SAU20220194; courtesy of Carl Drexler).**

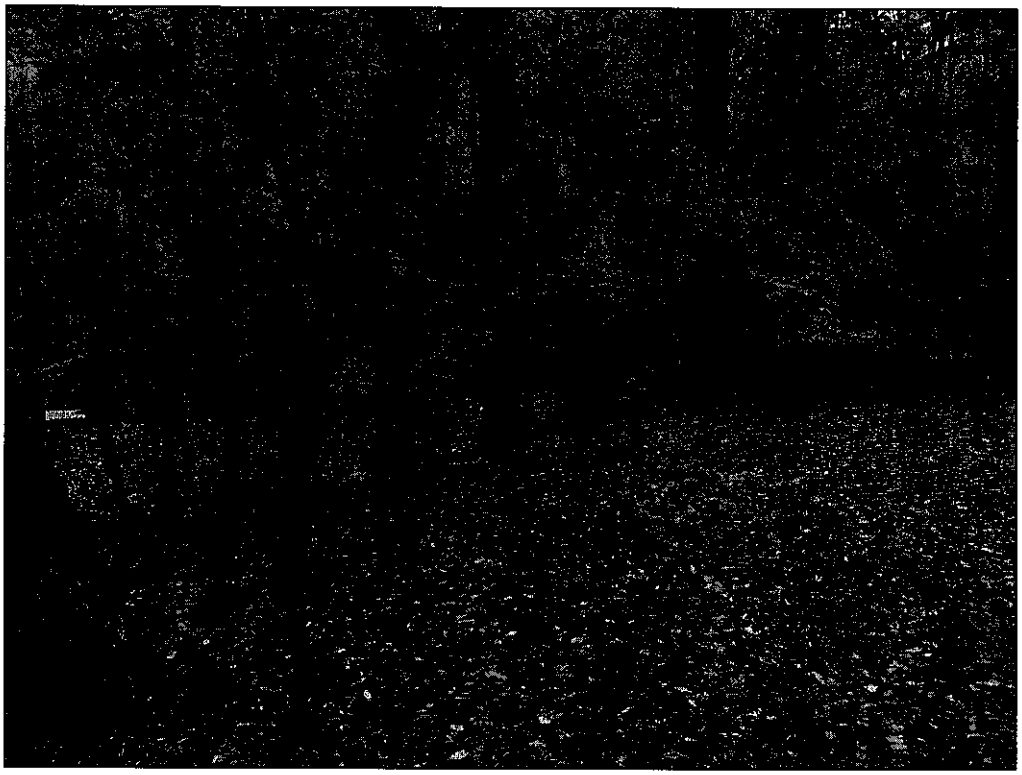

**Figure 1-07. Tabernacle locus with the Salt Springs trail in the background, view east (SAU20220184; courtesy of Carl Drexler).**

**Figure 1-08. Steps at the Hotel locus, view southwest (IMG_0705).**

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**Figure 1-10. Terra cotta feature at the Hotel locus, view east (SAU20220204; courtesy of Carl Drexler).**

## *REPORT OUTLINE*

The technical report that follows is organized in the following manner (see also *Table of Contents*). The most salient aspects of the local environment are outlined in Chapter 2. A discussion of the local cultural sequence is provided in Chapter 3. The results of the literature and records search are found in Chapter 4. Chapter 5 presents the geophysical methods and findings. The report concludes with a summary and recommendation section as Chapter 6, followed by references cited and an appendix.

# 2. ENVIRONMENTAL SETTING

## *PHYSIOGRAPHY*

Logoly State Park is located within the South Central Plain, a Level III ecoregion (Figure 2-01), and the park is designed to be a center for learning and sharing about the ecology of Arkansas's Gulf Coastal Plain. The Level III ecoregion is synonymous with the West Gulf Coastal Plain of older literature, and it covers 52 percent of Arkansas (Croneis 1930:7; Fenneman 1938). Here elevations range 100–700 ft. above mean sea level (amsl) with the lower areas in the southern portion (Croneis 1930:11). In general, the terrain is rolling and broken by stream valleys. The South Central Plains ecoregion is subdivided into six Level IV ecoregions, and the Logoly State Park is located on the Tertiary Uplands (35a) (Woods et al. 2004). The physiography there is characterized as a rolling plain with occasional sand hills. Elevations range from 100–500 ft., and local relief ranges 50–300 ft.

## *GEOLOGY*

Geologically, most of the West Gulf Coastal Plain is made up of "clay, sandstone, marl, chalk, conglomerate, and lignite, and range in age from early Cretaceous to Quaternary" (Croneis 1930:7-8). Tertiary clays, sands and silts with lignite deposits and Quaternary gravels, sands and clays characterize the eastern three-fourths of the West Gulf Coastal Plain. Logoly State Park occurs on the Eocone-aged Claiborne Group (Tc) of the Tertiary period.

The Claiborne Group is sub-divided into four formations, and from upper to lower they include: Cockfield, Cook Mountain, Sparta Sand and Cane River. Logoly State Park is situated at the center of an outcrop of the Cook Mountain formation that cover portions of 12 townships (Tait et al. 1953:Figure 3). The Cook Mountain formation ranges in thickness from a feather edge to 280 ft. and is composed of "layers of gray to greenish shale, silt, and lignitic silty shale, with a few beds of fine- to coarse-grained sand" (Tait et al. 1953:15). The Cook Mountain formation is fairly impermeable and where it overlies the Sparta Sand it prevents the movement of water, as does the Cane River Formation below the Sparta Sand, which is similarly impermeable.

### *SPARTA AQUIFER*

The water flowing from the Magnesia Springs, and the nearby Salt Springs, at Logoloy State Park is interpreted as derived from the Sparta Sand. As the water travels underground within the aquifer it picks up magnesium (Mg), calcium (Ca), iron (Fe), sulfate ($SO_4$) and other minerals and these dissolved elements are the source of the claimed healing properties of the springs. Chemical analysis of samples from a Boy Scout water well (16S20W-16bdc2) within what is now Logoloy State Park revealed it contained 1.2 parts per million (ppm) of magnesium and 79 ppm of sodium (Na), or salt (Tait et al. 1953:Table 4).

Importantly, the Sparta Sand houses the Sparta Aquifer, which is an aquifer of regional importance within the Mississippian Embayment System (McKee and Hays 2002). It extends from south Texas, north into Louisiana, Arkansas and Tennessee, and eastward into Mississippi and Alabama. Withdrawal of ground water from the Sparta Aquifer began during the early 1900s primarily for industry and public supply. However, by the 1940s significant declines in the aquifer's water levels were documented in Union and Jefferson Counties in Arkansas (McKee and Hays 2002).

The decline in water level within the Sparta Aquifer appears to have negatively affected the flow rate from Magnesia Springs at Logoly State Park. Additionally, in 1946 and 1948 the Boy Scouts drilled two 4-in. wells (322 ft. and 508 ft. deep) within what is now the park (Tait et al.

1953:Table 3), and this no doubt further contributed to the lowering of the flow rates at the Magnesia Springs.

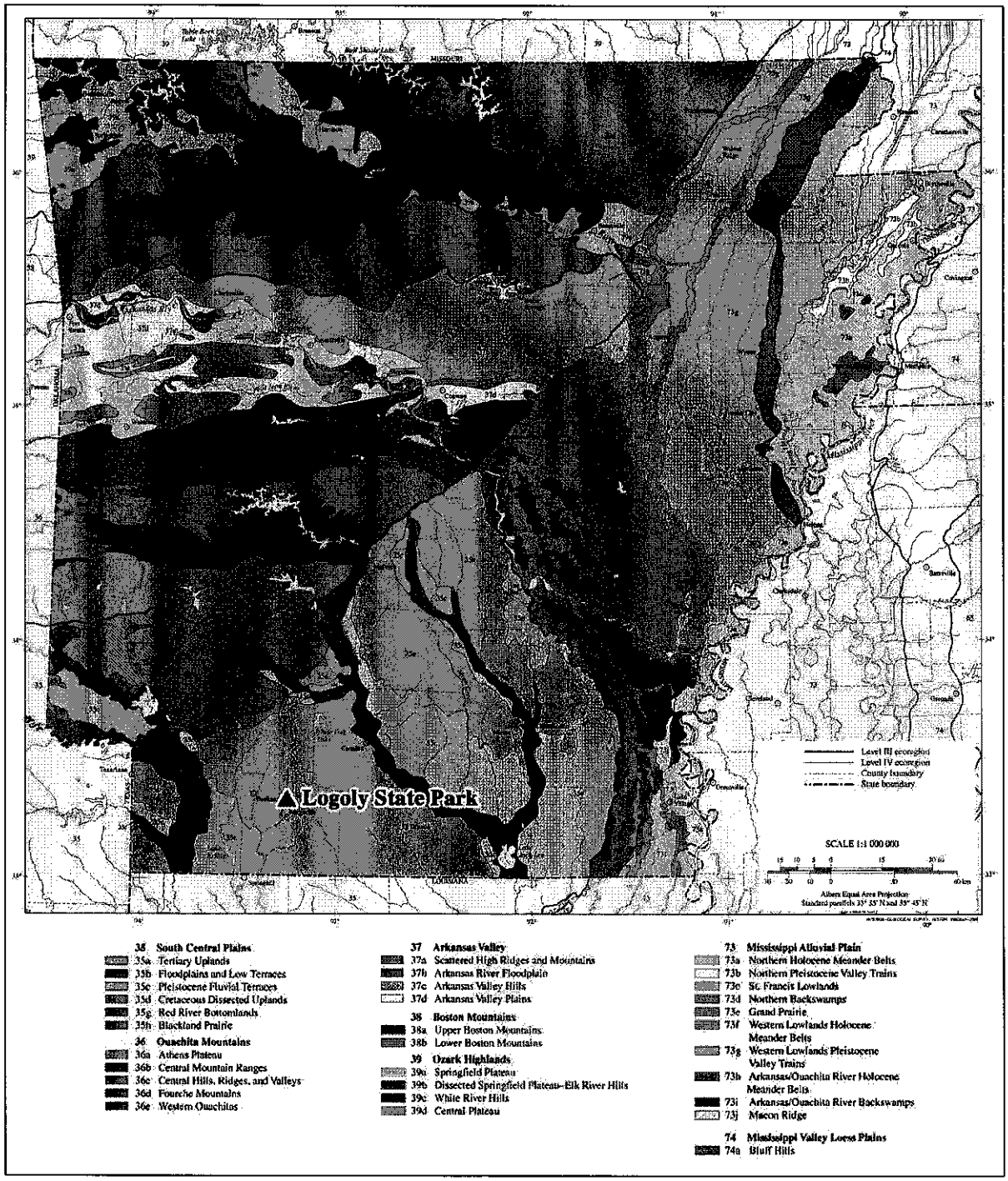


**Figure 2-01. Logoly State Park shown on an ecoregions map of Arkansas (Woods et al. 2004).**

## *DRAINAGE*

The various springs within Logoly State Park are near the headwaters of Spring Creek, which flows northeasterly and is a tributary of Smackover Creek. Smackover Creek is in turn a tributary of the Ouachita River. The Ouachita River basin covers approximately 16,000 mi.$^2$ in Arkansas and Louisiana. The Ouachita River is a navigable stream, and it played an important role in the historic settlement of southern Arkansas. Navigation improvements on the Ouachita River were first authorized in 1871 and consisted of snagging and clearing of the channel (U.S. Army Corps of Engineers, Vicksburg District 2009). By 1926, a navigable channel greater than or equal to 6.5 ft. deep extended from the mouth of the Ouachita River to Camden, Arkansas, a distance of 351 mi. In 1950, the original project was modified to increase the navigable depth to 9 ft., and this required the construction of locks and dams. The Jonesville and Columbia locks and dams in Louisiana opened in 1972, and the Felsenthal and Calion locks and dams in Arkansas were placed in operation in 1984 and 1985, respectively (U.S. Army Corps of Engineers, Vicksburg District 2009).

## *SOILS*

The soil in the Magnesium Spring vicinity, which includes the Bandstand and Tabernacle geophysical survey areas, is mapped as Sacul fine sandy loam, 8 to 12 percent slopes, while the soil at the Hotel geophysical survey area is mapped as Sacul fine sandy loam, 3 to 8 percent slopes (Avery 1985:Sheet 11). Sacul series soils consist of deep, moderately well drained, nearly level to moderately sloping soils that formed in clayey marine sediment (Avery 1985:62-63). They are distributed on hilltops and side slopes.

## *FLORA & FAUNA*

The loblolly-shortleaf pine forest group dominates the West Gulf Coastal Plain. Over 50 percent of the trees in this category are varieties of the southern pine group. The upland forests of this area have much in common with the Oak-Hickory region, which is adjacent to the north. The transition from the Oak-Hickory to the Oak-Pine is indicated not by a boundary but more of an overlap. These forests are often comprised of a massive assortment of different species (Braun 1950).

Woods et al. (2004) characterize the native vegetation of the Tertiary Uplands as a mixed shortleaf pine-loblolly pine forest and upland deciduous. The native vegetation of the Pleistocene Fluvial Terraces is similar, but extensive pine flatwoods are found that are adapted to seasonally wet conditions.

The vegetation of the lowlands in the Coastal Plain includes dense stands of bald cypress in the swampy areas, whereas hardwoods occupy most of the poorly drained soils. In lower areas that are wet but not swampy, water tupelo, sweet gum, soft elm, green ash, hackberry, cottonwood, overcup oak, and willow oak are the most common tree species (Braun 1950).

Faunal species occupying these communities include: large mammals, such as the white-tailed deer (*Odocoileus virginianus*) and black bear (*Ursus americanus*); smaller mammals, such as opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), rabbit (*Sylvilagus* sp.), beaver (*Castor canadensis*), otter (*Lutra canadensis*), and squirrel (*Sciurus* sp.); and large terrestrial birds, including wild turkey (*Meleagris gallapavo*). Riverine species within these communities would have included: fish species, such as bass (*Micropterus* sp.), catfish (*Ictalurus* sp.), sunfish (*Lepomis* sp.), drum (*Aplodinotus grunniens*), and gar (*Lepisosteus* sp.). All the faunal species, described immediately above, would have offered important subsistence resources for humans.

## *PRESENT CLIMATE*

The Late Holocene (i.e., present) climate of southern Arkansas is characterized by warm summers with relatively mild winters. During the late spring, summer, and early fall, sunlight is quite intense, which keeps the humidity and soil moisture evaporation levels high. Winters in this area are characterized by cool and cloudy weather coupled with frequent rainfall, interspersed with periods of clear and cold conditions. Warm, rainy periods occur intermittently during the winter months as well. In Columbia County, July is, on average, the warmest month with a mean daily maximum temperature of 93.3° F, and an average daily minimum temperature of 68.7° F (Avery 1985:Table 1). The coldest month is, on average, January with an average daily maximum temperature of 55.2° F, and an average daily minimum temperature of 32.8° F (Avery 1985:Table 1).

Precipitation in Columbia County averages 50.27-in. per annum (Avery 1985:Table 1). The wettest month is April when an average of 5.59-in. of precipitation falls. Frontal systems associated with areas of low pressure provide the area with the majority of its rainfall. During summer months, convection clouds, caused by high temperatures and humidity levels, provide rainfall frequently during the afternoon hours. The driest month, on average, is October (2.89-in.). Periods of drought are infrequent.

# 3. CULTURAL BACKGROUND

As the focus of this investigation is late nineteenth and early twentieth century structures associated with the former Magnesia Springs Resort, an extended discussion of the local Prehistoric sequence is not warranted, however we refer the readers to the following sources for information about the Prehistory of southwest Arkansas: Early (1982), Hemmings (1982), Klinger et al. (1992); Moore (1909), Schambach (1990), Schambach and Early (1982) and Schambach and Rolingson (1981).

## *CADDO*

It is though that the Caddo Indians first introduced the Euro-American settlers to the springs at Logoly State Park. There has been considerable archaeological research regarding Caddo culture (Pertulla et al. 1999). The period is marked by the appearance of a distinctive set of cultural traits, including flat-topped temple mounds. Caddo culture was largely contemporary with cultures of the Mississippian Tradition to the east and Plaquemine Tradition to the south and shared many similarities with these cultures. However, the origins of Caddo culture are believed to have been independent, and there are a number of features, such as house types, the ceramic tradition, and the persistence of burial mounds, which distinguish the two (Kelley 1986; Kidder 1990).

Historically, there is some confusion concerning terminology for the Caddo sequence. Through the work of Webb and Gregory (1978), Suhm et al. (1954), Suhm and Jelks (1962), and others, a two-part division was established: the Gibson Aspect followed by the Fulton Aspect. Through further research, these divisions have been broken down into many phases, and complexes.

The Caddo period is well represented in southwestern and south-central Arkansas by numerous mound and habitation sites. The period is usually broken down into five subperiods, Caddo I through Caddo V. These divisions are based on the occurrence of particular ceramic decoration. Much of the available information comes from mound site and burial excavations. Named phases do not correspond exactly with these numbered subperiods but overlap somewhat.

Caddo IV is represented by the Social Hill phase. The Social Hill Phase is known chiefly from grave lots, and information regarding architecture, and community patterns are unknown (Early 2002). There was a reliance on maize ad other cultigens, similar to the preceding Mid-Ouachita Phase. Key sites include Hedges (3HS60), Denham Mound, and Bayou Sel. No Social Hill Phase habitation sites or middens have been excavated. Diagnostic traits or artifacts include high frequencies of shell-tempered pottery, Cook Engraved carinated bowls, Hardman Engraved open bowls, Belcher engraved, *var. Manchester* and Blakely Engraved *var. Witherspoon* bottles, polished basketball-shaped seed jars, Foster Trailed Incised utilitarian jars, and Maud, Bassett, and Perdiz arrowpoints (Early 2002).

During the Social Hill Phase (A.D. 1500–1650) the de Soto expedition encountered Caddo villages in west Arkansas. The proposed route of the expedition lies north and west of Logoly State Park. After De Soto's death during the spring of 1542, the expedition attempted to travel west and south to New Spain (Mexico) (Early 1993). They stopped at the Province of *Chaguate*, which is located in the Middle Ouachita region between where the Ouachita River leaves the mountains near Rockport and its junction with the Little River below Arkadelphia (Early 1993:75; Schambach 1993:82). In *Chaguate* the Spaniards made salt at a Caddo salt works that has been identified as the Bayou Sel site (3CL27) on Saline Bayou (Schambach 1993:83). They spent six days at *Chaguate*, and then traveled to the Province of *Aguacay*. This town is

speculated to lie near Nashville, Arkansas (Schambach 1993:84). They remained there at least 11 days before moving farther southwest to the Red River Valley (Schambach 1993:83).

### *COLONIAL PERIOD*

Stewart-Abernathy and Watkins (1982:12) consider the early portion of this interval (ca. 1660–1720) a period of direct contact and the latter portion (ca. 1720–1770) a period of coexistence between native Arkansas and Euro-Americans. Diagnostics artifacts should include French, English, and Spanish trade goods dating from the late seventeenth century to late eighteenth century.

The Historic Caddo or Cadhadacho Confederacy consisted of three confederations and about 25 tribes. The Caddo lived in Northern Louisiana, Southern Arkansas, and into west Texas. They made contact with the Spanish explorer Francisco Vasqueze de Coronado between 1540 and 1542 and by the time of La Salle they were in frequent contact with the Spanish of Mexico. The Caddo benefited by occupying a strategic middle ground between the French and Spanish (Dougan 1993: 29).

Arkansas was part of Louisiana (New France) during most of the Colonial period (1673–1803). Since the history of Colonial Arkansas is essentially that of Arkansas Post (Arnold 1991), it is not surprising that the best-known Colonial period archaeological assemblages are associated with Arkansas Post. Excavations have been conducted at two of Arkansas Post's locations: the mid-eighteenth century location, the 1756–1779 Fort Desha (3DE23) (McClurkan 1971), and the 1779–1804 upstream *Ecores Rouges* location (Holder 1957).

During the 1790s, growing numbers of Anglo-Americans crossed the Mississippi River into Arkansas. The random and dispersed settlement pattern of the Americans contrasted with the clustered colonial pattern (Foley 1989:82-83).

The first European to settle in the Camden area was a Frenchman named Fabre, and his place was known as *Ecore a Fabre*, or Fabre's Bluff (Herndon 1922:787). Camden was strategically important because it was located at the head of navigation on the Ouachita River (Herndon 1922:873).

### *TERRITORIAL PERIOD*

The Colonial period ends with the Louisiana Purchase in 1803. Formal transfer of authority took place at Arkansas Post (3AR47) in 1804 (Arnold 1991). Arkansas was part of the Louisiana District from 1804 to 1805, and until 1812, was part of the Louisiana Territory. In 1808 the Osage ceded 14,000,000 ac. in eastern Arkansas, including the St. Francis Basin and the Lower White River, to the U.S. government (Hanson and Moneyhon 1989:19). From 1812 to 1819, Arkansas was part of the Missouri Territory. After the War of 1812 ended (in 1815) and the British-Creek Confederacy was defeated, immigration increased rapidly. The General Land Office (GLO) began surveying Arkansas into townships in 1815; this work continued up to the Civil War (see *Public Land Sales* below). The objective was to lie out 2,000,000 ac. for distribution to veterans of the War of 1812 (Hanson and Moneyhon 1989:26).

On 2 March 1819, President James Monroe signed a bill creating the "Arkansaw Territory," which included present-day Arkansas and Oklahoma (Hanson and Moneyhon 1989:28). During the Territorial period (1819–1836) county formations by the General Assembly further subdivided the landscape. By act of Congress, Arkansas became a state on 15 June 1836.

### *PUBLIC LAND SALES*

As a result of the Louisiana Purchase all the land in Arkansas became public domain. In 1815, GLO survey teams began mapping eastern Arkansas, using the 5th Principal Meridian as the baseline. The policy of surveying public land into 6 mi. square townships subdivided into 36 numbered sections of 640 ac. was established by the Ordinance of 1785 (Fehrenbacher 1969:40).

Initially public land was sold in 640 ac. tracts (whole sections), but such tracts proved too large and too expensive—even at the Land Act of 1796 price of $2 an acre—for most frontiersmen. The Land Act of 1800 (also known as the Harrison Land Act) authorized minimum purchases of 320 ac. and a four-year credit system (Johnson 1966:663). However, the credit system failed on account of the large number of overdue payments. This, coupled with the financial panic of 1819, prompted Congress to abolish the credit system. The Land Act of 1820 reestablished the policy of selling land only for cash, but lowered the price to $1.25 per acre and allowed a minimum size of 80 ac.

The Land Act of 1820 did not, however, resolve the issue of squatters on public land. Although settling on un-surveyed lands was not legal until 1880 (Gates and Swenson 1968), it was widely practiced. The public land question in general became a factor in national politics in the 1830s, and in 1848 the free-land movement resulted in the formation of the Free-Soil Party. Earlier, the Pre-emptive Act of 1841 had made it possible for an actual settler (i.e., a squatter) to be given priority in claiming the land, but cash value still had to be paid for proper title. Fehrenbacher (1969:43) remarks, "The Pre-emptive Act of 1841 marked the demise of the old conservative land policy with its emphasis on revenue. Thereafter, despite strong opposition from some quarters [particularly slave owners], the trend was toward greater liberality, culminating in the Homestead Act of 1862."

It was the secession of the southern states in 1861 that cleared the way for the passing of the Homestead Act of 1862. A homestead law had been a Republican Party plank in the 1860 election. The Act provided that to acquire title to a tract of land in the public domain (up to 160 ac., a quarter section), a homesteader was obliged to settle on or cultivate it for five years. Homesteaders had to be U.S. citizens who were either the head of a household, 21 years old, or a military veteran. The Federal homestead laws provided an incentive, in the form of land, for the settlement of the West.

### *ANTEBELLUM PERIOD*

In 1836, Arkansas became the twenty-fifth state. The population was 52,240, of which 19 percent were black slaves (Hanson and Moneyhon 1989:38). The combined Territorial (1804–1836) and Antebellum (1836–1861) periods fall within Stewart-Abernathy and Watkins' (1982) Pioneer Activity period (1780–1850).

The development of southwest Arkansas was greatly stimulated by the increasing volume of steamboat traffic during the Early Statehood period, the latter portion of which (1840s–1850s) is correlated with the "Golden Age" of steamboats. Once early technical difficulties were overcome, the number of steamboats increased rapidly. Increased steamboat traffic during the 1820s–1830s fostered the development of new settlements along the Ouachita and Red rivers. These settlements often began as woodyards to supply steamboats with fuel, then later became farms, plantations, communities or landings.

Columbia County was created December 17, 1852 out of portions of Hempstead, Lafayette, Ouachita and Union County (Herndon 1922:745). The next summer the site for the new county seat was chosen, and Magnolia was incorporated on January 6, 1855 (Herndon 1922:879).

The early Euro-American settlers of Columbia County brought slavery with them. In 1854 there were 1,675 slaves of all ages out of a total county population of nearly 6,000 (Martel 1943:226). Martel (1943:227) provides a list of the largest slave owners in 1853, and notes that there was a lot of variability in the slave ownership within the county. By 1860, there were 3,599 slaves out of a total population of 12,449 in Columbia County.

In the South, the archaeology of the Antebellum period has typically been characterized by ethno-archaeological studies of plantations and slavery (Singleton 1985, 1995).

### *CIVIL WAR & RECONSTRUCTION*

Arkansas's position in the Civil War was complex as a result of being a slave border state. Unionist sentiment was highest in the northwest, while the southern and eastern counties, where cotton was produced with slave labor, not surprisingly favored secession. After the war began in April, the convention reconvened and Arkansas voted for secession on May 20, 1861.

No strategically significant military engagements took place in southwest Arkansas during the Civil War. However, southwest Arkansas was an important supply area for the Confederates during the Civil War, and Washington in Hempstead County was made the Confederate Capitol of Arkansas after the fall of Little Rock in 1863. The nearest significant battles to the study area—Poison Springs, Marks Mill, and Jenkin's Ferry—took place during April 1864 and were peripheral actions relating to the Union's failed Red River campaign.

In Camden, a Civil War earthwork identified as Fort Southerland was built to defend the southern approach to the town. This fortification is more correctly known as Fort Diamond, and two elements of it have been assigned archaeological site numbers (3OU236 and 3OU270). Other Civil War era military sites in Camden include: two Confederate Infantry Camps (3OU94 and 3OU276); Fort Lookout (3OU202); the wreck of the steamboat *Homer* (3OU248); Fort Pickett (3OU268); Fort Simmons (3OU269); Parson's Cavalry Camp (3OU273); a Confederate Cavalry Camp (3OU274); the Camden Checkpoint (3OU275); and the Camden Water Battery (3OU284).

Reconstruction lasted from 1865–1874 in Arkansas. Far more serious than the loss of life during the war were the effects of occupation. Both sides were responsible for burning crops, buildings, and industrial and manufacturing centers. It took more than twenty years to recover and rebuild from the effects of such destruction, and the scarcity of food and goods during the war had far-reaching, long-term effects on the economic and social fabric of society. In 1874, the "Brooks-Baxter War" between rival claimants to the governorship ended when President Grant intervened and ordered the Brooks forces to disperse (Herndon 1922). In 1874, Arkansas adopted a new constitution that restored franchise to all whites and guaranteed full civil rights for African-Americans, as a result the state was readmitted to the Union.

### *RAILROAD PERIOD*

During the Railroad period (1855–1950) communication and transportation became dominated by the railroads. The period is "foremost characterized by a drastic reorganization of non-farming settlement pattern keyed to extremely narrow corridors ..." (Stewart-Abernathy and Watkins 1982:HA18-19). From an archaeological viewpoint the Railroad period is summarized as:

> ... a side from the increased presence of consumer goods and increased general information level, the Railroad period is reflected by scores of nucleated settlements whose end or beginning date correspond to the coming of the railroad, and by some of the greatest landscape modifications made by people. These modifications take the form of embankments, cuttings, bridges, and

> support complexes, and exist on an intensive and extensive scale matched only by the construction after 1950 of highways and levees [Stewart-Abernathy and Watkins 1982:HA18-19].

An important early railroad in southwest Arkansas was the Cairo & Fulton (C&F). By 1874 the C&F, an extension of the St. Louis, Iron Mountain & Southern Railroad, had completed a line from northeastern Arkansas to Little Rock and southwest to Fulton on the Red River, and trains were running from St. Louis to Texarkana (Hanson and Moneyhon 1989:49).

The 1880s railroad construction in Arkansas was a watershed event. The two most significant lines built in southwestern Arkansas were the St. Louis & Southwestern and the St. Louis & Iron Mountain (Hanson and Moneyhon 1989:49). The growth of Magnolia was slow until the completion of the railroad in 1881 (Herndon 1922:880).

McNeil, just west of Logoly State Park, was located at the junction of the Louisiana & Northwest Railroad and the St. Louis Southwestern Railroad. McNeil was incorporated on February 12, 1884 (Herndon 1922:746). Visitors to the former Magnesia Springs Resort de-trained at McNeil and walked or rode wagons to the springs (Encyclopedia of Arkansas 2014).

One aspect of early railroad development (ca. 1876–1914) was the presence of numerous short line railroads (Hull 1997). These lines developed out of local interests and played an important role in developing the state. While no short line railroads serviced Columbia County, two short line railroads serviced Ouachita County to the north (Hanson and Moneyhon 1989:50). The Prescott & Northwestern Railroad was chartered in 1890 and was built primarily to haul timber and timber products (Hull 1998:366). The Reader Railroad, or the Possum Trot Line, was built in 1925 to transport oil from Waterloo, Arkansas to market (Hull 1998:306-309.

### *LUMBER INDUSTRY*

Railroads construction in previously isolated areas of Arkansas led to a "transition from household economies and neighborhood businesses to industrial activities on a larger scale" (Gannon 1998:9). The trunk line railroads opened up the forests of the Coastal Plain to exploitation by the logging industry. By 1899, the lumber industry was responsible for two-thirds of the value—roughly $11,000,000—of the Arkansas's total manufactured goods. In 1909, timber production peaked in Arkansas, the South, and in the U.S. (Strausberg and Hough 1997:7). During the early timber boom years, the lumber companies cut over large tracts with little regard to the future. The practice, often referred to as "cut-out and get-out," resulted in the deforestation of large tracts of land. Sawmills and mill towns were constructed and operated in the study vicinity from the 1890s to ca. 1930. As rapidly as they appeared, most mills and mill towns were abandoned "ghost towns" by the 1930s.

The most common archaeological site type associated with the lumber industry is tramway. Tramways are linear earthworks that supported light, narrow gauge feeder line locomotives that were built to service logging camps, and to move timber from the woods to the mills (Fair 1997:55). Tramways are "ubiquitous" in the pine belt region (Anderson and Smith 2003:566).

### *MODERN ERA*

Oil was first discovered in Arkansas on April 14, 1920 at the Lester and Haltom No. 1 Well Site on Old Wire Road about 1.5 mi. south of Ogemaw in Ouachita County. However, this well was never a significant producer it was simply the "first in a multitude of oil discoveries that would come in rapid succession and would change the face, physical and economic, of much of southwest Arkansas" (Doss 1975). The first commercially viable oil well was the Busey Well which "blew in with a force that changed Union County forever" on January 10, 1921 (Parker 2001:31). The gusher from this well was visible from downtown El Dorado. On May 14, 1922

the Murphy No. 1 well, located just south of Smackover, hit the apex of the Norphlet Dome and exploded—leaving a 450-x-70-ft. deep crater. El Dorado and Smackover were chaotic boom towns for the next few years.

By the 1940s companies emphasizing conservation of existing forests began to dominate the timber industry, and a second timber boom ensued. In 1939, Columbia County had ten lumbering or finishing firms (Hanson and Moneyhon 1989:51).

### *LOGOLY STATE PARK*

In 1940 the properties that would become Logoly State Park were owned by three families: the Longinos, Goodes, and Lyles (Encyclopedia of Arkansas 2014). The Desoto Council of the Boy Scouts of American leased the families land for a summer camp and named the camp after the first two letters of the three families names (i.e., LO-GO-LY). The Boy Scouts constructed a mess hall, staff cabins, showers, campsites, trails and a swimming pond at Camp Logoly. The concrete foundations of some of their latrines can today be seen near Magnesia Springs. Camp Logoly closed in 1967.

Following the closure of Boy Scout Camp Logoly, Hugh Longino contacted Arkansas State Parks (ASP) about incorporating the former camp into the park system to "preserve the area's unique beauty, history and woodlands" (Encyclopedia of Arkansas 2014). The Nature Conservancy purchased the property in 1974, and held it until the Arkansas Legislature voted for funding the purchase by ASP in 1975 and 1977.

Logoly State Park opened May 19, 1978 as Arkansas's first environmental education state park. Most of Logoly's 370 ac. comprise a State Natural Area that includes unique plant species and mineral springs and is surrounded by old-growth forest.

# 4. LITERATURE & RECORDS SEARCH

## *ARCHAEOLOGICAL SITES*

An on-line review of the Automated Management of Archaeological Site Data in Arkansas (AMASDA) maintained by the Arkansas Archeological Survey (ARAS) was conducted. This revealed that there are two previously recorded sites within Logoly State Park (3CO64 and 3CO65), and one site within a 2 km search radius (3CO262).

### *3CO64*

Importantly, Site 3CO64 is recorded at Magnesia Springs. It represents the location of the nineteenth century Bathing Reservoir, and is described on the August 22, 1979 3CO64 site form as follows:

> The site is the foundation of the ruined 19th century bathouse. At one time a hotel, and a band stand were also located in this area. There was no evidence of these structures at the time of the survey. The resort was a health spa. At the time of the survey park personnel had cleaned off the foundation of the bath house and it was photographed and mapped. Two large cisterns and a concrete tank are relatively intact.
>
> Only the concrete foundation exists at present (I am not sure there ever was a superstructure) and it is in need of repair to underground pipes [3CO64 site form].

Robert Cande with the ARAS Fayetteville Station completed the site form as a part of AMASDA Project 2163, see below. No maps or images are included with the site form, but negative numbers 792145-792149 are noted.

### *3CO65*

Site 3CO65 is the location of an isolated Archaic projectile point recovered from a gully about 320 m north-northwest of the Magnesia Springs. Robert Cande with the ARAS Fayetteville Station completed the site form as a part of AMASDA Project 2163, see below.

### *3CO262*

Site 3CO262 is the location of the New Bethel Cemetery and former location of the New Bethel Church at the community of Magnesia Springs, which is located about 0.5 mi. southeast of the Magnesia Springs (outside of Logoly State Park). Vernon Perry completed the site form in 2006 based on archival data alone as part of the "Columbia County Historic Site Survey." Marcia Chapman canvassed the cemetery in 2001, and her list of monument inscriptions is provided with the site form. The cemetery dates to at least 1853 and continues to be used into the present. A church is shown at this location on a 1914 map, but it is no longer present.

## *PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS*

Review of AMASDA project records reveals that little archaeological work has been conducted in the section of Columbia County. The ARAS conducted a reconnaissance survey of a portion of Logoly State Park during 1979 (recall that the park opened on May 19, 1978) and this resulted in the identification of Sites 3CO64 and 3CO65, see above. Cande's report, if there is one, is not available on-line (see AMASDA Project 2163).

## *NRHP LISTINGS*

Importantly, there are no listed NRHP properties within Logoly State Park. There are currently 22 properties in Columbia County, Arkansas that are listed on the NRHP, and most of these are concentrated in Magnolia. Three formerly listed properties have been de-listed, including the Louisiana & Northwest Railroad Depot in Magnolia. The nearest listed property to the study area is the US 79 overpass over the Union Pacific Railroad at McNeil.

## *AHPP STRUCTURE FILES*

In 1995 the AHPP recorded the Magnesia Springs as COØ398, and it NRHP status was listed as unknown. There are no other AHPP properties recorded within or near Logoly State Park.

## *MAGNESIA SPRINGS RESORT*

As noted in Chapter 1, the Magnesia Springs started being used by locals and tourists during the late 1800s for healthy mineral baths and drinking. The spring water contained various minerals (see Chapter 2) that reportedly had curative powers. A stop on the St. Louis Southwestern Railway (an important trunk line) at McNeil provided for access to the springs and the Magnesia Springs Resort that developed there. From the depot guests either walked or rode carriages to the resort, which was about a mile to the east.

As early as 1888, Methodists began using Magnesia Springs as a campground[1], and a Tabernacle and Bandstand were built near the Magnesia Springs. The Tabernacle was a large open sided wooden pavilion with wooden benches (Figure 4-01). The Bandstand was a smaller elevated wooden platform with steep steps located on a higher area close to the Tabernacle (see Figure 4-01). The Magnesia Springs water was collected in an artificial pool lined with reticulated blocks (Figures 4-02 and 4-03).

Eventually two hotels developed at the so-called Magnesia Springs Resort: the Duke and the Mendenhall. The Duke Hotel appears to have been a two-story frame building with covered porches on both floors (Figure 4-04).

The Methodists continued to congregate at Magnesia Springs into the 1930s, but the resort fell into disuse. This may be partly attributed to the drop of the water table within the Sparta Aquifer that fed the springs (see Chapter 2).

[1] Camp meetings were an important part of Methodist ministry, and during the nineteenth century when few congregations had actual sanctuaries, circuit riding preachers often held services in brush arbors or rough board tabernacles erected near springs for fresh water (Britton 2022). Camp meetings were "great social gatherings where whole families came, bringing the milk cow with them, and camped for a week or more around the big spring that was always a prime requisite for the location of permanent camo ground site" (Martel 1943:240). The original Columbia County camp meeting grounds was located at College Hill, a few miles north of McNeil (Martel 1943:234). It was the site of the Arkansas Methodist's Ouachita Conference meeting in 1864 (Jewel 1892:296, 418).

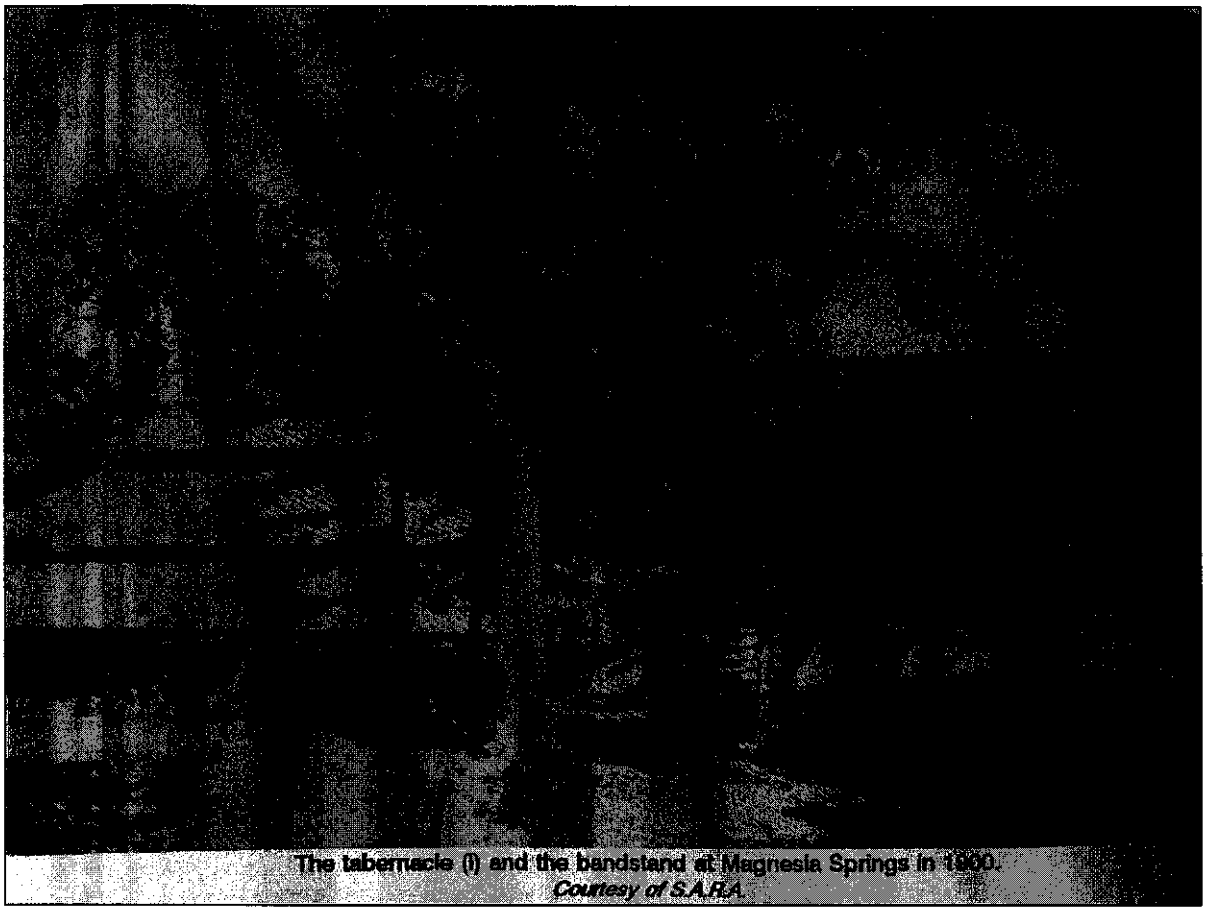


**Figure 4-01. A 1900 photo of the Tabernacle and Bandstand at Magnesia Springs, view is interpreted as to the south.**

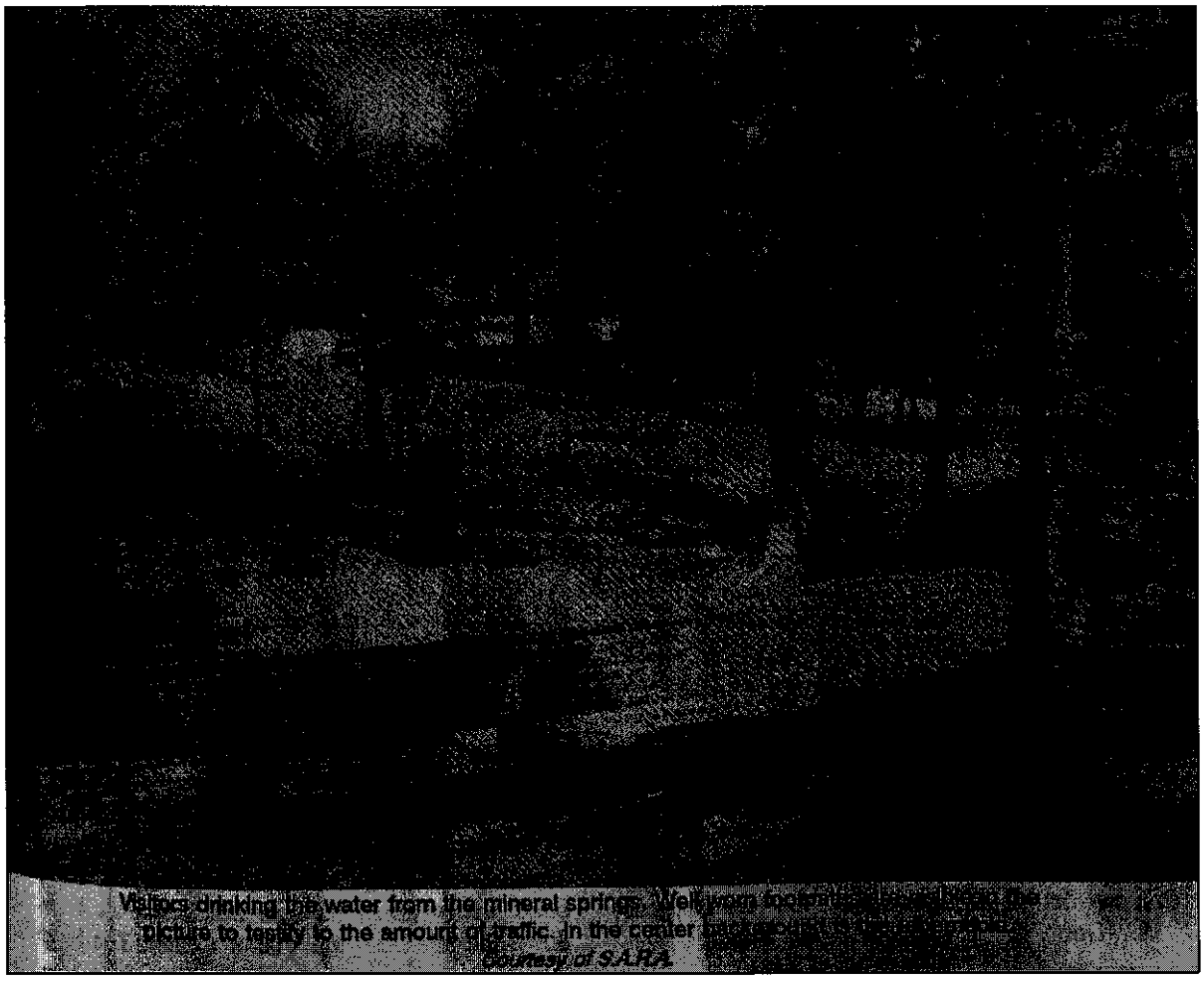

**Figure 4-02. Undated photo of visitors at Magnesia Springs with the Tabernacle in the background, view is interpreted as to the northwest.**

**Figure 4-02. An 1896 photo of the Lyle Family at Magnesia Springs" (Photo courtesy of Mrs. Charlie Lyle), the view is interpreted as to the southwest.**

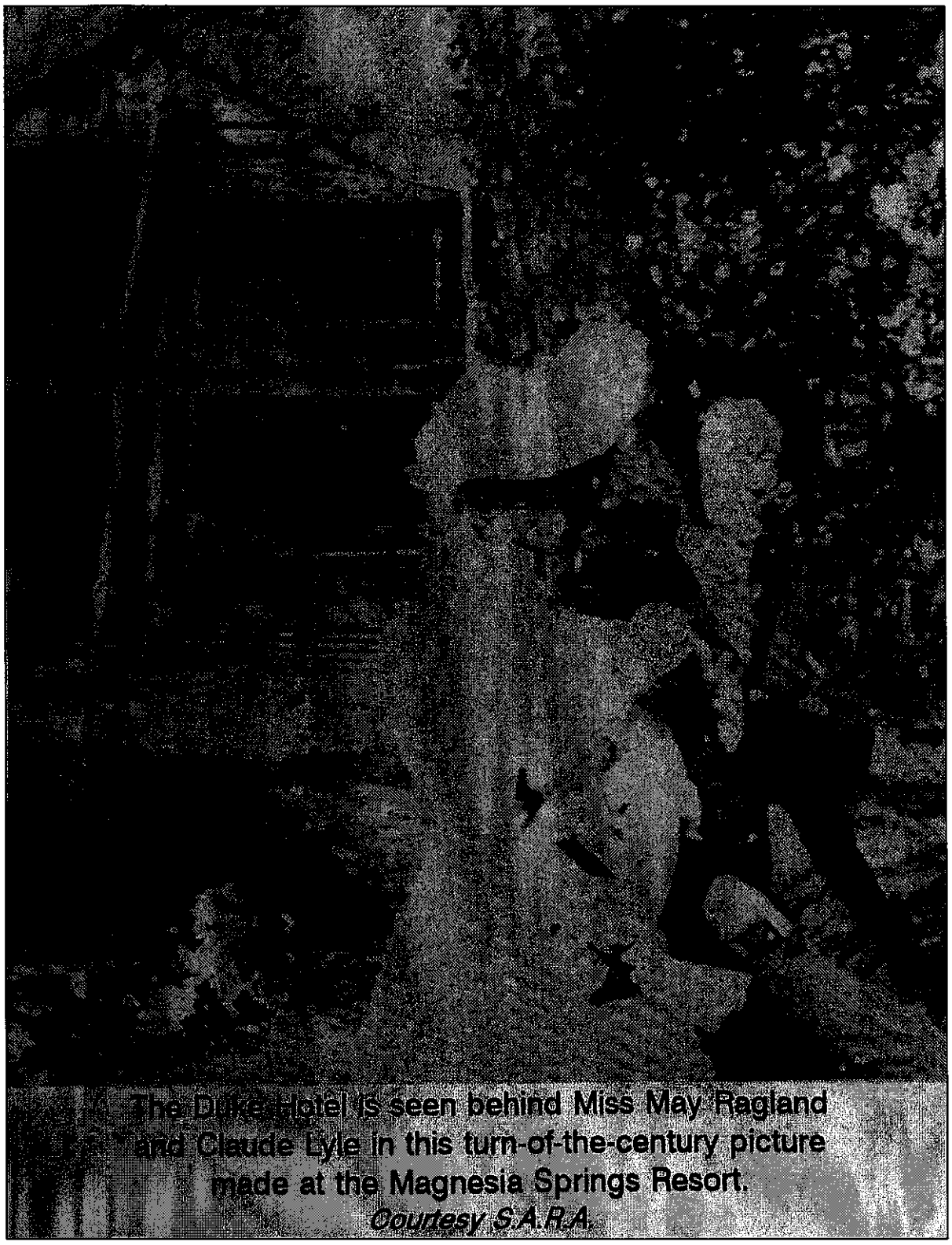


**Figure 4-03. A ca. 1900 photo of the Duke Hotel behind Miss Ragland and Claude Lyle.**

## *CARTOGRAPHIC REVIEW*

### *1832 GLO PLAT MAP*

The earliest detailed map of the study area is the 1832 General Land Office (GLO) plat map for T16S R20W (Figure 4-05). This map shows no improvements within the township, only drainages, the area was a wilderness at this time.

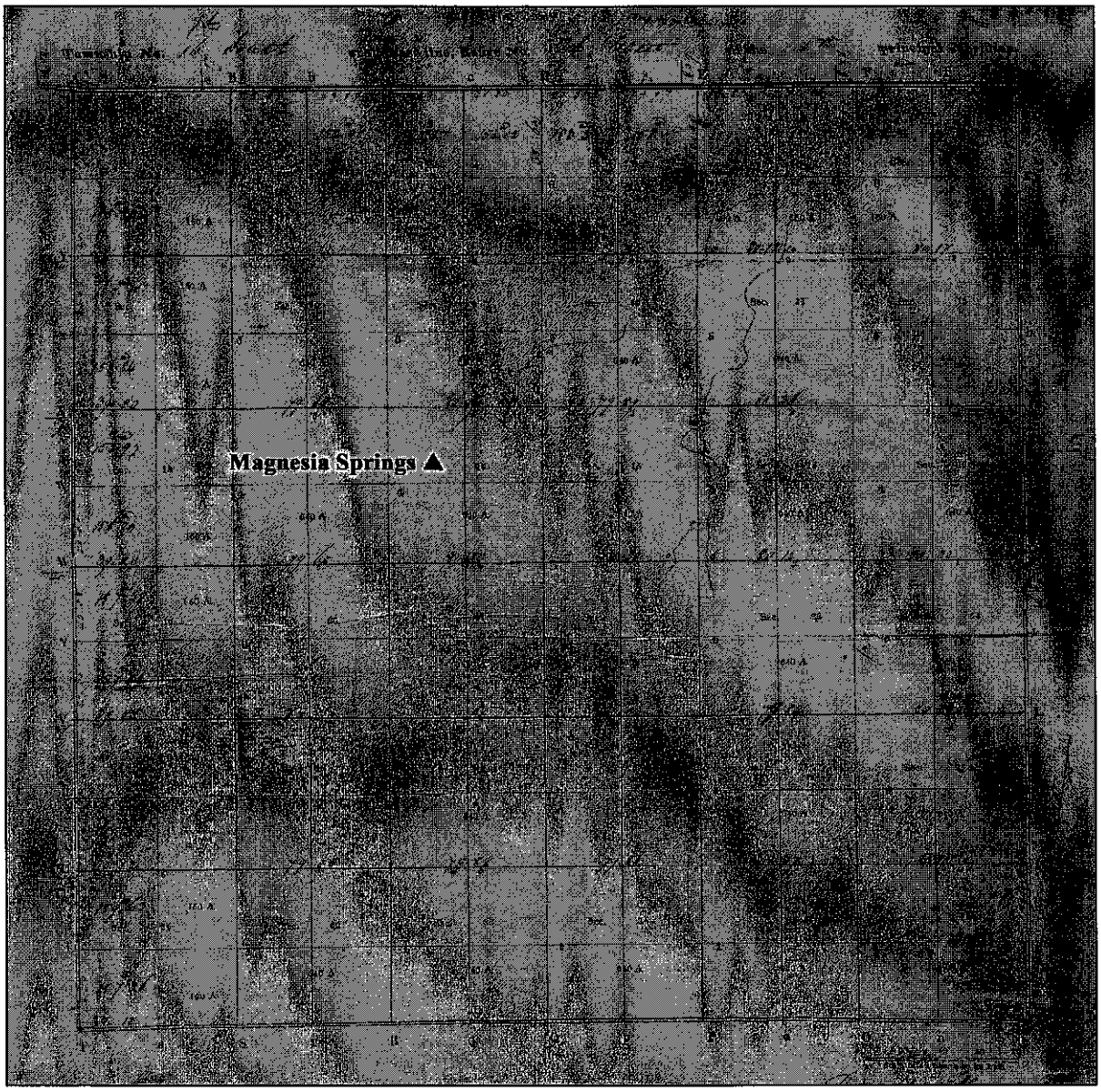


**Figure 4-05. The 1832 T16S R20W General Land Office plat map with the Magnesia Springs location added.**

### *1936 ROAD MAP*

The 1936 Columbia County Road Map shows no structures or roads in the Magnesia Springs vicinity (Figure 4-06). The church to the southeast is the New Bethel Church and Cemetery (3CO262). Reportedly this church is also shown on 1914 soil survey map, but we were unable to retrieve a copy of this source.

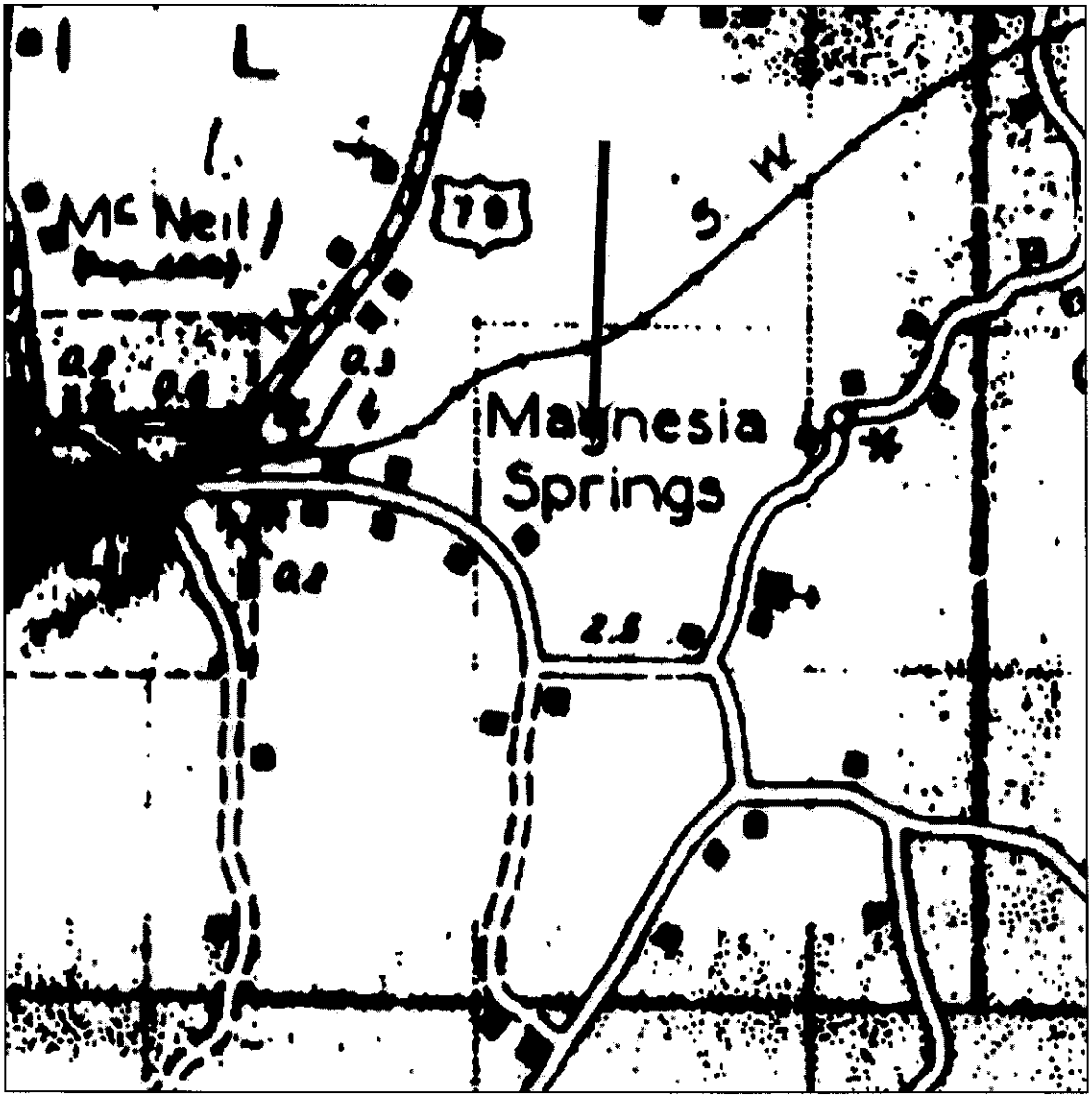


**Figure 4-06. A portion of the 1936 Columbia County Road Map with the Magnesia Springs location indicated by arrow.**

### *1968 QUAD*

The 1968 Magnolia, AR 7.5-min. quad shows the Magnesia Springs area the year after the Boy Scout Camp Logoly was shuttered (Figure 4-07). An unimproved road is shown leading down a ridge side to the Magnesia Springs. To the west three structures are found along an improved road that leads southwest. These three structures likely represent more permanent Boy Scout buildings, such as the mess hall or staff cabins.

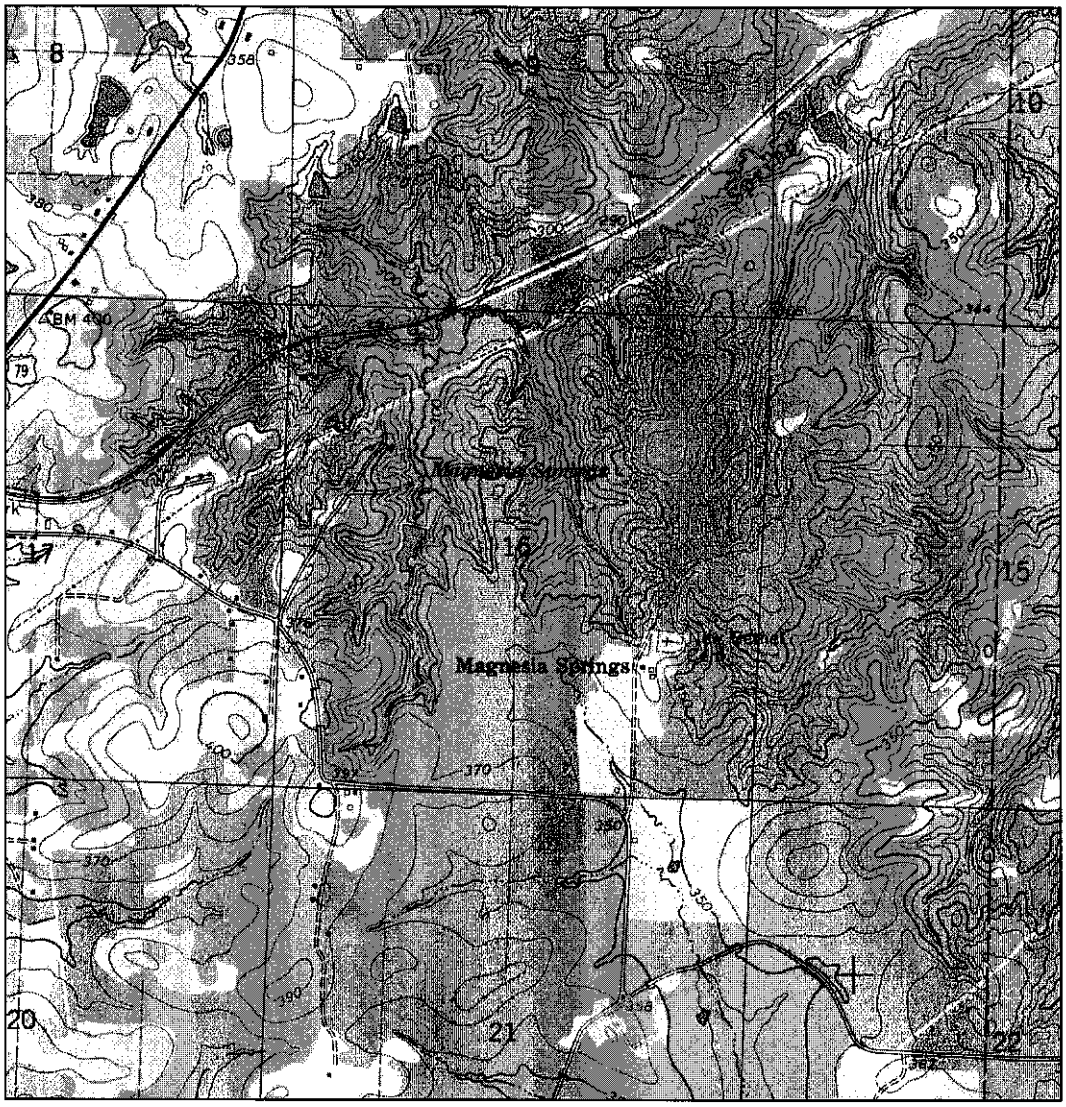


**Figure 4-07. A portion of the 1968 Magnolia, AR 7.5-min. quad showing Magnesia Springs.**

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# 5. GEOPHYSICAL SURVEY

## *GEOPHYSICAL INVESTIGATIONS IN ARCHAEOLOGY*

Geophysical survey investigations have become an important part of the pursuit of North American archaeology and employ a range of techniques for the non-destructive prospecting of archaeological deposits (Gaffney and Gater 2003; Kvamme 2008). Several techniques have been derived from geophysical prospecting and adopted for archaeological investigations through rigorous field collection techniques and unique data processing programs specifically developed for the study of the archaeo-geophysical record (Clark 1990; Kvamme 2003). Techniques used mostly for archaeological research include soil resistivity, soil conductivity, magnetic susceptibility, magnetometry, and ground-penetrating radar (GPR) (Clark 1990; Kvamme 2003). All require different equipment and produce different results.

Geophysical instruments are differentially affected by variables such as moisture, metal trash/debris, and the transmission of signals such as cell phones and transmission lines. Data collection is also impacted differently for each of the geophysical instruments by physical impediments such as trees, pavement, fences, structures, and vegetation. The different geophysical techniques that have been used in archaeology have been discussed in a number of seminal books and journal articles (Bevan 1998; Clark 1990; Conyers 2004; Gaffney 2008; Gaffney and Gater 2003; Scollar et al. 1990; Weymouth 1986; Witten 2006).

Field methods for archaeo-geophysical investigations vary in detail from technique to technique, but there are several factors that are consistent with all techniques. The density of the dataset is controlled by two factors: (1) traverse interval—the distance between the passes the instrument makes back and forth across the collection area; and (2) sample interval—the distance between readings the instrument records as it passes along each traverse. Readings are either collected in a known cycle (i.e., 5 readings per second) and the surveyor matches their sets to their gait to establish the desired sample density (this is the case with the gradiometer), or a calibrated survey wheel is used to record readings at set intervals (as is the case with GPR).

While an important and useful means of data acquisition, geophysical prospecting is most effective when combined with detailed understanding of the site-specific characteristics of archaeological deposits. This has been demonstrated by numerous case studies (e.g., Clark 1990; Weymouth 1986). A growing body of literature addresses the use of geophysical prospecting as a primary means of data collection when coupled with other data from previous and/or current excavations and has been described by Kvamme (2003) as the future of archaeological geophysics. Each method used in this project is described briefly below.

Gradiometer surveys are non-invasive and passive techniques that measure slight variations in the magnetic properties of soil and buried objects. Gradiometers have become the primary tool for archaeo-geophysicists due in part to the fact that geophysical data can be collected and processed rapidly and efficiently, and, when conditions are right due to the properties of specific soils, gradiometers have proven useful in locating negative relief features such as pits and post holes as well as thermally-altered features such as fire hearths and burned structures (Gaffney 2008; Gaffney et al. 2000; Kvamme 2006b).

Gradiometers record the minute fluctuations that sediments and objects have on the earth's magnetic field. This is known as induced magnetism because the object does not maintain its own magnetic field. If the effects of this induced magnetism are strong enough compared to the magnetism of the surrounding soil matrix, even small pit features or post holes can be identified or resolved in the geophysical data along with the larger-sized features (i.e., structures). A second type of magnetism called remnant magnetism is created when an object maintains its own magnetic

field. In prehistoric archaeological examples, this occurs when objects themselves are thermally altered, thus creating a magnetic state called thermo-remanent magnetism (Kvamme 2006a:207). The properties of the specific gradiometer used in the current study—a Bartington 601-4 Fluxgate Gradiometer—is discussed in detail by Bartington and Chapman (2004).

## *Site Specific Field Methods*

### *Gradiometer*

Gradiometer data were collected using a Bartington Fluxgate Gradiometer setup in a Grad601-1 array (Figures 5-02, 5-03, 5-04, 5-05, 5-06 and 5-07). Data were collected in 10 m grids using non-magnetic markers on opposite sides of the collection grid to guide the surveyor's path back and forth across the collection area. Grids were established using Emlid Reach RS2 RTK GNSS in conjunction with a Leica Viva TS15 Robotic Total Station. The data were collected at 0.5 m traverse intervals with a sampling interval of 8 readings/meter circumventing trees within the survey grid. The gradiometer survey covered a total area of 0.367 acres. Local grid markers were left in the field to aid in reestablishing grids for future investigations of the site.

**Table 5-01. Gradiometer coverage by locus.**

| Locus | Coverage (m²) | Coverage (ac.) | Coverage (ha) |
|---|---|---|---|
| Bandstand | 110 | 0.027 | 0.0110 |
| Tabernacle | 476 | 0.118 | 0.0476 |
| Hotel | 900 | 0.222 | 0.0900 |
| Totals: | 1,486 | 0.367 | 0.1486 |

### *sUAS*

Low altitude LiDAR data were collected over the localities using a DJI Matrice 300 RTK UAV. LiDAR data were collected with a Zenmuse L1 payload sensor array at a flight altitude of 100 m. Data were collected in compliance with Federal Aviation Administration (FAA) small Unmanned Aircraft Systems (sUAS) Regulations (Part 107) and was conducted by FAA licensed sUAS operator Chester Walker (License #4442784). The LiDAR survey covered a total area of 395.4 ac. (160 ha) (Figures 5-08, 5-09, 5-10, 5-11 and 5-12).

## *Data Processing*

### *Overview*

All collected data sets were processed and filtered to remove extraneous false readings (spikes and drop-outs). Data processing levels the datasets combining adjacent grids into a single image with no "grid lines." Datasets were processed to enhance the visibility of the target features and geophysical anomalies through statistical manipulation of the recorded data as well as through image processing of the image file output.

The general goal of data processing is to lessen the effects of background "noise" and to enhance the quality of the "target." In geophysics in general, and archaeo-geophysics in particular, the term "noise" is used to discuss any return that is not a result of the object under investigation—the latter being referred to as the "target" or "signal." Hence, in some cases what is discussed as noise can in another case become the signal or target (Milsom 2005:13-14). Accuracy of the geophysical readings are not as important for resolving targets as is the change or delta (Δ) between the target and its surrounding matrix.

The major data processing techniques are discussed below along with details on the specific data processing workflow applied to each collection grid. Kvamme (2006b:236) is followed in the general approach to data processing. After each processing step, the results are closely compared to their previous state to assure that data manipulation is not in fact decreasing the clarity and quality of the data, thus ensuring that the findings are not products of data processing.

### *GRADIOMETER DATA PROCESSING*

The gradiometer data processing workflow consisted of several steps. First, the raw data (gradiometer readings with local grid coordinates) were passed through a time domain zero median filter. This filter levels the background levels of the two gradiometer arrays and de-stripes the data. De-striping is a process used to equalize the underlying differences between grids caused by instrument drift, inconsistencies during setup, delays between surveying adjacent grids, or heading error from magnetic instruments. The mean, mode, or median of each grid or traverse is subtracted from the grid or traverse, effectively zeroing the mean, mode, or median. When the mean is used, thresholds are set to exclude extreme data points.

The data was then gridded using Golden Software's Surfer 15. The grid file was then inspected and smoothed using a low pass filter. High and low pass filters are used to remove high or low frequency components in a geophysical survey. A high pass filter calculates the mean of a window of a specified size, then subtracts this mean from the center value. A low pass filter calculates the mean of a window of a specified size and replaces the center value with the mean. Either filters can use Uniform or Gaussian weighting. With uniform weighting, all values within the window are given equal weight. Gaussian weighting gives a higher weight to values closer to the center of the window. Low pass filters are more commonly applied to lessen the effects of background noise. Both filters should be used with caution and close attention should be made to their resulting effects, assuring that no artifacts of the processing are created, or that no significant anomalies have been removed as a result of their application (Kvamme 2006b).

The surfer grid was imported into ArcGIS Pro 2.9.2 and was geo-referenced and assigned a projection. The gradiometer data values were then clipped to focus the color scale to enhance the legibility of the archaeological information. Clipping replaces all values outside a specified minimum and maximum range. These minimum and maximum values are specified in either absolute values or ± Standard Deviations (SD). This process is used to remove extreme data point values and aids in normalizing the histogram of the data. Archaeological details are subtle and having a normal distribution of data allows the fine detail to show through with clarity.

### *sUAS DATA PROCESSING*

LiDAR data was processed first using DJI Terra Pro and then post-processed using Green Valley LiDAR 360. LiDAR 360 was used to classify the point cloud and extract the ground points. The ground points were processed into a digital terrain model (DTM). DTMs allow for the creation of topographic maps of areas that are covered in vegetation.

## *RESULTS & INTERPRETATIONS*

The geophysical survey was conducted by a two-person crew from May 4 to 12, 2022. As noted above the three gradiometer survey areas covered 0.367 ac. (0.149 ha) (see Table 5-01) and LiDAR data was collected from a 395.4 ac. (160 ha) area.

Gradiometer data successfully located several magnetic anomalies at all three loci and identified the probable locations of two structures. Figures 5-02 and 5-03 show the gradiometer data and interpretation from the Bandstand locus The anomalies noted in Figure 5-03 should be tested to determine if they are associated with the historic structure.

Figures 5-04 and 5-05 show the data and interpretation from the Tabernacle locus. The magnetic anomalies appear to be footers associated with a possible structure depicted in Figure 5-05. The location of this structure should be "ground-truthed" before this interpretation is used for any future planning at the Logoly State Park. Further historic photograph analysis could aid in bolstering this interpretation.

The clearest results of the geophysical survey were at the Hotel locus. Figures 5-06 and 5-07 show the gradiometer data and interpretations of the Hotel. The magnetic anomalies are clearly related to the sub-structure of the Hotel. Some of these features are visible at the ground surface directly under the leaf cover. Magnetic anomalies that are outside of the possible structure should be tested to determine if they are associated with a privy or other feature types associated with the historic building.

Results of the LiDAR survey are presented in Figures 5-08, 5-09, 5-10, 5-11 and 5-12. These figures show the extent of the LiDAR survey area (Figure 5-08), a 20 cm contour map of the "bare earth" DEM (Figures 5-09 and 5-10), a "bare earth" DEM displayed as a hillshade (Figure 5-11) plotted with the gradiometer survey areas and location of an old road (Figure 5-12).

**Table 5-02. Gradiometer Anomaly Coordinates (UTM NAD83 Zone 15N EPSG:26915).**

| Anomoly | Locality | Easting | Northing | Local East | Local North |
|---|---|---|---|---|---|
| 1 | Bandstand | 483121.16 | 3689803.84 | 8.5 | 10 |
| 2 | Bandstand | 483126.68 | 3689807.5 | 2 | 9.5 |
| 3 | Bandstand | 483118.98 | 3689811.16 | 6.5 | 2.5 |
| 4 | Tabernacle | 483101.02 | 3689868.53 | 16 | 29 |
| 5 | Tabernacle | 483103.35 | 3689867.04 | 17.5 | 27 |
| 6 | Tabernacle | 483102.02 | 3689860.7 | 17 | 22 |
| 7 | Tabernacle | 483103.87 | 3689857.89 | 18 | 18 |
| 8 | Tabernacle | 483096.66 | 3689854.74 | 11 | 15.5 |
| 9 | Tabernacle | 483093.67 | 3689854.56 | 8 | 15 |
| 10 | Tabernacle | 483096.38 | 3689848.72 | 10.5 | 8.5 |
| 11 | Tabernacle | 483105.68 | 3689842.88 | 20 | 3 |
| 12 | Hotel | 483236.71 | 3689601.24 | 15.5 | 22 |
| 13 | Hotel | 483227.81 | 3689598.13 | 24.5 | 22.5 |
| 14 | Hotel | 483240.29 | 3689596.79 | 26 | 17.5 |
| 15 | Hotel | 483242.33 | 3689587.3 | 26 | 7.5 |
| 16 | Hotel | 483231.43 | 3689581.48 | 19 | 3.75 |
| 17 | Hotel | 483236.74 | 3689581.48 | 14 | 5 |

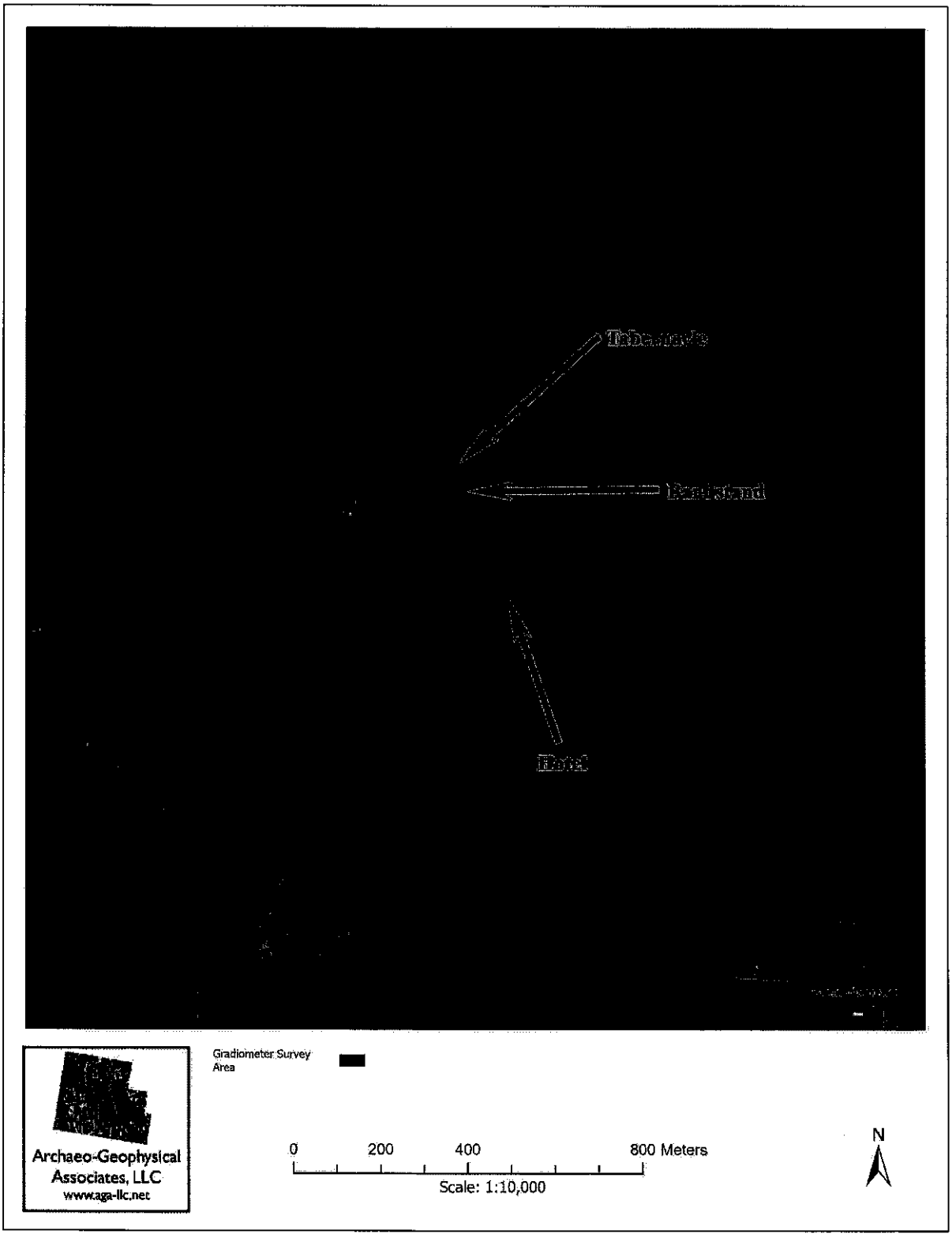


**Figure 5-01. Geophysical survey areas.**

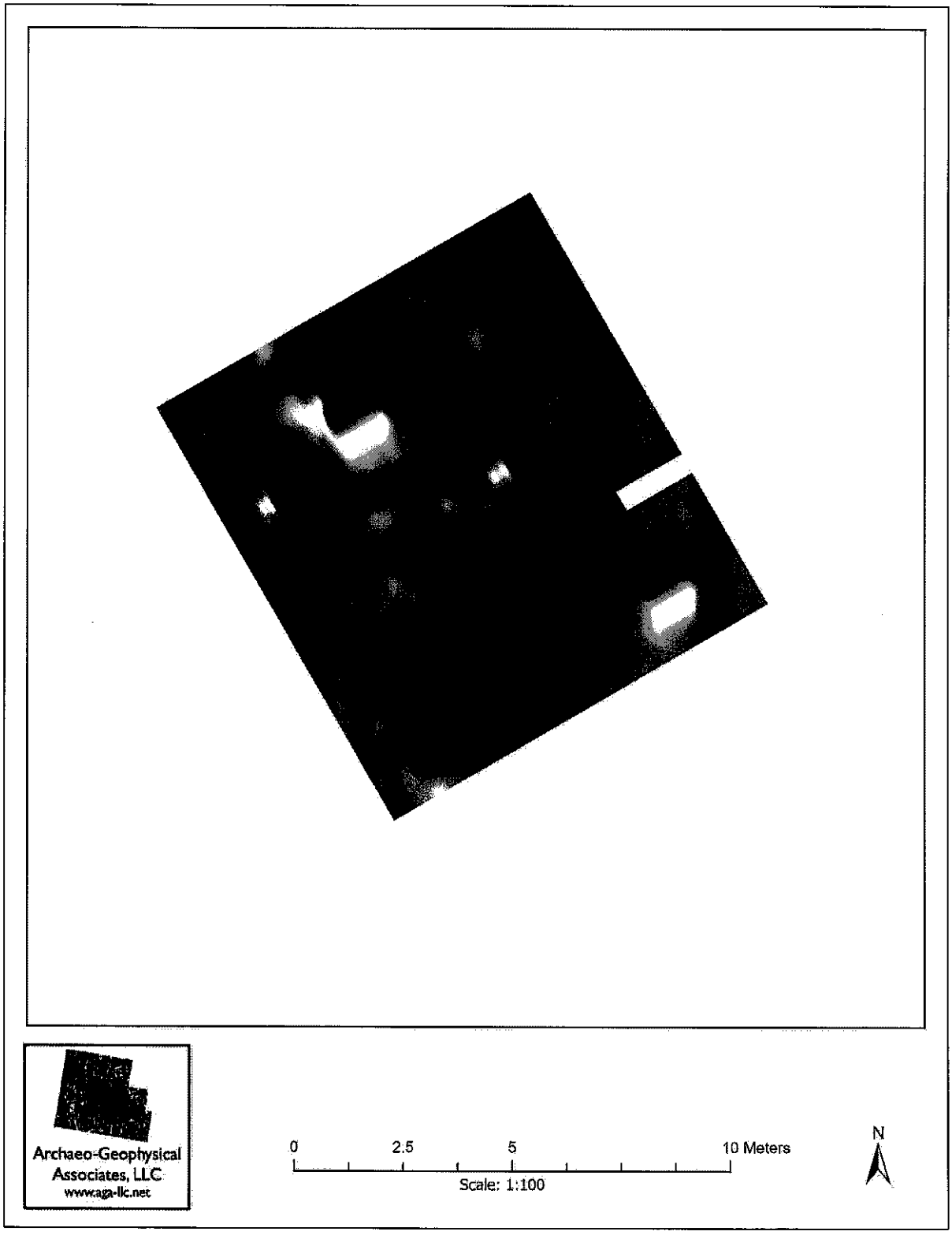


**Figure 5-02. Gradiometer data from the Bandstand locus.**

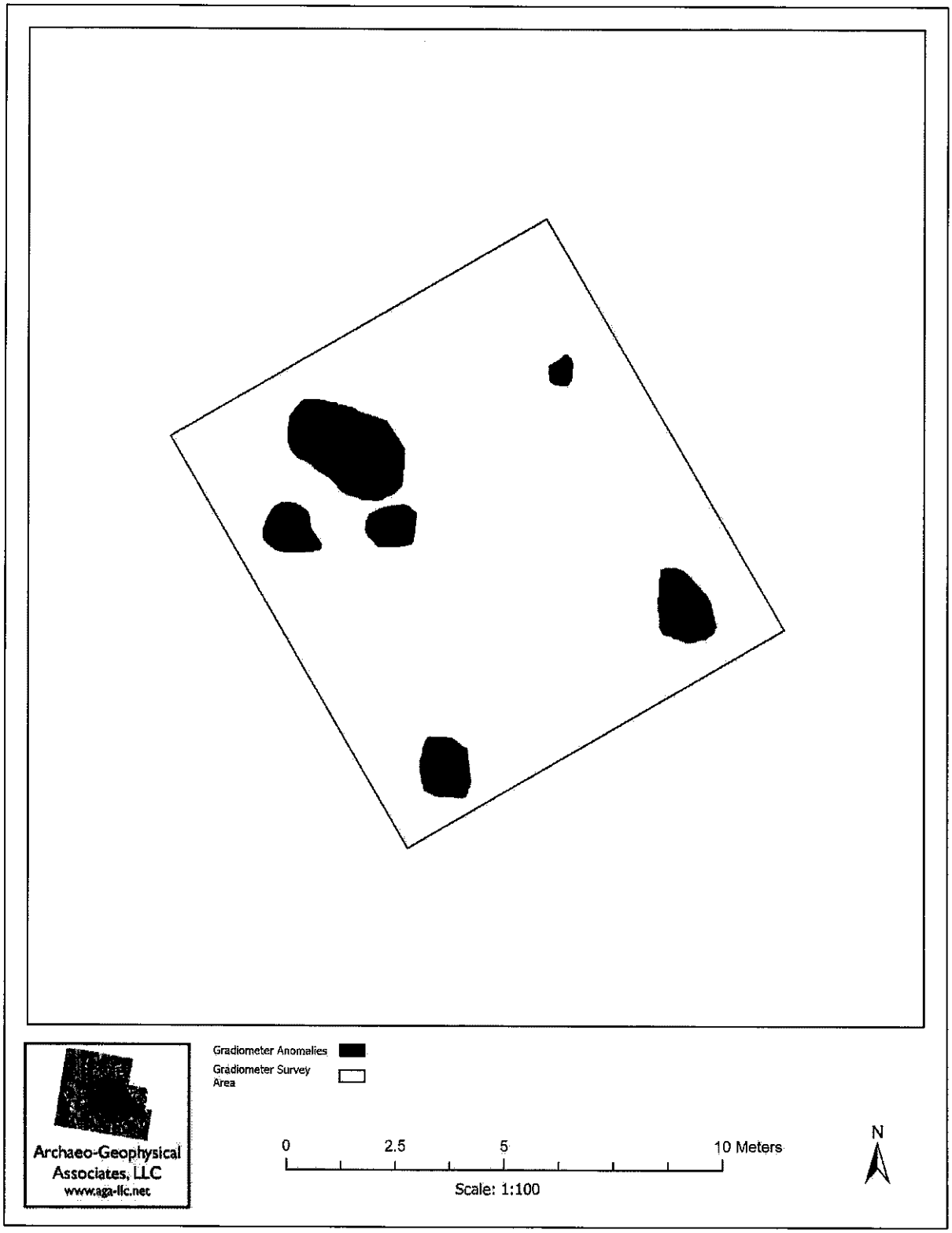


**Figure 5-03. Interpretation of data from the Bandstand locus.**


**Figure 5-04. Gradiometer data from the Tabernacle locus.**

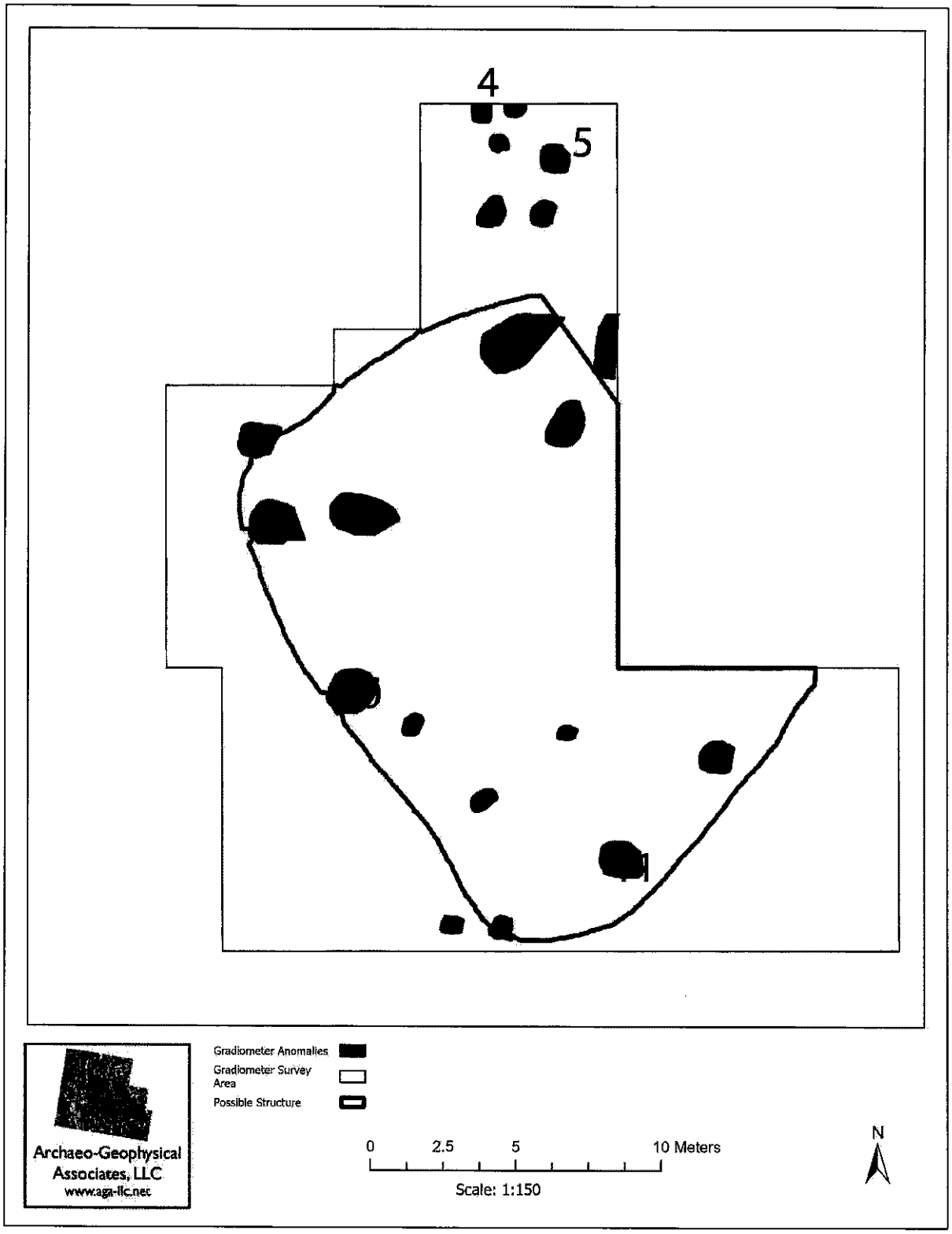


**Figure 5-05. Interpretation of data from the Tabernacle locus.**

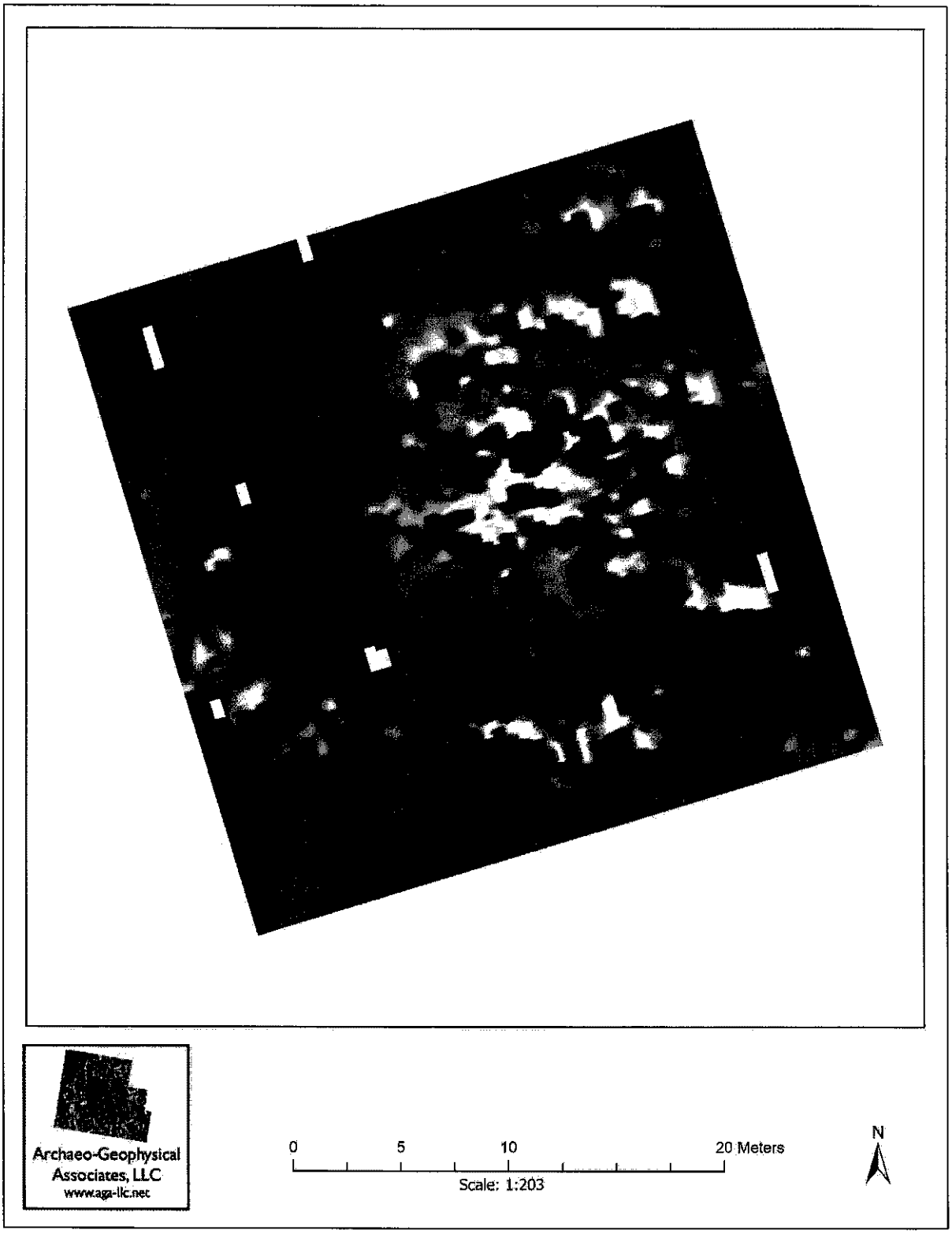


**Figure 5-06. Gradiometer data from the Hotel locus.**

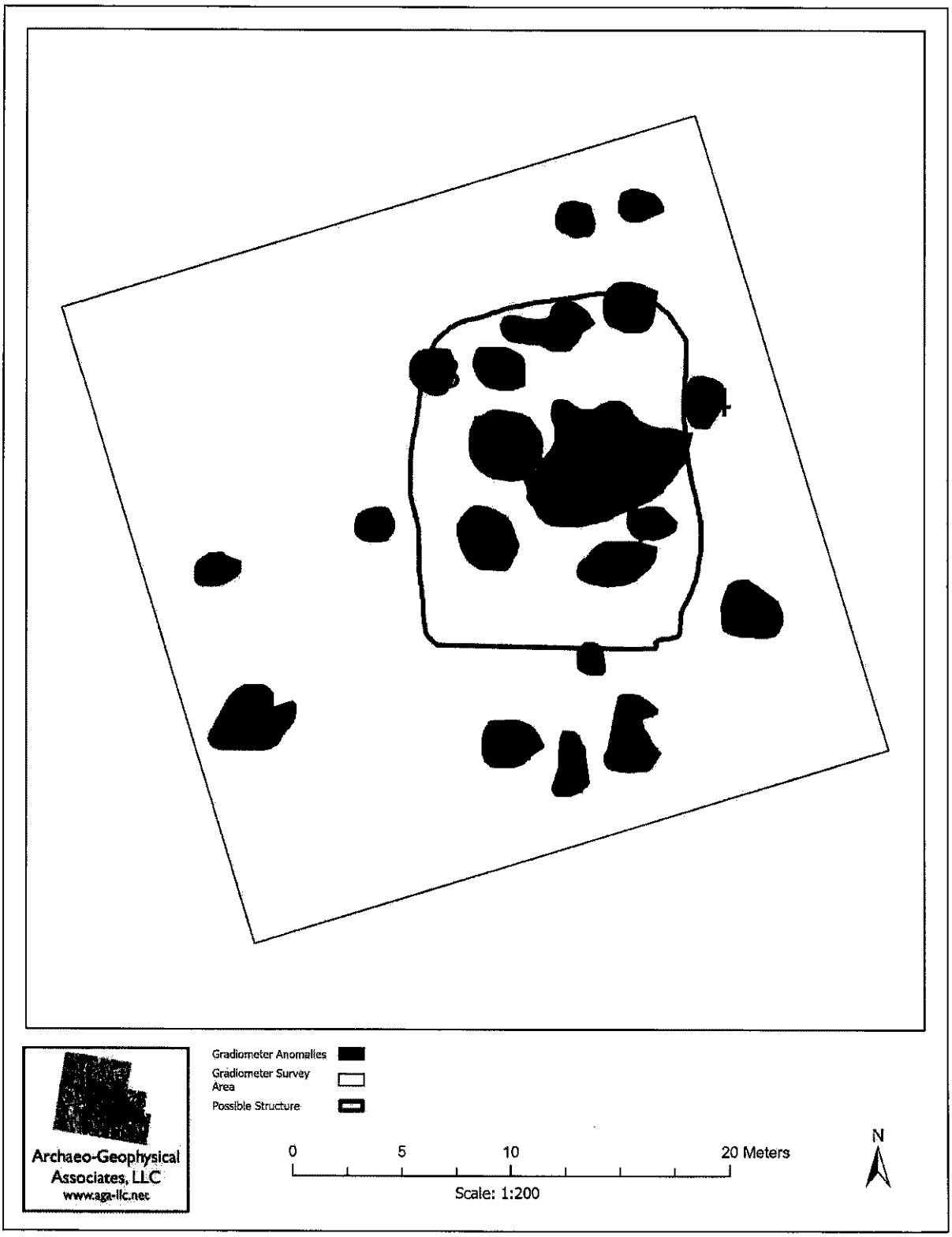


**Figure 5-07. Interpretation of data from the Hotel locus.**

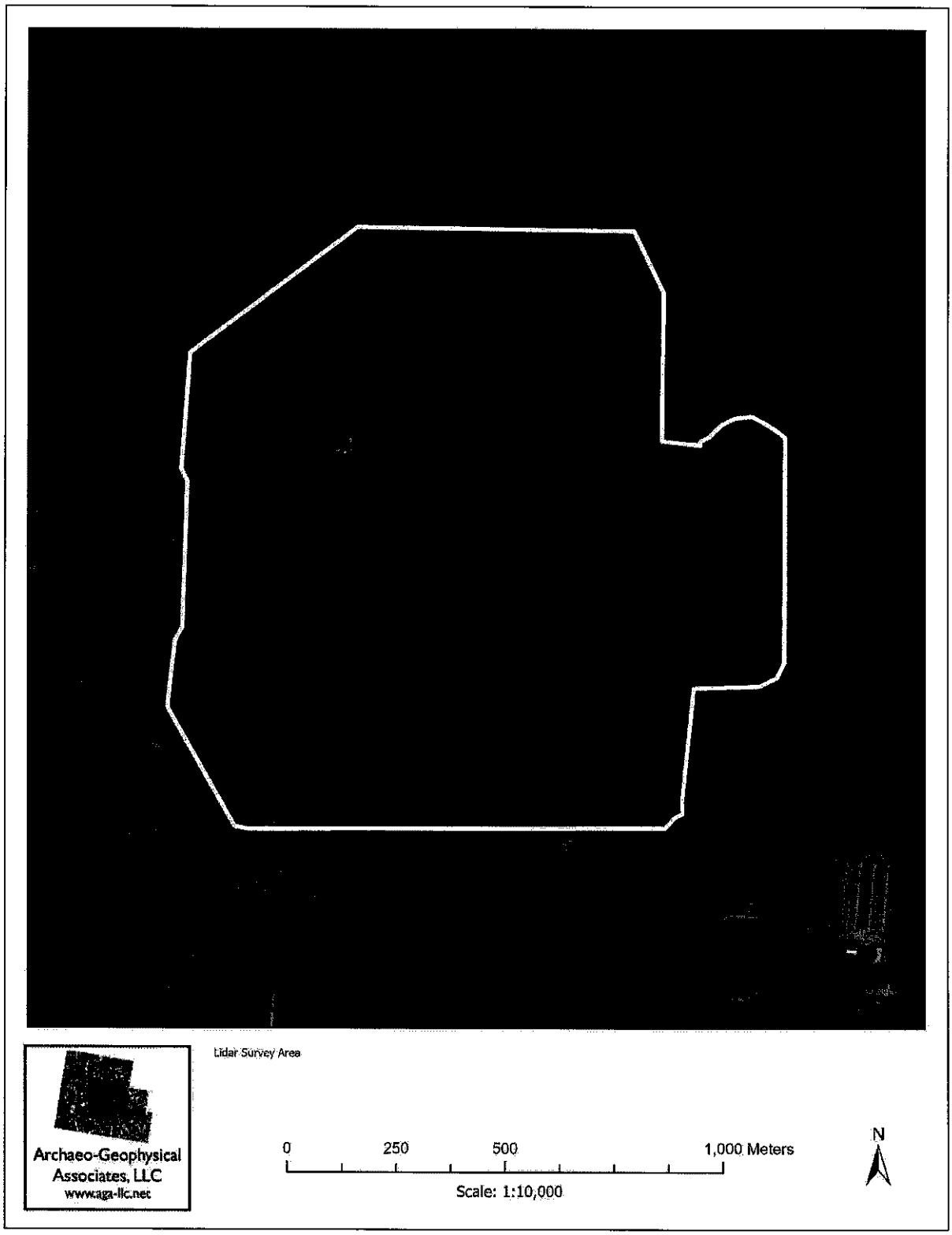


**Figure 5-08 . LiDAR Survey Area.**

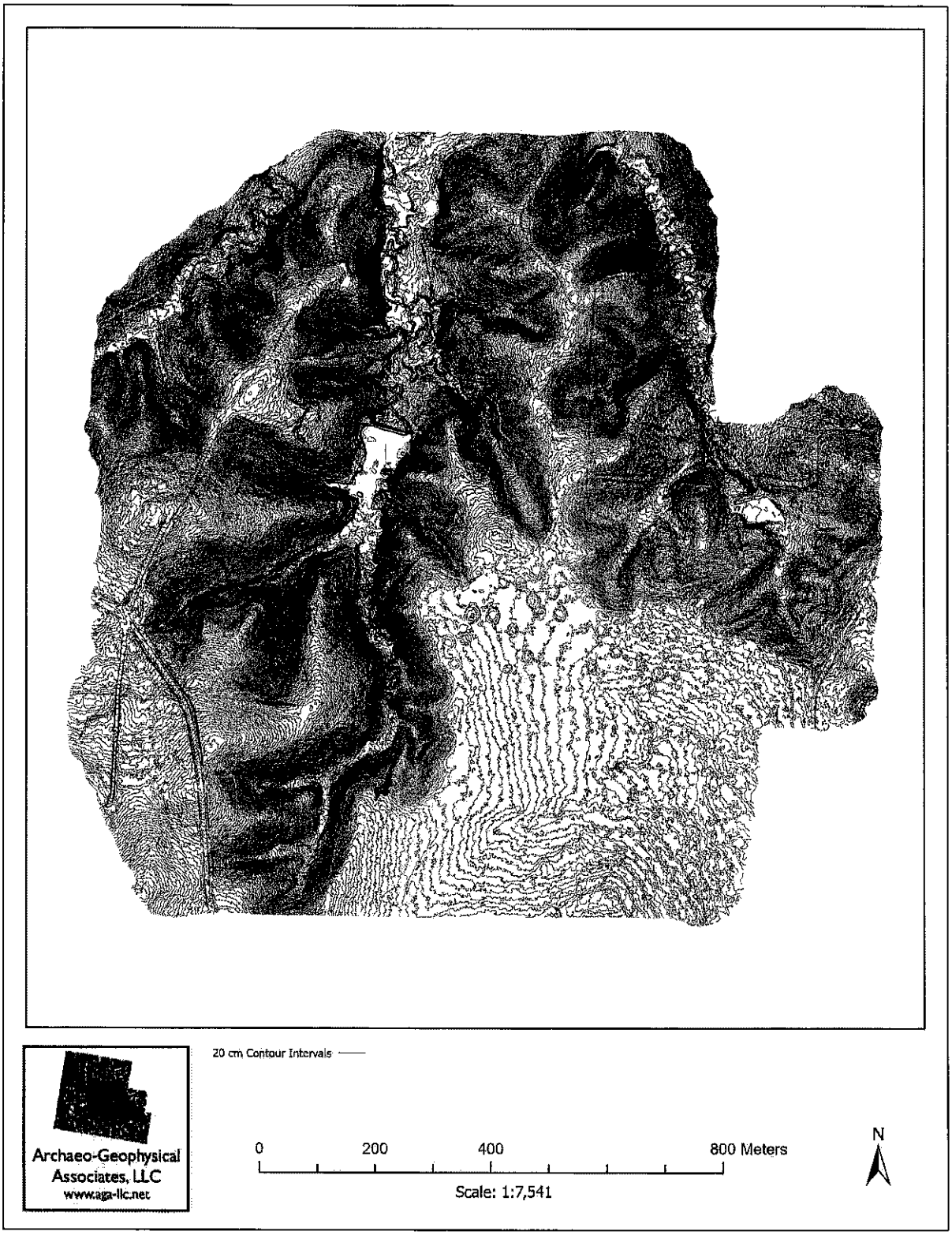


**Figure 5-09. LiDAR DEM contour map with 20 cm contour intervals.**

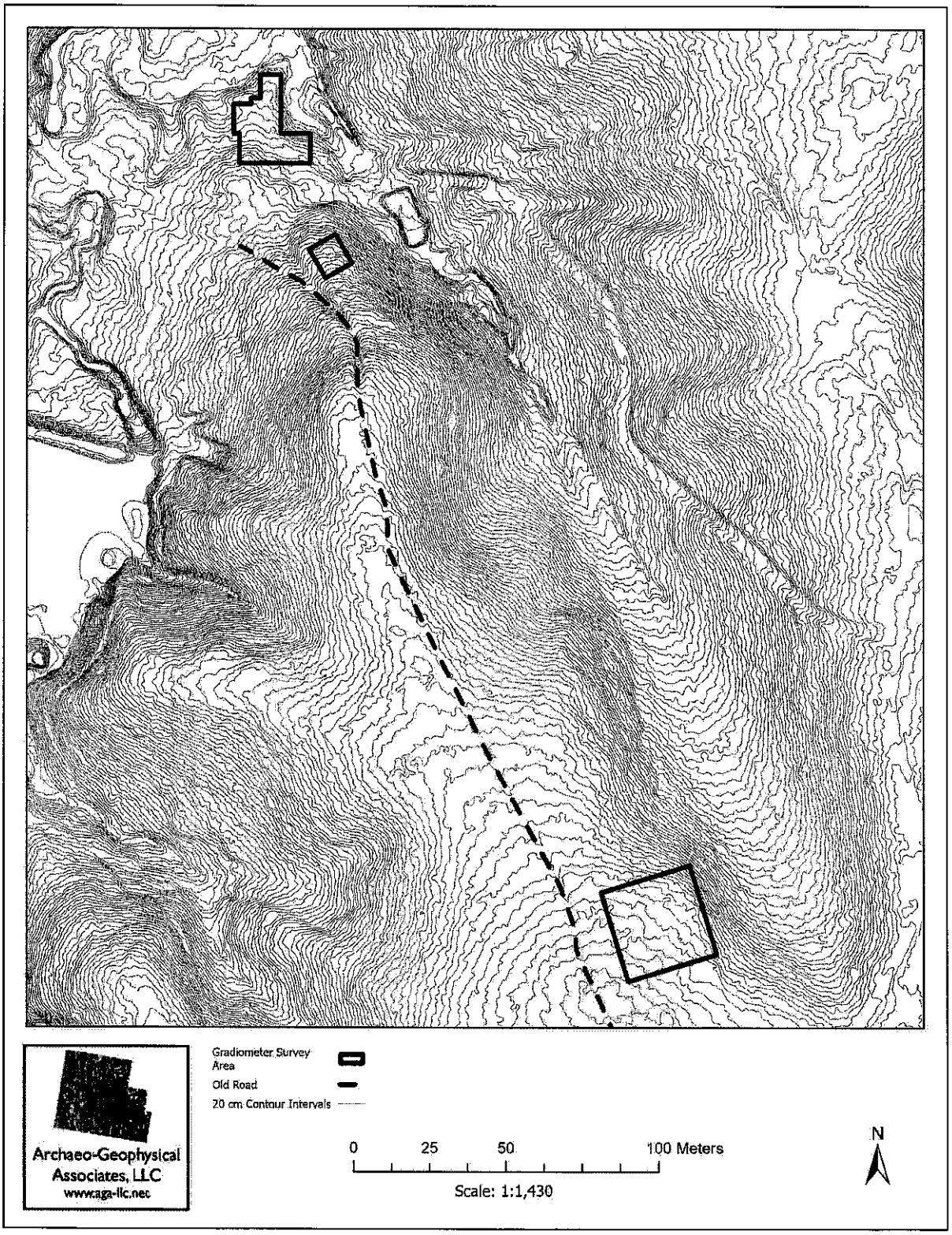


**Figure 5-10. Gradiometer survey areas and the old road plotted on the topographic map.**

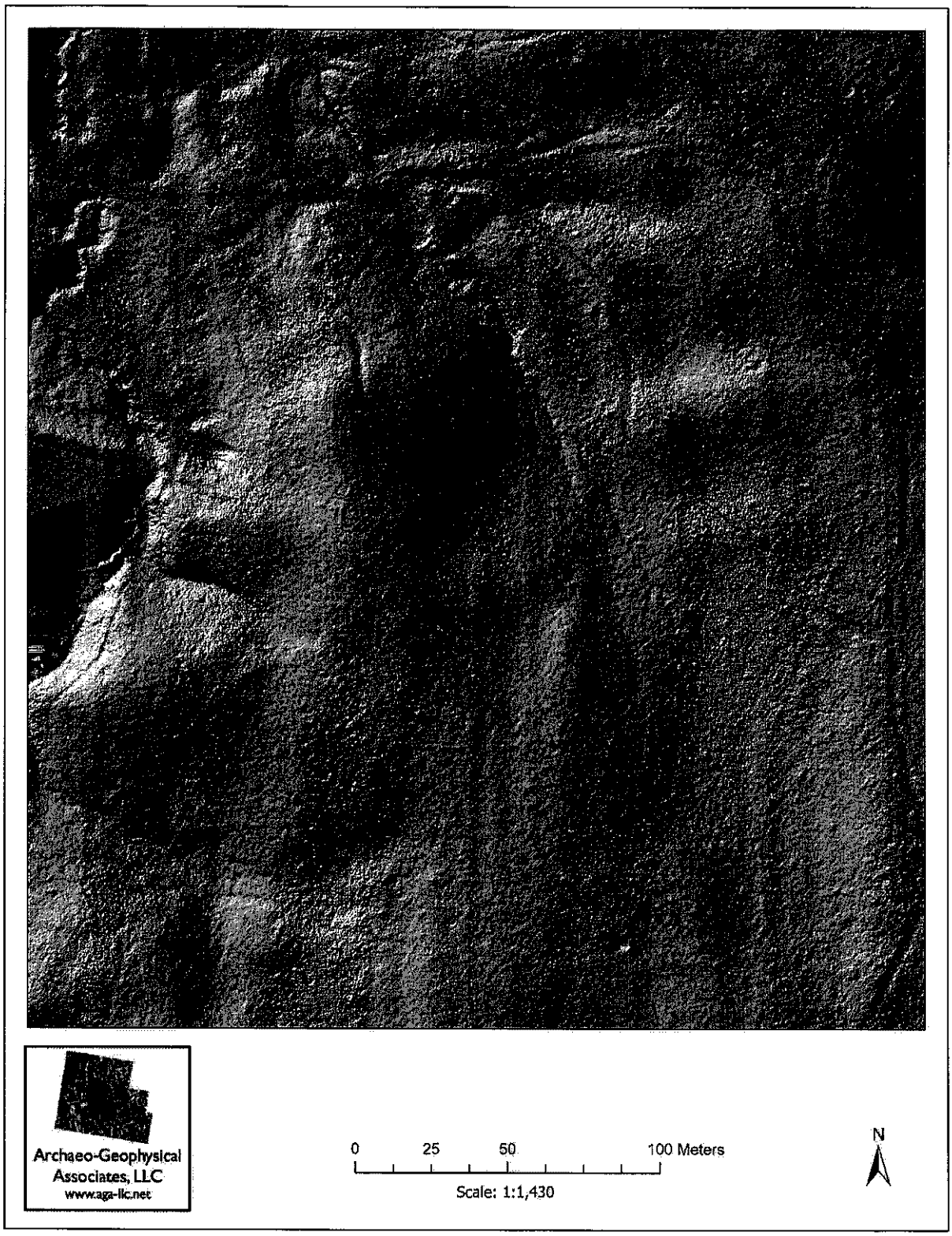


**Figure 5-11. LiDAR DEM hillshade.**


**Figure 5-12. Gradiometer survey areas and old road plotted on hillshade.**

**Figure 5-13. Gradiometer survey in progress at the Bandstand locus, view west (3-45-43).**

**Figure 5-14. Gradiometer survey in progress at the Tabernacle locus, view north (2-38-02).**

**Figure 5-15. Gradiometer survey in progress at the Tabernacle locus, view northwest (2-36-46).**

**Figure 5-16. Gradiometer survey in progress at the Hotel locus, view west (3-56-11).**

**Figure 5-17. Gradiometer survey in progress at the Hotel locus, view northwest (3-07-10).**

**Figure 5-18. Gradiometer grid near the steps feature at the Hotel locus, view southwest (4-20-20).**

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# 6. SUMMARY & RECOMMENDATIONS

## *SUMMARY*

Under PO No. 4502071132 with the Arkansas Department of Parks, Heritage and Tourism, Commonwealth Heritage Group, Inc.'s Memphis office conducted a geophysical survey of three locations within Logoly State Park in Columbia County, Arkansas. The geophysical survey is the first step in an attempt to archaeologically locate three former late nineteenth century structures associated with the Magnesia Springs Resort.

Magnesia Springs started being used by locals and tourists during the late 1800s for healthy mineral baths and drinking. Two hotels eventually were developed at the so-called Magnesia Springs Resort, which was accessible from a stop on the St. Louis Southwestern Railway in McNeil. By 1888 Methodists were using Magnesia Springs as a camp meeting ground, and a Tabernacle (i.e., pavilion) and a Bandstand were built near the Magnesia Springs. Methodists continued to congregate at Magnesia Springs into the 1930s, but the resort fell into disuse. The former resort was used as a Boy Scout Camp from 1940 to 1967 and opened as an environmental state park in 1978.

The goal of this investigation is to archaeologically locate three structures that formerly stood at the Magnesia Springs Resort. These structures include:

- The Bandstand near the Bathing Reservoir feature at Magnesia Spring
- The Tabernacle near the Bathing Reservoir feature at Magnesia Spring
- A possible Hotel on a ridgetop ≈220 m to the south-southeast of Magnesia Spring

The approximate locations of the Bandstand and Tabernacle are known from historic photos and from their spatial relationships to the former Bathing Reservoir foundation, which was refurbished in 1979. The possible Hotel locus exhibits surface features including a deep depression, an upright terra cotta pipe and a set of concrete steps. The geophysical survey needed to be conducted to assist in determining the locations to excavate (i.e., archaeologically ground-truth) during a second phase of the project.

An on-line review of the AMASDA database revealed that there are two previously recorded sites within Logoly State Park and one site within a 2 km search radius (see Chapter 4). Importantly, Site 3CO64 is recorded at the Magnesia Springs, and it consists of the concrete foundation of the Bathing Reservoir, which resembles a swimming pool (see Figures 1-03 and 1-04). The site was identified during a 1979 reconnaissance survey of Logoly State Park (AMASDA Project 2163).

Historic photos reveals that the Tabernacle was a large open sided wooden pavilion with wooden benches and the Bandstand was a smaller elevated wooden platform with steep steps located on a higher area close to the Tabernacle (see Figure 4-01). The Magnesia Springs water was collected in an artificial pool lined with reticulated blocks (see Figures 4-02 and 4-03). The Duke Hotel appears to have been a two-story frame building with covered porches on both floors (see Figure 4-04).

The geophysical survey was conducted by a two-person crew from May 4 to 12, 2022. As previously noted, the three gradiometer survey areas covered 0.367 ac. (0.149 ha) (see Table 5-01) and LiDAR data was collected from a 395.4 ac. (160 ha) area. The latter resulted in the production of detailed topographic maps and a shaded hillside relief maps of the park.

After the fieldwork was completed, we applied for new site numbers (trinomials) for each of the three loci (Bandstand, Tabernacle and Hotel), but the ARAS Site Files Curator declined to assigned new numbers and indicated all of these loci should be considered part of 3CO64.

### *BANDSTAND*

The Bandstand is topographically associated with the end of a narrow finger ridge at about 320 ft. amsl that is west of the concrete Bathhouse foundation (see Figures 1-05 and 5-13). An old roadbed immediately west of the geophysical survey area leads up the crest of the finger ridge southeast toward the Hotel locus (see Figure 1-06).

Six anomalies were identified via the gradiometer survey of the 110 $m^2$ Bandstand collection grid (see Figure 5-02). The Bandstand anomalies are distributed over a roughly 8-x-9 m (26-x-29 ft., or 754 $ft.^2$) which seems a reasonable size for such a structure. Dr. Walker recommended test excavations at three of these: Anomalies 1, 2 and 3 (see Figure 5-03). As the Bandstand was an elevated platform built on tall posts, most of the anomalies here likely represent posts or disturbances associated with the razing of the structure. The larger one (Anomaly 3) may be correlated with the location of the base of the wooden steps shown a 1900 photo, which face northwest toward the Tabernacle (see Figure 4-01).

### *TABERNACLE*

The Tabernacle is topographically associated with relatively level area at about 300 ft. amsl that is north of a modern service road and west of the Salt Springs Trail, and it overlooks a lower drainage area to the north where the Salt Springs are found (see Figures 1-02, 1-07, 5-14 and 5-15). It was a fairly large open-sided pavilion with an intriguing three-tiered roof that was probably designed to improved air circulation (see Figure 4-01).

Twenty anomalies were identified via the gradiometer survey of the 476 $m^2$ Tabernacle collection grid (see Figure 5-02). Dr. Walker recommended tests excavations at eight of these: Anomalies 4, 5, 6, 7, 8, 9, 10 and 11. Additionally he suggested these magnetic anomalies were likely footings associated with a structure about 12-x-19 m (39-x-62 ft., or 2,418 $ft.^2$) in size (see blue line on Figure 5-05). It appears that a portion of the southeastern section of the potential structure is located outside the geophysical collection grid.

### *HOTEL*

The Hotel setting is a relatively level upland plane at 360 ft. amsl, near the edge of heavily dissected terrain to the northeast and west (see Figures 1-01, 1-02, 5-09 and 5-10 for various maps illustrating the topography). This location represents the northwestern edge of plateau that extends southeast to the community of "Magnesia Springs" and the New Bethel Cemetery (see Figure 1-01). A finger ridge extends down from the Hotel locus to the Bandstand locus, and the ridge narrows as it loses elevation. The trace of an old road can be observed on this ridge crest.

Importantly, the Hotel locus exhibited the strongest archaeological and geophysical signature for a former structure. This is not surprising given that several surface features are present at the locus including a deep circular depression, an upright terra cotta pipe, a set of concrete steps and brick and concrete scatters. Additionally Dr. Walker indicated that additional surface features lie just under the leaf litter. Note that the upright terra cotta pipe at the Hotel appears identical to the one in the Bathhouse foundation (compare Figures 1-04 and 1-10) and thus it is interpreted as a wellhead for extracting mineral water. The circular depression is likely the location of a mineral water bathing pool for the guests. A former Park Superintendent stated that the Hotel was rumored to have had a private mineral bath, and these features appear to confirm that.

Twenty anomalies were identified via the gradiometer survey of the 900 $m^2$ Hotel collection grid (see Figure 5-07). Dr. Walker recommended tests excavations at eight of these: Anomalies 12, 13, 14, 15, 16 and 17). He also tentatively identified the outline of a structure measuring roughly 12-x-6 m (39-x-52 ft., or 2,028 $ft.^2$) (see blue line on Figure 5-07). The large unnumbered anomaly in the center of the proposed structure may represent a cellar feature and should be added to the list of anomalies to ground-truthed. The magnetic anomalies that are outside of the possible Hotel structure should be tested to determine if they are associated with a privies or other external feature types typically associated with late nineteenth century habitations. The southwestern most unnumbered anomaly is correlated with the deep circular depression surface feature that is interpreted as the Hotel mineral bath location.

## *RECOMMENDATIONS*

Site 3CO64, which includes the Bathing Reservoir foundation, the Bandstand locus, the Tabernacle locus and the Hotel locus, is recommended as eligible for the NRHP under criterion D because it has the potential to produce important archaeological information about the Magnesia Springs Resort and its structures, and more broadly about late nineteenth and early twentieth century tourism. Additionally, the site is important to the history of the Methodist Church in southwest Arkansas.

Exploratory excavations are recommended at all three loci—Bandstand, Tabernacle and Hotel—to verify their validity and learn more about the nature and construction of the structures that are postulated to have stood at these locations. A list of magnetic anomalies to ground truth is provided as Table 5-02.

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# APPENDIX A: BIOGRAPHIES OF KEY PERSONNEL

## *C. ANDREW BUCHNER*

C. Andrew Buchner has 31 years of experience as a cultural resource management (CRM) archeologist and currently manages Commonwealth's Memphis office. His degrees include an MA (1989) in Anthropology from the Memphis State University and a B.A. (1984) in Anthropology and Sociology from Westminster College in Fulton, Missouri. A native Arkansan (Little Rock Catholic High Class of 1980), he is certified by the Register of Professional Archeologists (RPA ID# 12420) and is a member of various professional organizations, including the Society for American Archeology, the Southeastern Archeological Conference, the Caddo Conference, the Society for Historical Archeology, and the Society for Industrial Archeology. Additionally, he is a Life Member of the Arkansas Archeological Society.

"Drew" has participated in dozens of projects in rural and urban contexts within Arkansas for clients, including your agency, the Corps of Engineers, the National Park Service, the U.S. Forest Service, U.S. Fish & Wildlife Service, ARDOT, and the Arkansas Game & Fish Commission, as well as various engineering and environmental firms. Mr. Buchner has written or co-written over 800 cultural resource reports, including at least 334 reports in the AMASDA database. He is published in various peer-reviewed journals and is the lead author of two monographs in the Arkansas Archeological Survey's Research Series: *Mississippian Transitions at John's Lake* (Research Series No. 60) and *Excavations at the Howe Pottery: A Late Nineteenth-Century Kiln in Benton, Arkansas* (Research Series No. 66). He is also a contributing author to the online *Encyclopedia of Arkansas* hosted by the Central Arkansas Library System.

## *CHET WALKER*

Chester Walker is the owner/operator of Archaeo-Geophysical Associates, LLC (AGA), and has 12 years of experience in archaeo-geophysical surveys and 18 years of experience in the field of archaeology. His degrees include a Ph.D. in Anthropology from the University of Texas (2009), an M.A. in Anthropology from the University of Memphis (2000), and a B.A. in Anthropology from Southwest Texas State University (1997). Chet's firm (AGA) has performed geophysical surveys at over 200 archaeological sites and has conducted projects in multiple U.S. states, as well as Europe, South and Central America and the South Pacific.

Mr. Walker and AGA have collaborated with Panamerican (now Commonwealth) numerous times in the past, and has conducted at least two studies within Arkansas State Parks: a 2014 geophysical survey of the Jacksonport State Park Visitor Center tract and 2021 investigations at Davidsonville State Park. Other studies conducted by him in association with Panamerican (now Commonwealth) in Arkansas include a 2012 geophysical survey of an early nineteenth century Arkansas Cherokee site (3PP449) near Russellville, and 2013 geophysical surveys at the Dover Cemetery (3PP1317) and the Goforth Cemetery (3IN1262) for the Arkansas Highway and Transportation Department (AHTD). Most significantly, in 2017 he identified the previously unknown mile long palisade wall encircling the Middle Mississippian Sherman Mound and Village (3MS16) near Osceola, a finding that led to the site being placed on the NRHP.

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