GROUND WAVE EMERGENCY NETWORK
FINAL OPERATIONAL CAPABILITY

ENVIRONMENTAL ASSESSMENT
FOR
SOUTHERN ARKANSAS RELAY NODE

SITE NO. RN 8C912AR

19 February 1993

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THE GROUND WAVE EMERGENCY NETWORK (GWEN) IS A RADIO COMMUNICATION SYSTEM DESIGNED TO RELAY EMERGENCY MESSAGES BETWEEN STRATEGIC MILITARY AREAS IN THE CONTINENTAL UNITED STATES.

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NAME OF ACTION: GROUND WAVE EMERGENCY NETWORK
SOUTHERN ARKANSAS RELAY NODE

DESCRIPTION OF PROPOSED ACTION ALTERNATIVES:

The U.S. Air Force plans to construct a radio communications relay node in southern Arkansas (Nevada County) as part of the Ground Wave Emergency Network (GWEN) communications system. Five action alternatives associated with five candidate GWEN sites (CGSs) in southern Arkansas and the no action alternative have been considered and evaluated in an environmental assessment (EA).

GWEN is a radio communications system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear detonations in the ionosphere that would disrupt conventional communications equipment. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system is a network of relay nodes, receive-only stations, and input/output stations. The relay node in southern Arkansas would be part of the Final Operational Capability (FOC) phase of the GWEN system and would establish essential links with adjacent nodes in the network.

In September 1987, the U.S. Air Force Electronic Systems Division, Hanscom Air Force Base, Massachusetts published a Final Environmental Impact Statement (FEIS) for the GWEN FOC that addressed the system as a whole and identified expected environmental effects common to all sites. Section 5 of the FEIS described a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Network definition identified the need for a relay node in southern Arkansas. Regional screening resulted in the identification of five CGSs in southern Arkansas that met the exclusionary and evaluative criteria described in that FEIS. Individual site evaluation examined the relative suitability of the CGSs through site-specific technical studies. The EA is a part of the third phase and is tiered from that FEIS. It addresses the potential environmental effects of the five action alternatives and the no action alternative.

The proposed relay node in southern Arkansas will be an unmanned facility located on approximately 11 acres of land and, once constructed, will resemble an AM radio broadcast station. The facility will consist of a 299-foot-tall, low-frequency (LF) transmitter tower, three equipment shelters, an access road, and associated fences. The tower will be supported by 24 guy wires, including 12 top-loading elements. An equipment shelter at the tower base will contain an antenna tuning unit. An 8-foot-high chain link fence topped with barbed wire will surround the tower base and associated equipment shelter. A radial ground plane, composed of 60 to 100, 0.128-inch-diameter copper wires buried about 12 inches underground, will extend out about 330 feet from the tower base. A 4-foot-high fence will be installed around the perimeter of the copper radials.

A second equipment area located at the site perimeter will contain two shelters housing a back-up power group (BUPG) with two internal fuel storage tanks and radio processing equipment. The BUPG will operate during power outages and for testing purposes. An LF receive antenna, consisting of a pair of 4-foot-diameter rings mounted on a 10-foot pole, and an ultrahigh-frequency (UHF) antenna, used for communicating with airborne input/output terminals and consisting of a 9-foot-high whip-like antenna mounted on a 30-foot-high pole, will also be located in this area. An 8-foot-high chain link fence topped with barbed wire will enclose the entire equipment area. A 10-foot-wide gravel road will connect this area to the tower base. A 12-foot-wide gravel road will provide access to the site from a public road.

The station will use existing commercial three-phase electric power and telephone service. Power and telephone service will be brought to the site through either overhead or buried lines, depending on local utility practices. In its ready status, the antenna will transmit in the LF radio band at 150 to 175 kilohertz for a total of 6 to 8 seconds per hour.

Four of the five action alternatives are discussed in this Finding of No Significant Impact (FONSI). Impacts on archaeological resources are unknown on the Harrison site (CGS-8) because the site was withdrawn by the landowner before the archaeological survey was completed. For this reason, this site will not be considered in this FONSI.

ANTICIPATED ENVIRONMENTAL EFFECTS

The EA evaluated potential impacts to the physical, biological, and socio-cultural environment from construction and operation of the relay node.

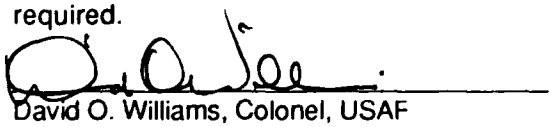
The project would have no significant impacts on physical resources. Erosion and increased runoff would be minimized by using proper erosion control techniques during construction and by replanting the site afterwards. Impacts on mineral resources would not be significant. Paleontological resources are not likely to occur on any of the sites; therefore significant impacts to them are not anticipated. No prime farmland would be removed from production. Water quality would not be significantly affected because increases in copper concentrations due to corrosion of the ground plane would be negligible. Potential impacts on water quality to the Vandiver site (CGS-6) would be mitigated by liming the soil. Air quality would not be significantly affected. During construction, temporary and insignificant increases in emissions would occur, and during operation, emissions from the BUPG would not be sufficient to result in violation of air quality standards.

The project would have no significant impacts on biological resources. The sites are located on pasture and grazing rangeland and do not contain sensitive wildlife habitat. None of the sites is within 300 feet of wetlands, and none is within a 100-year floodplain. Informal consultation with the U.S. Fish and Wildlife Service indicated that the project would not affect any threatened or endangered species. The Arkansas Game and Fish Commission indicated that no state-listed rare, threatened, or endangered species or unique biological communities are known to occur on any of the sites. Bird-tower collisions may occur but would not be significant because the tower would be located away from primary bird habitats and migration routes.

The project would have no significant impacts on socio-cultural resources. Construction would have a small, beneficial impact on the local economy, in part by providing temporary employment for contractors and construction workers. Community support systems would not be significantly affected. Land use and noise impacts would not be significant. The relay node signal would not interfere with commercial television or radio broadcasts, amateur radio operations, garage door openers, or pacemakers. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals. The Arkansas Historic Preservation Program was consulted and has concurred that the project would not affect significant cultural resources. Significant impacts to Native American traditional, religious or sacred sites are not anticipated. A visual analysis conducted in accordance with the criteria developed in the FOC FEIS concluded that the relay node facility would not cause significant visual impacts.

CONCLUSIONS:

No significant impacts to the surrounding environment would be caused by construction and operation of the proposed relay node on the Ellis (CGS-2), Henry (CGS-3), Vandiver (CGS-6) or Butler (CGS-10) sites. Therefore, an environmental impact statement for a GWEN relay node at the cited locations in southern Arkansas is not required.



David O. Williams, Colonel, USAF
Chairman
HQ ESC Environmental Protection Committee

4 May 93
Date

PREFERRED GWEN SITE REPORT
SOUTHERN ARKANSAS

The U.S. Air Force is proposing to construct a relay node for the Ground Wave Emergency Network (GWEN) in Southern Arkansas. The Air Force has followed the siting process described in Section 5 of the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of the GWEN program to identify alternative Candidate GWEN sites (CGSs). The five CGSs identified in Southern Arkansas are referred to as the Ellis, Henry, Vandiver, Harrison, and Butler sites.

This Preferred GWEN Site Report (PGSR) summarizes the process of selecting the preferred site from among the five CGSs. This PGSR, along with a site-specific Environmental Assessment (EA) and Finding of No Significant Impact (FONSI), is being distributed for information and comment in compliance with the Air Force's process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP).

Subsequent to release of the Preliminary Site Evaluation Report, the Air Force withdrew the Harrison site from further consideration, at the landowners request. However, site-specific studies had been completed with the exception of the archaeological survey. Therefore the Air Force decided to include the results of the site-specific studies in the EA. The EA, FONSI, and this PGSR are being distributed for information and comments in compliance with the Air Force's process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP).

Operational, environmental, and developmental suitability; construction and real estate acquisition costs; and public comments and concerns are all factors which have been considered in arriving at the selection of the preferred site.

Without an **operationally suitable** location, connectivity of the relay node in Southern Arkansas to the GWEN network cannot be achieved. Ground conductivity measurements are acceptable at all sites. During site-specific studies, no radio frequency interference was detected in GWEN frequency bands which would interfere with the operation of the GWEN receiver. Also, operations at either site would pose no interference with other known systems. UHF line-of-site coverage for a potential airborne interface would be uninhibited at either of the five sites. Therefore, all five sites are operationally suitable.

The next major factor considered in selecting the preferred site is **environmental suitability**. The environmental suitability of each CGS was determined from information provided by an independent field analysis and is documented in the EA. The EA for the five CGSs was completed in February 1993. Due to early withdrawal of the Harrison site, no archaeological survey was conducted and therefore, the potential for archaeological resources on that site are unknown. Based on the environmental analysis of the four remaining CGS, the Air Force has concluded that no significant environmental impacts would occur at either of those CGSs for Southern Arkansas. A FONSI for the four sites was completed on 4 March 1993. Thus, all four CGSs are environmentally suitable.

All five CGSs are **suitable for development** as a GWEN relay node. The FAA has approved construction of the GWEN relay node at either of the CGSs. **Construction cost** varies between sites due to the length of access road upgrade/construction, distance to 3-phase power and telephone, and the amount of clearing required on

the site. Therefore, construction cost is a major factor in the selection of a preferred GWEN site. Construction costs are lowest at the Henry and Ellis sites respectively. However, all five sites are developmentally suitable.

The final consideration as to the preferred GWEN site is the **real estate acquisition**. Final real estate agreements were reached with owners of the Ellis, Henry, and Butler sites. The costs for leasing the Henry site was lower than the Ellis and Butler sites. Therefore, the Henry site is more acceptable to the Air Force based on lease cost and the agreements with Ellis and Butler were cancelled.

With operational factors acceptable, environmental factors weighed, and developmental factors and acquisition costs considered, the Air Force prefers the Henry site. The Henry site is preferred because it ranks best overall among the previously mentioned criteria including lowest overall construction and lease costs.

I therefore have selected the Henry site as the Air Force's preferred site for development as the GWEN relay node in Southern Arkansas. After reviewing the information received during the IICEP process, I will direct final land acquisition activities and prepare for construction of the relay node.

STEPHEN T. MARTIN, Lt Col, USAF
Program Manager, GWEN

15 March 93
(Date)

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SUMMARY

The Ground Wave Emergency Network (GWEN) is a radio communication system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear bursts in the ionosphere that would disrupt conventional communications equipment such as telephones and shortwave radios. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system consists of a network of relay nodes, receive-only stations, and input/output stations. Each relay node, such as the one proposed in southern Arkansas, consists of a guyed radio tower facility similar to those used by commercial AM broadcast transmitters.

A Final Environmental Impact Statement (FEIS) for the GWEN Final Operational Capability (FOC) was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. That FEIS addressed the GWEN system as a whole, identifying expected environmental effects common to all sites. Section 5, beginning on page 5-1 of the FEIS describes a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation.

Phase 1, network definition, identified the geographic coordinates that met the operational needs and technical constraints of the network. Each set of coordinates became the center of a circular site search area (SSA) with a 9-mile radius (250 square miles). The SSA discussed in this Environmental Assessment (EA) was centered west of the town of Rosston, in Nevada County, southern Arkansas, at latitude 33.60° N and longitude 93.33° W. The SSA also includes a small portion of Hempstead County. The principal communities in the SSA are Rosston, Bodcaw, Cale, and Willisville.

Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to avoid environmentally sensitive areas. The remaining areas, called potential areawide sites (PAWS), became the focus of the siting process. A field investigation for southern Arkansas was conducted in late October and early November 1989. Fourteen sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs). All PCGSs were located in Nevada County. Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry were granted to investigate eight PCGSs. Following evaluation against the environmental siting criteria set forth in the FEIS, five PCGSs were recommended as candidate GWEN sites (CGSs) for further review. These CGSs were described in the Preliminary Site Evaluation Report (PSER) of November 15, 1989.

Subsequent to the PSER being issued, and the majority of the site-specific studies being accomplished, a CGS landowner withdrew one site from consideration (Harrison, CGS-8). However, since the site-specific studies, with the exception of the Phase I archaeological study, had been accomplished on this site prior to the owner's withdrawal and because this site continues to be considered a viable alternative, the Air Force has presented this data on the withdrawn site in this EA.

Phase 3, individual site evaluation, involves evaluating the relative suitability of the candidate sites through site-specific technical studies. This EA is a product of those evaluations and discusses the five siting alternatives in southern Arkansas. It addresses only those criteria that apply to the candidate sites. The sixth alternative, no action, would impair performance of the GWEN system but leave the environment unchanged.

To be suitable for construction and operation, a site should measure at least 700 by 700 feet (approximately 11 acres), be relatively level and undeveloped, be free of natural or man-made obstructions, and have soils capable of supporting relay node structures. The site should also be close to all-weather roads, commercial three-phase power, and telephone lines to minimize costs. To operate effectively, the site must be located at least a minimum distance from obstructions that could affect reception and transmission. These

include buildings and towers, high-voltage power lines, and other communications systems or sources of radio-frequency interference. Specific minimum distances depend on height and power levels of identified obstructions or interfering sources.

Impacts to cultural resources are unknown on the Harrison site (CGS-8) because the site was withdrawn before the archaeological survey was completed.

Construction and operation of a GWEN relay node on four of the five sites would have no significant impacts (Ellis, CGS-2; Henry, CGS-3; Vandiver, CGS-6; and Butler, CGS-10). During the 6-week construction period, the project would cause temporary and insignificant air quality and noise impacts and slight increases in traffic. It would have a small, beneficial impact on the local economy, in part because it would provide temporary employment for contractors and construction workers. If built on any of the above sites, the project would have no significant impacts on air quality; water quality; land use; mineral resources; known paleontological resources; biological resources, including threatened and endangered species; or cultural resources that are listed, eligible, or potentially eligible for listing on the National Register of Historic Places. Visual impacts would not be significant. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals.

1.0 PURPOSE AND NEED FOR ACTION

The proposed action covered by this Environmental Assessment (EA) includes construction and operation of a relay node of the Ground Wave Emergency Network (GWEN) in southern Arkansas (see Figure 1.1 of this EA). This relay node will provide essential connections with adjacent nodes in the network. The major features of a GWEN relay node and associated environmental impacts common to all sites are addressed in the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of GWEN, which was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. This EA is tiered from that FEIS and addresses site-specific conditions at the candidate GWEN sites (CGSs) for this particular site search area (SSA).

The purpose of GWEN is to provide to the President and the National Command Authority a strategic communications network that is immune to the effects of high-altitude electromagnetic pulse (HEMP) and will carry critical attack warning and force execution data. As a result, GWEN will remove any possibility of potential aggressors taking advantage of the electromagnetic pulse generated by a high-altitude nuclear burst. A HEMP surge would disrupt the nation's electric power line transmission capability, cripple electronic devices, and adversely affect skywave communications networks based on conventional electronics. GWEN provides a low-frequency (LF) ground wave communication network that will not be affected by HEMP effects. It thereby strengthens deterrence by removing the option of beginning an attack against the United States by using HEMP effects.

A partial GWEN network, called the Thin Line Connectivity Capability (TLCC), has been completed. It contains 8 input/output stations, 30 receive-only stations, and 54 relay nodes. The TLCC provides a limited level of HEMP-protected communications to strategic forces and the National Command Authority.

The FOC phase of GWEN will add 29 relay nodes. The FOC will allow communication along several routes, thereby enhancing system availability and ensuring that vital communications will be maintained.

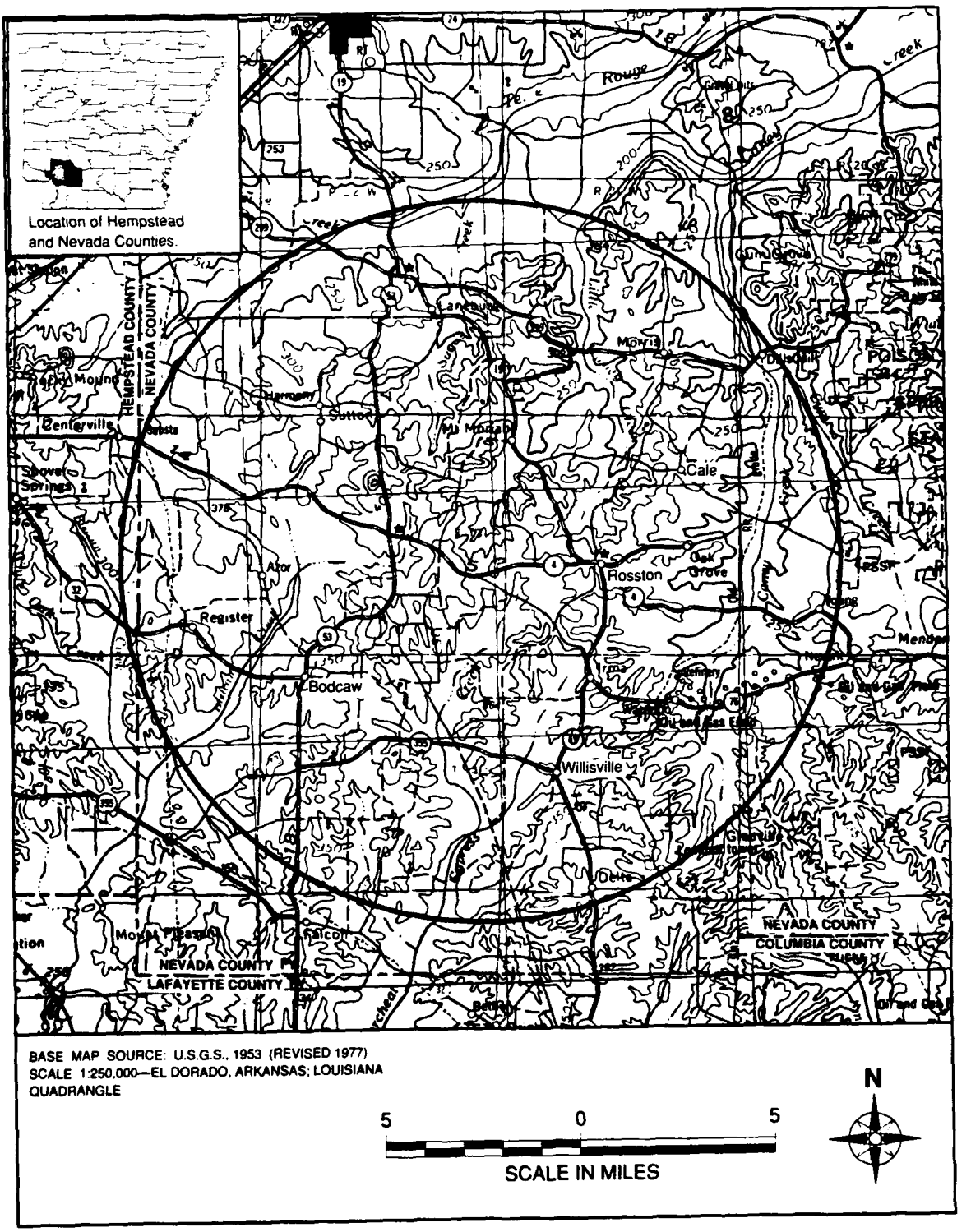

FIGURE 1.1 SOUTHERN ARKANSAS SITE SEARCH AREA (SSA), NEVADA AND HEMPSTEAD COUNTIES, ARKANSAS

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The five action alternatives are site-specific applications of the standard relay node design presented in the FEIS. Consequently, they share a number of features that are discussed in Section 2.1 of this EA. The site-specific features are discussed in Sections 2.2 through 2.6 of this EA. Site descriptive data was obtained during field investigations conducted in October and November 1989. Figure 2.1 of this EA shows the five CGSs in relation to the major features of the SSA. Figure 2.2 and Appendix B of this EA show the locations of the CGSs in relation to local roads and surrounding topography, respectively.

2.1 Common Features of the Action Alternatives

2.1.1 Site Selection Process

The process used to select sites is described in Section 5, beginning on page 5-1 of the FEIS. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Appendix A of this EA provides a diagram of the site selection process. The environmental criteria used in this process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.

Phase 1, network definition, involved locating network nodes to optimize their performance while serving a predetermined number of users. A typical GWEN ground wave has an effective range of about 150 to 200 miles. Thus, relay nodes could not be located independently; changing the location of one would affect the connectivity with other nodes in the network. Once the optimal coordinates of the relay nodes were identified, a 9-mile-radius SSA was defined around each point to provide suitable opportunity for siting a relay node near that point. The 9-mile radius was chosen because it provided a reasonably sized search area consistent with the technical constraints on the relay node. If a significant portion of an SSA fell within an environmentally highly sensitive area such as a national park or wilderness area, an alternative was selected and its connectivity evaluated. This process was repeated until all relay nodes fell outside such areas.

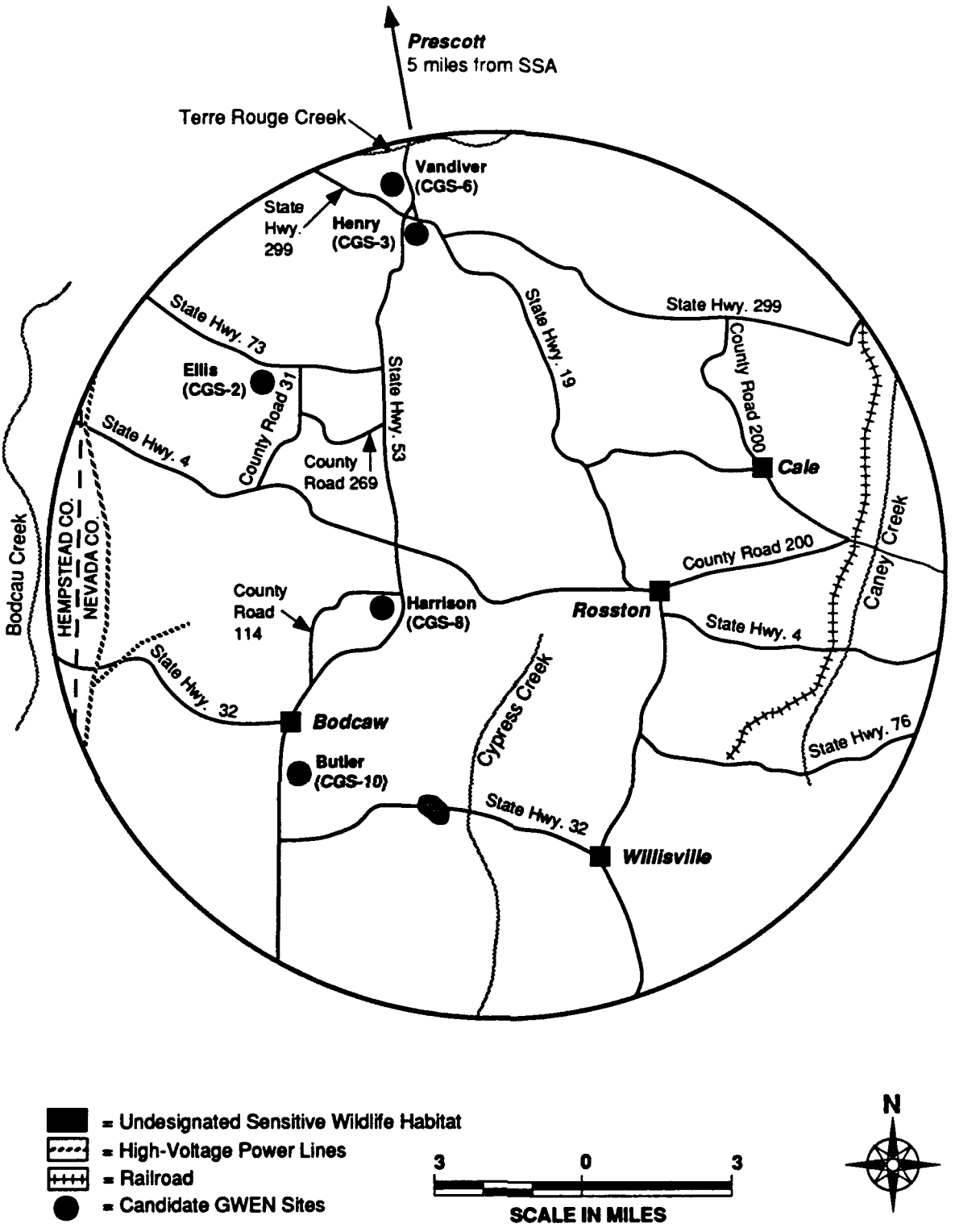

FIGURE 2.1 LOCATIONS OF CANDIDATE GWEN SITES (CGSs) RELATIVE TO SELECTED MAJOR FEATURES AND ROADS WITHIN THE SOUTHERN ARKANSAS SITE SEARCH AREA

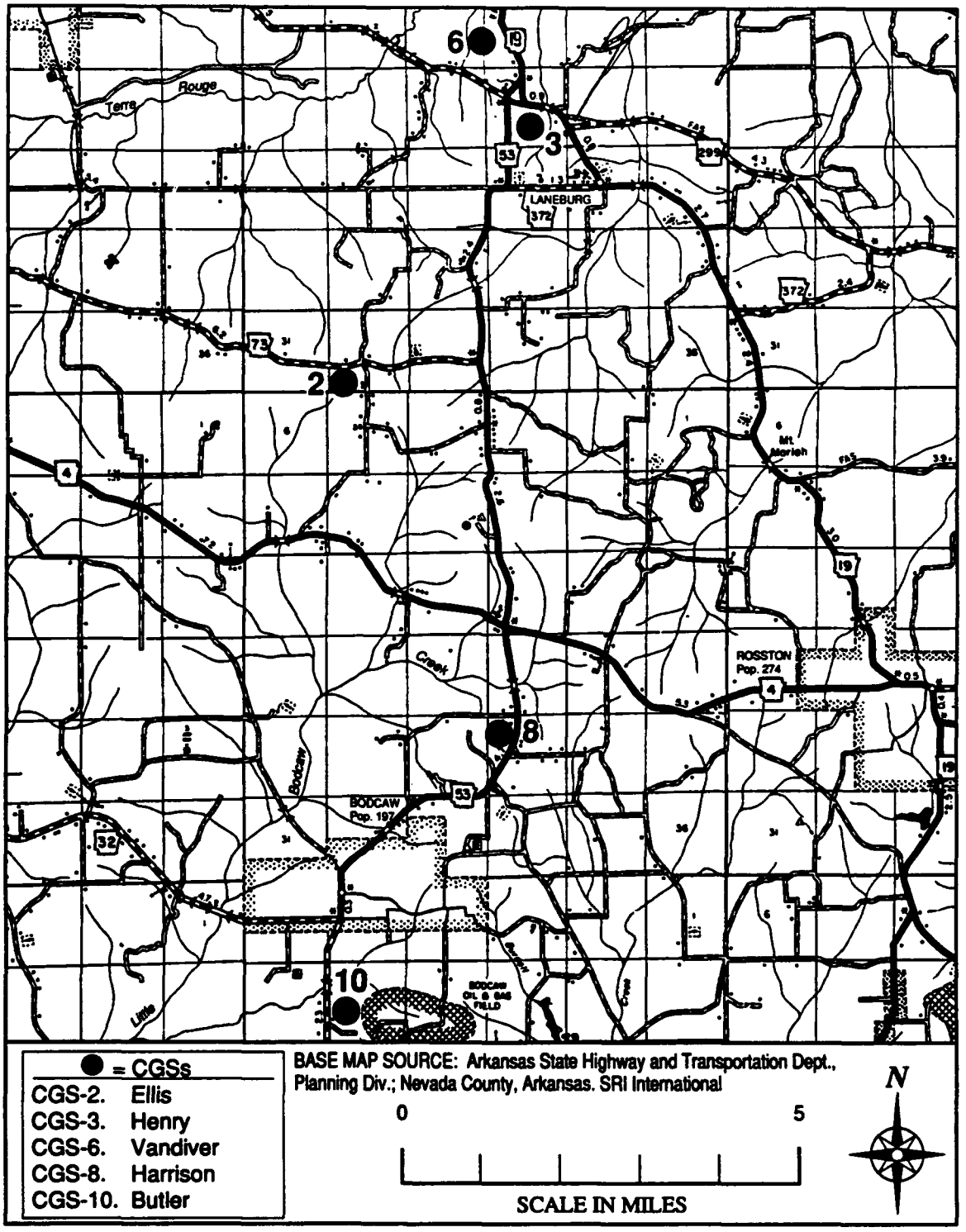

FIGURE 2.2 LOCATIONS OF CANDIDATE GWEN SITES (CGSs) IN NEVADA COUNTY

Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to identify areas that might contain operationally acceptable sites outside environmentally sensitive areas. The resulting search areas, called potential areawide sites (PAWS), were submitted to appropriate federal, state, and local officials for review. The PAWS were then redefined, as appropriate, by incorporation of the comments of the reviewers, and a field investigation was conducted to find suitable candidate sites for a GWEN relay node within the redefined PAWS.

A field investigation for southern Arkansas was conducted in late October and early November 1989. Fourteen sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs). Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry were granted to investigate eight PCGSs. All PCGSs were located in Nevada County. Following evaluation against the environmental siting criteria set forth in the FEIS, five PCGSs were recommended as CGSs for further review.

Subsequent to the PSER being issued, and the majority of the site-specific studies being accomplished, a CGS landowner withdrew one site from consideration (Harrison, CGS-8). However, since the site-specific studies, with the exception of the Phase I archaeological study, had been accomplished on this site prior to the owner's withdrawal and because this site continues to be considered a viable alternative, the Air Force has presented this data on the withdrawn site in this EA.

Phase 3, individual site evaluation, of which this EA is a part, is then used to determine the relative suitability of the candidate sites through site-specific technical studies. This EA presents the results of the environmental portions of those studies and covers site-specific impacts associated with construction of a relay node in southern Arkansas. These are summarized in Sections 4.2 through 4.6 of this EA. The findings of this EA and site-specific studies of operational parameters will be used to select a preferred GWEN site (PGS).

2.1.2 Relay Node Construction and Operation

A typical relay node site is located on approximately 11 acres of land (see Figure 2.3 of this EA). It is an unmanned facility consisting of a 299-foot-tall, three-sided, 2-foot-wide LF transmitter tower, three equipment shelters, an access road, and associated fences. The tower has a base insulator and lightning protection and is supported by 24 guy wires, including 12 top-loading elements to further strengthen the signal and provide additional structural support.

These guy wires and top-loading elements are attached to the tower and 18 buried concrete anchors. The sizes of these anchors and their depth of burial varies with local soil and bedrock properties. However, the guy-wire anchors typically are rectangular blocks buried 5 feet below the surface. If bedrock occurs at or near the surface, the anchors are special rock-embedded rods. The tower base is concrete with a cross-section area resembling an inverted T. The size of this foundation is determined by soil conditions.

A radial ground plane, composed of buried copper wires, extends out from the base of the tower. Each wire is 0.128 inch in diameter, about 330 feet long, and buried approximately 12 inches underground. The ground plane helps to strengthen the broadcast signal, and the number and length of the wires depend on the soil conductivity at the site. The ground plane for CGS-3 would have 60 copper wires, and CGSs -2, -6, -8 and -10 would have 100 wires. A 4-foot-high fence is installed around the perimeter of the ground plane to protect the ground plane and guy anchors and to prevent inadvertent exposure to electric shock resulting from the buildup of static electric charge.

In addition to the main tower, the relay node has two other antennas. One is an LF receive antenna made up of a pair of 4-foot-diameter rings mounted on a 10-foot pole. The second is an ultrahigh-frequency (UHF) antenna used for communicating with airborne input/output terminals. It is a 9-foot-high whip-like antenna mounted on a 30-foot-high pole. Both antennas are located within the equipment area at the perimeter of the site, which is enclosed by an 8-foot-high fence.

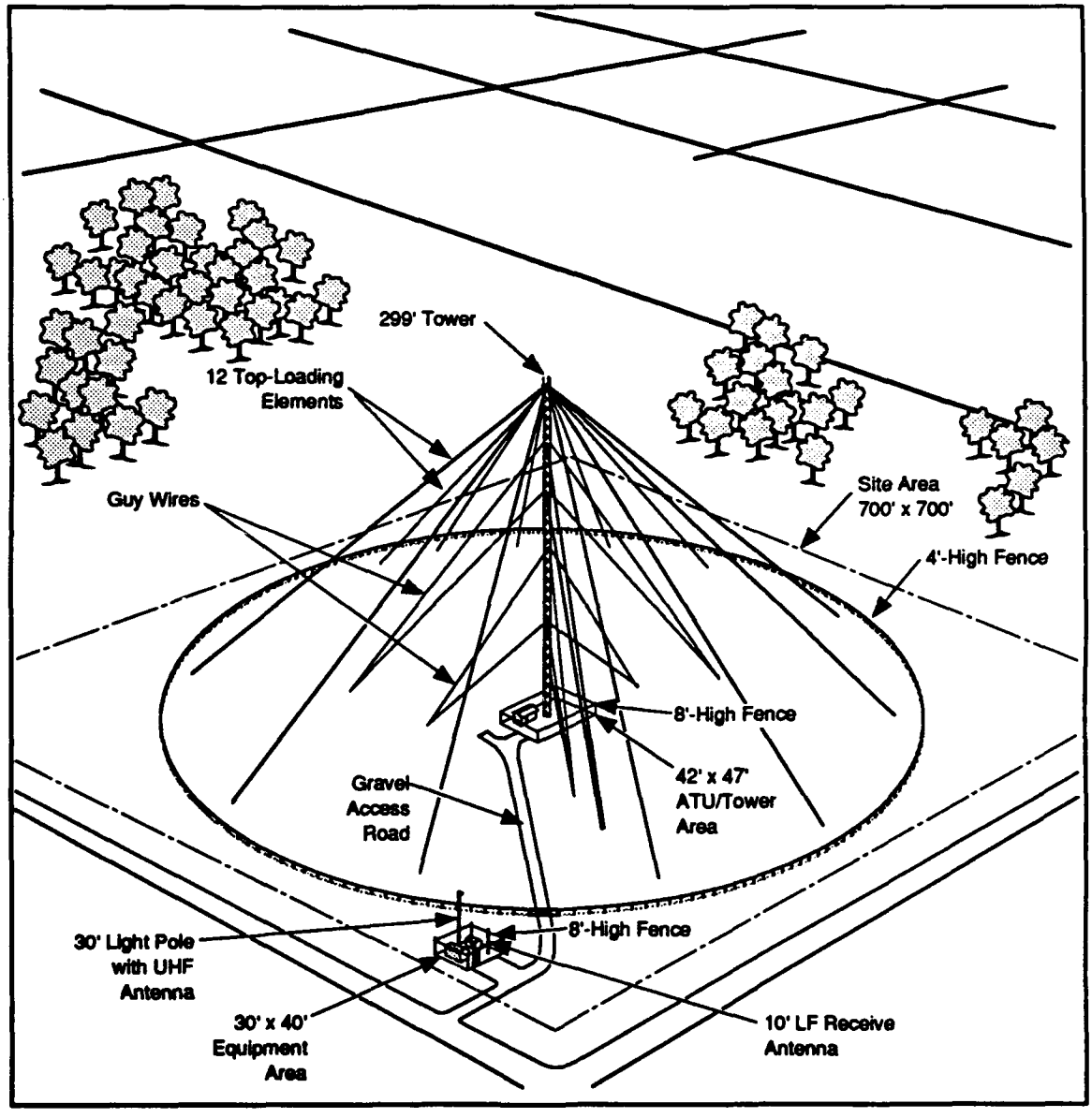

FIGURE 2.3 TYPICAL LAYOUT OF FOC RELAY NODE STATION

The siting and design of the tower are coordinated with the Federal Aviation Administration (FFA) to ensure compliance with FAA standards and regulations. The tower is equipped with a white strobe light at the top, which emits 40 flashes per minute and is rated at 20,000 candelas for daytime and twilight use and 2,000 candelas for nighttime use. To minimize glare at ground level, the light is focused upward and horizontally outward.

GWEN operates intermittently in the LF radio band at 150 to 175 kilohertz (kHz). For comparison, the low end of the AM band for commercial broadcasts is 530 kHz. The peak broadcast power for each GWEN tower is from 2,000 to 3,000 watts, depending on local soil conditions. In its ready status, GWEN typically transmits for a total of 6 to 8 seconds per hour. GWEN does not interfere with commercial television, radio broadcasts, amateur radio operations, garage door openers, or pacemakers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

All equipment shelters are anchored to concrete pads. One shelter, located at the base of the tower, houses the antenna tuning unit (ATU). Two other shelters are located side by side in the equipment area enclosed at the perimeter of the property. One houses radio-processing equipment, and the other houses a 70-horsepower, back-up diesel generator and two aboveground fuel tanks. The generator operates 2 hours per week for testing purposes and during power outages. Locked, 8-foot-high chain link fences topped with barbed wire secure the equipment shelter areas at the base of the tower and at the perimeter of the site to provide safety and to inhibit unauthorized entry. A 12-foot-wide gravel road provides access to the equipment area enclosure at the perimeter of the property. A 10-foot-wide gravel road leads from the equipment enclosure to the tower.

Fuel is stored in two aboveground steel tanks inside the generator shelter. Tank capacities are 559 gallons and 461 gallons. Each tank pipes fuel separately to the back-up power group (BUPG) and is equipped with two outlet shut-off valves, one controlled manually and one controlled automatically. If a leak occurs, fuel will flow into a floor drain leading to a tightly capped pipe extending outside the BUPG. Once approximately 2 gallons of fuel accumulate in the pipe, a "liquid spill" signal is sent to the GWEN Maintenance Notification Center, which will dispatch maintenance personnel. However, if

a leak were not detected, an explosion inside the shelter would be extremely unlikely due to the high flash point of diesel fuel. If a tank at the GWEN station failed, the entire contents of one tank could be released and contained inside the BUPG shelter. Refer to Section 4.12.1.1, beginning on page 4.12-1 of the FEIS for further discussion on diesel fuel spills and leaks.

The station uses existing commercial three-phase electric power and telephone service, but does not require water, septic, or sewer systems. Power and telephone service are brought to the site through either overhead or buried lines depending on local utility practices. Power and telephone service are generally brought underground from the site boundary to the equipment shelter area.

Temporary increases in air pollutant emissions will occur during construction, primarily from greater use of heavy machinery than is required in normal farming operations. Emissions resulting from operations of the facility will be limited to the operation of the BUPG, which will operate only 2 hours every week for testing purposes and for additional periods as required during power outages. Thus, the generator will operate for a total of 152 hours per year, if commercial power outages totaled 48 hours. If the generator runs at 100 percent load during the projected 152-hour operating time, total emissions in one year will be less than 350 pounds per pollutant, as documented in Section 4.3.1, beginning on page 4.3-1 of the FEIS.

Noise levels generated by construction equipment are discussed in Section 4.5.1.1, beginning on page 4.5-1 of the FEIS. Under worst-case assumptions, levels could reach 78 dBA at the site boundary from on-site activity and 92 dBA at distances of 50 feet from equipment installing the off-site access road. Noise generated during GWEN operation would come from the BUPG, which will operate only 2 hours per week and during commercial power outages. The BUPG will be located at least 50 feet within the site boundary with its exhaust side oriented toward the tower area. Noise levels due to intermittent operation of the BUPG will be less than 72 dBA at the site boundary, which is within the standards typically set for lands under agricultural use (70 to 75 dBA). At 50 feet beyond the site boundary, the noise level would drop below 65 dBA, which is within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA).

These noise levels and standards are discussed in Section 3.5.3, page 3.5-2 and Section 4.5.1, pages 4.5-1 through 4.5-6 of the FEIS.

Construction will require as many as 20 workers at any given time and take about 6 weeks. Standard earth-moving and erection equipment will be used, as detailed in Table 2-1, page 2-14 of the FEIS. Erosion control techniques that are consistent with local practices will be used during construction. Vegetation removal will be minimal except at the Henry (CGS-3) and Vandiver (CGS-6) sites, which are discussed in Sections 2.3 and 2.4 of this EA. Grading will be minimal except at the Harrison site (CGS-8), which is discussed in Section 2.5 of this EA. The site will be replanted after construction is finished.

After construction is completed, personnel requirements will be limited to periodic maintenance by a contractor who will service the equipment, cut the surface growth, remove snow from the access road, and perform other services, as needed. Security services will be arranged with local authorities. The projected life of the facility is 15 to 25 years. Upon decommissioning, the tower and other structures will be removed, as discussed in Section 2.1.4, page 2-18 of the FEIS.

2.2 Alternative 1: Ellis Site (CGS-2)

The Ellis site is 22 feet south of State Highway 73, 1.75 miles west of the intersection of State Highways 73 and 53, and 0.3 mile west of County Road 31, in the southwest quarter of the southwest quarter (SW1/4 SW1/4) of Section 32, Township 12S, Range 22W. The access road would be from State Highway 73 and would be 22 feet long.

Three-phase power would be obtained from overhead lines along County Road 269 by upgrading a combination of single-phase and two-phase power lines for a total distance of 4,800 feet. The existing single-phase line that cuts through the CGS would need to be relocated approximately 100 feet north to the site boundary. Telephone lines would be connected to an underground cable 66 feet north of the site along the north side of State Highway 73.

Appendix B, Figure B.1 of this EA, provides a map showing the surrounding topography.

2.3 Alternative 2: Henry Site (CGS-3)

The Henry site is 160 feet east of State Highway 53, 550 feet south of State Highway 299, and 0.5 mile south of the intersection of State Highways 53 and 19, in the NE1/4 SW1/4 of Section 15, Township 12S, Range 22W. The access road would be from State Highway 53 and would be 160 feet in length. About 1 acre of wooded area in the northwest corner of the site would require clearing, as well as some isolated groups of three to five trees.

Three-phase power would be obtained from overhead lines 212 feet west of the site across State Highway 53. Telephone lines would be connected to an underground cable 620 feet south of the site along State Highway 53.

Appendix B, Figure B.2 of this EA, provides a map showing the surrounding topography.

2.4 Alternative 3: Vandiver Site (CGS-6)

The Vandiver site is 0.35 mile west of State Highway 19, 0.4 mile north of State Highway 299, and 0.6 mile northwest of the intersection of State Highways 19 and 53, in the NE1/4 SE1/4 of Section 9, Township 12S, Range 22W. Access would be from State Highway 19. The access road would be 0.38 mile, half of that length being an upgrade of an already existing driveway. About 5 acres of woods would have to be cleared to accommodate the GWEN tower.

Three-phase power would be obtained from overhead lines approximately 0.38 mile east of the site across State Highway 19. Telephone lines would be connected to an underground cable at the same location.

Appendix B, Figure B.3 of this EA, provides a map showing the surrounding topography.

2.5 Alternative 4: Harrison Site (CGS-8)

The Harrison site is approximately 670 feet west of State Highway 53, 620 feet south of County Road 114, and 1.2 miles south of the intersection of State Highways 53 and 4, in the NW1/4 NW1/4 of Section 27, Township 13S, Range 22W. The access road would be from County Road 114 and would be 610 feet long. Removal of three to five trees and some grading and leveling would be required.

Three-phase power would be obtained from overhead lines 400 feet from the eastern boundary of the site. Telephone lines would be connected to an underground cable approximately 700 feet east of the site along State Highway 53.

Appendix B, Figure B.4 of this EA, provides a map showing the surrounding topography.

2.6 Alternative 5: Butler Site (CGS-10)

The Butler site is approximately 1 mile south of Bodcaw, 600 feet east of State Highway 53, and approximately 1 mile north of the intersection of State Highways 53 and 32, in the SW1/4 NW1/4 of Section 8, Township 14S, Range 22W. The access road would be from State Highway 53 and would be 650 feet long.

Three-phase power would be obtained from overhead lines approximately 860 feet west of the site across State Highway 53. Telephone lines would be connected to an underground cable approximately 700 feet west of the site across State Highway 53.

Appendix B, Figure B.5 of this EA, provides a map showing the surrounding topography.

2.7 No Action Alternative

The no action alternative is deletion of the southern Arkansas relay node from the GWEN network. Adoption of this alternative would mean a consequent degradation in the performance of the system due to a lack of connectivity to other nodes in the system.

3.0 AFFECTED ENVIRONMENT

This section discusses the environmental setting of the proposed GWEN project in southern Arkansas. Section 3.1 of this EA describes the general characteristics of the SSA, and Sections 3.2 through 3.6 of this EA describe the unique characteristics of each CGS within the SSA. Site descriptive data was obtained during field investigations conducted in October and November 1989. U.S. Geological Survey 7.5 minute topographical maps were used as data sources for distances, physiographic features, and topography (USGS 1968, 1973a-f, 1976a-b).

3.1 Site Search Area

Presented below is information on the physical, biological, and socio-cultural settings of the SSA.

3.1.1 Physical Setting

The SSA in southern Arkansas is a circular, 250-square-mile area in Nevada and Hempstead counties, centered west of the town of Rosston in the Gulf Coastal Plains physiographic province of the United States. This area, west of the Mississippi River Valley, is primarily agricultural or forested land, with a generally rolling terrain broken by stream valleys. Slopes are as high as 10 to 12 percent but are commonly 2 percent.

The geological composition of southern Arkansas consists of sedimentary deposits from the Tertiary period dating 2 million to 66 million years ago. These deposits are known to be as deep as 1.87 miles and overlie basement rocks consisting of Paleozoic sediments formed 250 million to 565 million years ago.

Based on historical records, the area around the SSA has been subject to relatively low levels of seismic activity. In 1940, an earthquake of Modified Mercalli (MM) intensity IV was centered about 47 miles west of the SSA's center, and in 1947 an earthquake of MM intensity V was centered 80 miles south of the same point. In 1974, four earthquakes of MM intensities III to IV had epicenters between 55 and 71 miles north of the SSA's center.

Earthquakes with MM intensity V or below are noticeable and can move small objects but are not strong enough to damage substantial structures (Howard *et al.*, 1979; King, 1967; Kinney, 1966; Stover, 1986; Stover *et al.*, 1979; Stover *et al.*, 1987). The level of hazard to a GWEN tower from seismic activity in southern Arkansas would be extremely low (Manitakos, 1989).

No significant mineral resources of commercial value exist in Nevada County. Sandstone, gravel, and clay are commonly found throughout the area; however, few extraction or processing facilities exist regionally. Small oil and natural gas extraction operations occur on 11 oil fields in the southern part of the county. Lignite mining is one potential energy resource available in various undefined areas throughout the SSA, but the economic viability of extracting this resource is not promising (Prior, 1989).

There are no known significant paleontological resources in the SSA. No major paleontological discoveries have occurred in Nevada County and none is anticipated due to GWEN construction (McFarland, 1989).

Soil formations in southern Arkansas typically have a silty loam layer or a silty clay subsoil that is neutral to extremely acidic (pH 7.3 to 3.6) with a low to moderate shrink-swell potential and a slight to moderate erosion hazard. On the Vandiver (CGS-6), Harrison (CGS-8), and Butler (CGS-10) sites the principal soil types are of the Kirvin series, which are well drained, with a very fine sandy loam top layer (0 to 11 inches), followed by a red clay layer (11 to 47 inches) and a sandy and shaly clay layer (48 to 64 inches). The topsoil is neutral to strongly acidic (pH 7.3 to 5.1) and the subsoil is very strongly acidic to extremely acidic (pH 5.0 to 3.6). The seasonally high water table of these soils is 6 feet or greater below the surface (SCS, 1978). The soils are not hydric (SCS, 1987), and they are not designated prime farmland (Gordon, 1989). Soil characteristics of the Ellis (CGS-2) and Henry (CGS-3) sites, where the seasonally high water tables are shallow, are discussed in Sections 3.2 and 3.3 of this EA. The soils on these sites are acidic (SCS, 1978) and are not designated prime farmland (Gordon, 1989). Soils on the Henry site (CGS-3) are hydric; soils on the Ellis site (CGS-2) are not (SCS, 1987).

The two largest waterways within the SSA are Cypress Creek, which begins near the center of the SSA and runs south into Dorcheat Bayou, and Caney Creek on the eastern side of the SSA, which runs north and eventually empties into the Little Missouri River about 12 miles northeast of the SSA. Terre Rouge Creek crosses the SSA at the northern boundary and empties into the Little Missouri River. Bodcau Creek is just outside the SSA along the western boundary. All these waterways drain either south or northeast away from the center of the SSA. None of the sites is in a 100-year floodplain of these rivers (FEMA, 1978). Several intermittent streams are present within the SSA, some coming within 300 feet of two of the CGSs (CGS-3 and CGS-6). The distances from each CGS to the nearest surface water or wetlands are given in Sections 3.2 through 3.6 of this EA.

Groundwater plays a major role in satisfying the water supply needs in southern Arkansas and is abundant in Nevada County within the Wilcox and Sparta aquifers. Groundwater resources provide more than 75 percent of the county's water for irrigation, industrial use, and public and rural supplies. Water quality in these aquifers is acceptable for most uses, but in many areas of the state the water contains undesirably large concentrations of iron and hardness (USGS, 1988). Copper concentrations have been measured at sampling stations on Dorcheat Bayou, Bodcau Creek, and the Little Missouri River by the U.S. Geological Survey. The mean concentration of copper measured in those streams is 7.8 micrograms per liter (µg/l), 8.6 µg/l, and 5.4 µg/l, respectively (Terry *et al.*, 1986).

The climate in southern Arkansas is characterized by long, hot summers caused in part by moist tropical airflows from the Gulf of Mexico. Winters are cool and short, with the few cold waves lasting an average of two to three days. Precipitation is fairly heavy throughout the year and prolonged droughts are infrequent. The average annual rainfall for southern Arkansas is approximately 50 inches and is unevenly distributed throughout the year, with precipitation in April double that of September (USGS, 1972). The average winter temperature is 46°F, the average summer temperature is 81°F, and the mean annual temperature is approximately 64°F. Snowfalls in the area are infrequent and the snow rarely sticks to the ground (Cande, 1990).

Air quality in Nevada County is good and does not exceed the National Primary or Secondary Ambient Air Quality Standards, which have been adopted by the State of

Arkansas (Department of Pollution Control and Ecology, Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Section 3[z]). According to the Arkansas Air Pollution Control Department, Nevada County has achieved a level of air quality attainment and is not subject to any restrictive air quality measures (Shar, 1989). Air quality standards are discussed in Section 3.3.3, pages 3.3-1 to 3.3-7 of the FEIS.

3.1.2 Biological Setting

Oak and pine forests have historically been abundant throughout the upland regions of southern Arkansas. Hardwood communities, including sweet gum, red maple, swamp chestnut, elm, sassafras, hackberry, pawpaw, dogwood, and oak, are indigenous to the bottomlands of the Gulf Coastal Plains. The majority of these trees were removed during the eighteenth and early nineteenth centuries for lumber and to clear the land for agricultural production. Much of the SSA was previously planted with cotton, which depleted the nutritional value of the land and diminished indigenous vegetation. As a result, few native plant communities still exist in Nevada County (Foti, 1989). Today, common vegetation throughout the SSA consists largely of pastureland and managed forests dominated by loblolly pine. Hay is the primary agricultural crop (Cande, 1990).

Common animals in southern Arkansas include white-tailed deer, squirrel, fox, raccoon, opossum, beaver, skunk, wolf, armadillo, and a number of rodents. Although the region at one time was a habitat of the black bear, its presence has become increasingly rare. Common birds include the turkey, grouse, quail, and a variety of seasonal migratory birds. Aquatic species common to the region include catfish, gar, bass, shellfish, and turtles (Cande, 1990).

The *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (GPO 1989-236-985/00336) states that an area must meet three criteria to be designated as wetland: hydric soils; hydrophytic vegetation; and wetlands hydrology, which includes a shallow water table and standing water for at least 7 days of the growing season (FICWD, 1989). This manual was used as the basis for wetland determinations. Based on field investigations (Chamberlain, 1989), soils data (SCS, 1978; SCS, 1987), and consultation with the U.S. Army Corps of Engineers (Lofton, 1990; Appendix C, Mosley, 1990, pages

C-7 and C-8 of this EA), none of the CGSs examined as part of this EA meets these three criteria, nor do the areas within 300 feet of the CGSs. In addition, the U.S. Fish and Wildlife Service (USFWS) concurs that the sites are primarily in upland pastures and woods (Appendix C, James, 1989, page C-4 of this EA).

No wildlife refuge areas protected by federal and state conservation authorities exist within the SSA. A sensitive habitat area for fish—a marshy section of Burdell Branch, near Cypress Creek in the southern portion of the SSA—is a fish-spawning area and the center of a variety of fish-hatching operations. This area is 3.25 miles from the Butler site (CGS-10), the nearest CGS. The SSA has no avian flyways (USFWS, 1971).

In compliance with Section 7 of the Endangered Species Act of 1973 as amended (16 United States Code [USC] 1531, *et seq.,* at 1536), a list of threatened and endangered species was requested during informal consultation with the USFWS. No threatened or endangered species listed by federal wildlife authorities are likely to inhabit areas in the vicinity of the CGSs (Appendix C, James, 1989, 1992, pages C-4 and C-10 of this EA; Appendix C, Hemesath, 1992, page C-9 of this EA).

Several plant and animal species of concern to the Arkansas Natural Heritage Commission (ANHC) are known to inhabit areas of the SSA. According to an ANHC data search, the state lists two species as threatened and fifteen as protected. The two threatened species are the plants scarlet beardtongue (*Penstemon murrayanus*) and smooth twistflower (*Streptanthus hyacinthoides*). The two animal species protected by state authorities are the mole salamander (*Ambystoma talpoideum*), which inhabits woodlands at low elevations and requires proximity to water, and the northern scarlet snake (*Cemophora coccinea copei*), which inhabits sandy soil or muck and needs physical structures to crawl under (Osborne, 1989). The remaining thirteen protected species are plants, but the deep sand deposit habitat areas for these protected and threatened plant communities do not exist on any of the sites.

3.1.3 Socio-Cultural Setting

Human occupation in the Little Missouri archaeological region of Arkansas, in which Nevada County lies, began around 12,000 B.C. The region appears to have had its most extensive Native American occupation during the Mississippian Period (A.D. 900 to 1541) when the dominant culture was the Caddo. Currently, 36 sites in Nevada County have a prehistoric Caddoan component (Cande, 1990).

The first Europeans entered Arkansas in 1541, on an expedition led by De Soto, but had no direct contact there with Native Americans. Traders and trappers followed in the late 1600s and early 1700s, exploiting the natural resources in the region but seldom establishing permanent settlements. During this period, the Caddo Confederacy, an amalgamation of several historic Caddo tribes, occupied much of the region. Increasing European intervention followed; exposure to European diseases resulted in a reduction in local Native American populations. Populations were also reduced due to raids by hostile Osage Indians. During the 1700s, after the resident Caddo groups had left the region, the Quapaw Indians from the north expanded their cultural presence in the area (Cande, 1990).

The earliest Euro-American settlers entered Nevada County around 1812 and established settlements along the Little Missouri River. Sustained settlement reflected an antebellum plantation system centered around the town of Washington (now in Hempstead County). Washington served as a Confederate supply depot and bivouac area for mustering recruits and troops in transit during the Civil War, a function climaxing with its role as the Arkansas Confederate State Capital in the latter part of the war (Cande, 1990).

Nevada County (so named because its shape resembles that of the State of Nevada) was established on March 20, 1871, from portions of Hempstead, Columbia, and Ouachita counties. Cotton was dominant during this period of the county's history, and forested land was cleared to accommodate its cultivation. Although most arable land was dedicated to cotton, some was used for corn and the raising of livestock (Cande, 1990).

The introduction of the railroad increased the area's market potential and resulted in a lumber industry boom between 1880 and 1920. The lumber industry was centered in Prescott (approximately 5 miles north of the SSA) and supplied lumber for local railroad expansion. The resulting rail system was used to ship lumber through the region. Consequently, many local timber resources were depleted and cotton cultivation was increased. During the 1930s, however, forest management techniques helped conserve and manage this important resource, and portions of the area were reforested with loblolly pine and Arkansas black oak. Logging is still an important industry in the region (Cande, 1990).

Few significant cultural resources have previously been found in the area. The Arkansas State Historic Preservation Officer (SHPO) was consulted, as required by the National Historic Preservation Act (16 USC 470, *et seq.*). The Arkansas SHPO determined that all CGSs had the potential to contain archaeological or historic resources and recommended that an archaeological survey be conducted on all sites (Appendix C, Buford, 1990, page C-5 of this EA).

A Phase I archaeological survey was conducted in May 1990 on all but the Harrison site (CGS-8), which had been withdrawn prior to this date. Each site was surveyed by a professional archaeologist qualified in the State of Arkansas using pedestrian transects at 30-meter intervals. No cultural resources were found on any of the four sites surveyed (Cande, 1990).

For reasons discussed in Section 4.8.1.3, beginning on page 4.8-2 of the FEIS and Section 4.1.3 of this EA, historic properties that occur within 1.5 miles of a CGS are potentially subject to adverse visual impacts from the relay node facility. A review of historic properties recorded by the Arkansas Historic Preservation Program determined that no historical or architectural properties listed, eligible for listing, or potentially eligible for listing on the National Register of Historic Places (NRHP) occur within 1.5 miles of any of the sites. The Arkansas SHPO determined that an historic structures survey was not necessary (Buford, 1990).

In compliance with the American Indian Religious Freedom Act of 1978 (42 USC 1996), the Bureau of Indian Affairs (BIA) was consulted in order to locate tribes associated with the project area. The BIA indicated that no federally recognized tribes currently live in Arkansas. The only federally recognized tribes that were historically in the area are the Quapaw, Caddo, and Osage (Sutherland, 1992). Based on BIA recommendations, the Quapaw Tribal Business Committee, the Caddo Tribal Council, and the Osage Tribe of Indians were notified of the GWEN project and information was requested regarding traditional, religious, or sacred sites within the SSA. A representative of the Caddo Tribe stated that the tribe had no concerns about cultural resources in the project area (Clark, 1993). No response has been received to the letter or several attempts at phone communication from the Quapaw Tribal Business Committee or the Osage Tribe.

Land use in Nevada County is devoted predominantly to agriculture and timber production. In 1982, 21 percent of the land was planted with hay, cotton, and corn. The abundant pasturelands throughout the county support an active livestock industry, primarily cattle. The lumber industry plays an important role in the local economy by being a significant employer in the region (Census Bureau, 1988). None of the candidate GWEN sites has a zoning designation (Haynie, 1989).

Outside of the area's towns, the density of residential structures is about one to two per square mile. The main east-west road through the area is State Highway 4, a two-lane paved road, and the main north-south roads are State Highways 53 and 19, both two-lane paved roads.

Sources of ambient noise are limited primarily to the operation of farm equipment and traffic. As described in Section 3.5.3, beginning on page 3.5-1 of the FEIS, local ordinances typically set maximum noise level limits at 70 to 75 dBA for land under agricultural use; however, Nevada County does not have a local noise ordinance (Hildebrand, 1990).

The 1986 population of Nevada County was 10,800, a decrease of roughly 3 percent from the 1980 figure of 11,097 (Census Bureau, 1988). The largest communities within the

SSA are Rosston, population 250, in the east central portion of the SSA, and Bodcaw, population 200, in the southwestern portion of the SSA (Census Bureau, 1988).

The major industries in Nevada County are based on natural resources. Although agriculture and its related services still play an important role in the lives of many local residents, the wood-processing industry is the largest employer in the area. In recent years, retail trade and service industries have grown fastest and are increasingly becoming a means of employment for new job seekers. Per capita income for Nevada County was $7,253 in 1985, below the state figure of $8,389 and the national figure of $10,798 for the same year. In 1986, 10 percent of the labor force in Nevada County was unemployed, higher than the 8.7 percent at the state level and the 7.0 percent national level (Census Bureau, 1988).

Recreational resources in Nevada County are primarily confined to the White Oak Lake State Park on the border of Nevada and Ouachita counties, about 5 miles east of the SSA. Portions of Poison Springs State Forest are as near as 0.1 mile from the SSA. Other than these state facilities, most recreational activities occur in or near the area's small towns (Friedman, 1989).

The visual setting is rural in character, composed of fairly level terrain with mildly rolling hills. Nongeometric patterns are evident in the local road system, which meanders through the region in no apparent design. Except for views that include towns, the complexity of the skyline is generally low, as defined in Section 4.8.1.3, page 4.8-10 of the FEIS. Farmsteads are situated between pine and oak groves that commonly provide visual barriers between residences. Farmhouses, row crops, and surrounding forestation provide variation on a local level. Tall structures such as silos and water towers are also common and are generally concentrated in or near towns.

3.2 Alternative 1: Ellis Site (CGS-2)

The Ellis site is an open pasture on relatively flat land. The slope does not exceed 1 percent in any direction away from a high point slightly west of the CGS center. The site naturally drains to the south.

The principal soil types at the site are of the Leadvale series, which are moderately well drained and have a low shrink-swell potential. The topsoil is strongly acidic to very strongly acidic (pH 5.5 to 4.5) and the subsoil is slightly acidic to very strongly acidic (pH 6.5 to 4.5). Because of a clay layer, Leadvale soils may have a perched seasonally high water table of 2 to 3 feet below the surface (SCS, 1978), even though the surface water levels of stock ponds in the vicinity of the site show the water table to be some 10 to 15 feet below the surface (USGS, 1973c). These soils are not hydric (SCS, 1987), and they are not designated prime farmland (Gordon, 1989).

The site has no surface water and shows no evidence of soil erosion or collapse. A small swale that handles runoff water from the immediate area begins 100 feet from the eastern boundary of the site and extends for approximately 400 feet before entering an intermittent stream (USGS, 1973c).

This site has been extensively cultivated in the past with cotton and hay and is currently used as pastureland for livestock grazing. The west and south site boundaries have 30-foot-high tree lines, although no old-growth or original vegetation remains.

The surrounding land is used for grazing or for the cultivation of hay. The nearest residential community is Bodcaw, more than 5.5 miles directly south of the site.

3.3 Alternative 2: Henry Site (CGS-3)

The Henry site is on slightly sloping land, with no slope greater than 4 percent.

The soils at this site, a combination of the Adaton and Falkner series, are composed of a thin mantle of silty loam over a silty clay base and are somewhat poorly drained with a low to moderate shrink-swell potential. The topsoil is moderately acidic to very strongly acidic (pH 6.0 to 4.5) and the subsoil is slightly acidic to very strongly acidic (pH 6.5 to 4.5). Adaton/Falkner soils have a seasonally high water table of 0.5 to 2.5 feet below the surface between January and April (SCS, 1978). These soils are not designated prime farmland (Gordon, 1989). The Adaton soils are hydric; the Falkner soils are not (SCS, 1987).

The natural drainage of the site is to the northeast and is aided by two swales and an intermittent stream. One swale, hidden in a stand of pine and deciduous trees, comes within 20 feet of the site's northwestern boundary. The second begins at the northeast corner of the site and continues northeast. An intermittent stream is tangent to and 185 feet from the site's southeastern corner. This places the stream approximately 350 feet from the copper ground plane. The swales merge into the intermittent stream northeast of the site and the stream continues for 2.5 miles before joining Terre Rouge Creek, a perennial stream.

The site is on an open field of Bermuda grass currently being used as pasture, though it has been extensively cultivated in the past with cotton and hay. Pine and deciduous trees border the site on the north and west between the proposed site boundary and State Highway 53.

The surrounding land is primarily used for livestock grazing and agricultural cultivation. Rosston, the nearest residential community, is approximately 7 miles southeast of the site.

3.4 Alternative 3: Vandiver Site (CGS-6)

The Vandiver site has a level central area and gently sloping edges of 1 to 2 percent that promote drainage away from the center. The Kirvin soils on the site are discussed in Section 3.1.1 of this EA.

The site has no standing surface water and shows no evidence of soil collapse, settlement, or erosion. A 30-by-40-foot stock pond 110 feet southeast of the site is large enough to support common species of algae, insects, and invertebrates but no fish. An intermittent stream on the west side comes within 65 feet of the site's southwest corner. This stream, which flows primarily during heavy rains, meets the Terre Rouge Creek about 1 mile northwest of the site. A small swale in the wooded portion of the northeastern corner of the site begins within the site and flows north, handling runoff water from the immediate vicinity.

The site is on a cleared field of mowed grasses. The western and northern boundaries of the site are wooded with pines and deciduous trees.

Prescott, the nearest residential community, is outside the SSA, approximately 6 miles north.

3.5 Alternative 4: Harrison Site (CGS-8)

The northwestern quadrant of the Harrison site is flat. The remaining portions have slopes ranging from 2 to 6 percent. Irrigation practices used in growing cotton many years ago produced ridges 1 to 2 feet high and about 3 feet wide which run in arcs spaced approximately 50 feet apart. These worn, subtle terraces give the field the appearance of having been contour plowed.

The Kirvin soils on the site are discussed in Section 3.1.1 of this EA.

The nearest surface water consists of two ponds both located 300 feet from the site, but more than 300 feet from the ground plane. One is located north of the site, the other is southeast. The site shows no evidence of soil collapse, settlement, or erosion. The site is on a grass-covered, harvested field, used for growing commercial-grade hay. A few young pine trees occur within the site's southern border and in its northwestern corner.

The nearest residential community is Bodcaw, 2.5 miles southwest of the site.

3.6 Alternative 5: Butler Site (CGS-10)

The Butler site slopes 2 to 3 percent to the north and east toward drainage areas dominated by pine trees and hardwood stands. These areas feed surface water resources approximately 1,000 feet north of the site. A similar drainage area along State Highway 53, more than 600 feet west of the site, feeds the same water resource.

The Kirvin soils on the site are discussed in Section 3.1.1 of this EA.

The nearest surface water is an intermittent stream which is located 300 feet east of the site, but more than 300 feet from the ground plane. The site shows no evidence of soil collapse, settlement, or erosion. The site is on a grass-covered field used to grow commercial-grade hay.

The nearest residential community is the town of Bodcaw, 1 mile north of the site along State Highway 53.

4.0 ENVIRONMENTAL CONSEQUENCES OF ACTION ALTERNATIVES

This section discusses the potential impacts of the GWEN project on the environmental setting of the five CGSs in southern Arkansas. Several impacts that would be common to all of the action alternatives are discussed in Section 4.1 of this EA. Impacts that are unique to each action alternative are discussed in Sections 4.2 through 4.6 of this EA. As indicated in Section 4.5 of this EA, impacts are unknown at the Harrison site (CGS-8) because the site was withdrawn before the archaeological survey was completed. There would be no significant impacts at the other four sites.

4.1 Common Features

Presented below is information on the physical, biological, and socio-cultural impacts common to all of the action alternatives.

4.1.1 Physical

Impacts from **construction** activities would not be significant. Construction would require localized earth-moving, including excavation and backfilling for placement of foundations and guy-wire anchors. Less than 3,800 square feet would be covered with concrete and gravel for the tower base and the equipment area enclosures. Similar coverage would be required for on-site access roads and parking; incidental activities during construction would disturb a similar amount. In total, about 0.25 acre would be occupied by foundations and the on-site access roads. Construction of the off-site access road and installation of utility lines would have no significant impacts because the sites are on relatively level terrain and the access road would require little grading. Furthermore, the disturbed area would occur within previously graded private farmland and/or public highway right-of-way. The amount of land disturbed for the access road and its right-of-way would range from 528 square feet to 48,000 square feet (1.1 acre), depending on the site selected.

The ground plane would be installed using machines that bury wire approximately 1 foot below the surface with minimal disturbance of the soil surface. This process would require

moving a small tractor or similar equipment over much of the 11-acre site, but would not significantly disturb the existing vegetation or create a significant erosion hazard.

Impacts to **mineral resources** would be minor, as indicated in Section 4.1.1.4, page 4.1-2 of the FEIS. No significant mineral resources of commercial value exist in Nevada County (Prior, 1989). If any mineral resources are present under any site, development of that site would only deny access to a small portion of those resources for the lifetime of the project and would not result in any significant impact.

Significant impacts on **paleontological resources** are not anticipated because fossils are unlikely to occur on any CGS (McFarland, 1989). However, if any fossils are found during construction, work that might affect them will be suspended while the Arkansas Geological Commission is notified and the significance of the find is evaluated.

Erosion and increase in storm water runoff would not be significant. All sites have slopes of generally less than 4 percent, so any required grading to level the site would be minimal, although the terrace-like ridges on the Harrison site (CGS-8) would require some leveling and grading. In addition, standard measures for erosion control would be used during and after site construction, including replanting the site. The Vandiver site (CGS-6) will require a storm water discharge permit under the National Pollutant Discharge Elimination System (NPDES) established by the Clean Water Act because more than 5 acres of land will be subject to construction disturbance (40 Code of Federal Regulations [CFR] 122-124).

None of the sites is located in a **100-year floodplain** (FEMA, 1978).

No **prime farmland** would be removed from production for the project, as none of the sites contains designated prime farmland (Gordon, 1989).

No significant impacts on **drinking water** are expected, as discussed in Sections 3.2.4.1 and 4.2.1.1, pages 3.2-2 and 4.2-3 of the FEIS. Corrosion of the ground plane is not anticipated to raise copper concentrations in any aquifer or surface water body by more than 20 µg/l. This represents only 2 percent of the maximum allowable copper

concentrations permitted by the Environmental Protection Agency (EPA) for raw water sources for potable water supply (EPA, 1985). The State of Arkansas does not set any standards for copper but does provide for the use of EPA-approved methodologies and guidance (Arkansas Commission on Pollution Control and Ecology, Regulation No. 2, Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas). The EPA standard is intended to maintain the aesthetic properties that relate to public acceptance of drinking water and is not related to public health. A threshold for the effects of copper on human health has not been determined (EPA, 1985).

Impacts on **surface water or wetlands** that support aquatic plants and animals would not be significant. Potential impacts could occur when the ground plane is less than 300 feet from surface water or wetlands, if the soil is acidic, or the depth to the seasonally high water table is less than 3 feet from the ground plane (4 feet from the surface), as discussed in Section 4.2.1.1, page 4.2-3 of the FEIS. Significant impacts are not expected on the Ellis (CGS-2), Henry (CGS-3), Harrison (CGS-8), or Butler (CGS-10) sites because the ground plane of each of these sites is at least 300 feet from surface water and wetlands. At that distance, the maximum increase in copper concentrations would be less than 1 to 2 µg/l. Assuming that the background concentrations of copper from Dorcheat Bayou, Bodcau Creek, and the Little Missouri River (5.4 µg/l to 8.6 µg/l) are indicative of surface water near the CGSs, the addition of 1 to 2 µg/l to this background concentration remains well within the EPA's maximum copper concentrations of 20 µg/l for water protected for wildlife, fish, aquatic and semi-aquatic life, and secondary human contact. Although the Vandiver (CGS-6) site is less than 300 feet from intermittent surface water, no significant impacts are expected, as discussed in Section 4.4 of this EA.

Impacts on **air quality** would not be significant. Temporary but insignificant increases in air pollutant emissions would occur during construction, primarily from greater use of heavy machinery than would be required in normal farming operations. During operation of the BUPG at 100 percent load, total yearly emissions from the BUPG would be less than 350 pounds per pollutant, as described in Section 2.1.2 of this EA. These are well below the standards set by the Clean Air Act (42 USC 7401, *et seq.*) which requires permits for facilities emitting any single regulated substance at the rate of 50 tons per year. Hence, the project would not result in violation of National Primary and Secondary Ambient Air

Quality Standards, which have been adopted by the State of Arkansas (Department of Pollution Control and Ecology, Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Section 3 [z]).

4.1.2 Biological

Impacts on **wildlife and wildlife habitats** would not be significant. With the exception of the Henry (CGS-3) and Vandiver (CGS-6) sites, which will require approximately 1 and 5 acres of clearing, respectively, each CGS is an agricultural field of commercial hay or is currently fallow and used as pasture for livestock grazing. Each site is far from areas of old-growth forest, lakes, or perennial streams, and no site is within 300 feet of federal jurisdictional wetlands (Lofton, 1990; Appendix C, Mosley, 1990, pages C-7 and C-8 of this EA). The sensitive fish-spawning habitat near Cypress Creek is 3.5 miles from the nearest site (Butler, CGS-10) and thus is too far away to be affected by a GWEN tower. Consequently, no critical or exceptionally valuable wildlife habitats would be at risk or would be close enough to attract waterfowl or other wildlife to the tower's vicinity.

Bird collisions with the tower may occur but are not expected to be significant. Section 4.4.1.5, page 4.4-5 of the FEIS states that most bird collisions occur in adverse weather conditions when the visibility of man-made structures is obscured and birds may be forced to lower their flight level. Generally, songbirds (passerines) are more likely to collide with a tower or the guy wires than are raptors or waterfowl (Avery *et al.*, 1980). The siting process aims to minimize the probability of collisions by avoiding areas with high concentrations of bird flight activity, such as feeding and nesting habitats, known migration corridors, raptor roosting areas, and prominent topographical features that could serve as navigational aids. The USFWS has confirmed that no significant impacts to avian species would result from the location of a GWEN tower on any of the sites (James, 1989).

No federally listed **threatened or endangered species** would be affected. The CGSs are located primarily in upland pastures and woods that have low to medium value for wildlife resources and would not attract such plant or animal species. This determination was made after informal consultation with the USFWS in compliance with Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531, *et seq.*, at 1536) (Appendix

C, James, 1989, page C-4 of this EA). Similarly, consultation with the Arkansas Game and Fish Commission determined that no state-listed rare, threatened, or endangered species would be affected (Mathis, 1990).

4.1.3 Socio-Cultural

Local employment would be increased slightly, primarily through use of local subcontractors for earth-moving and possibly for some of the facility's maintenance.

Impacts on **community support systems** would not be significant because the relay node will be unmanned and will use modest amounts of power (comparable to that used by an average single-family house). Security needs will be met through agreements with local police officials to monitor the integrity of the site during routine patrols, as detailed in Section 4.6.1.1, page 4.6-1 of the FEIS.

Impacts on **land use** would not be significant. All candidate sites are unzoned agricultural land, and a GWEN facility would be compatible with the surrounding land use (Haynie, 1989). Care was taken in the site selection process to maintain setbacks from institutional uses such as schools, churches, recreational areas, and areas zoned residential. The tower would not significantly affect property values because non-noxious, nonresidential land uses, such as the proposed relay node, have no systematic effect on housing values, as stated in Section 4.7.1.3, page 4.7-8 of the FEIS.

Construction **noise** impacts would be temporary and insignificant. Operational noise from the backup generator would be less than 72 dBA at the site boundary. At 50 feet beyond the site boundary the noise level would drop below 65 dBA, as discussed in Section 2.1.2 of this EA. Although Nevada County has no noise ordinances, this noise level is within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA), as stated in Section 3.5.3, page 3.5-2 of the FEIS. In addition, the BUPG would only operate at this noise level for 2 hours per week during testing and during commercial power outages.

Impacts on **public health and safety** would not be significant, as discussed in Sections 4.11 and 4.12, beginning on pages 4.11-1 and 4.12-1, respectively, of the FEIS. Shock and burn risks would be associated with the buildup of electrical charges on ungrounded metallic objects inside the inner exclusionary (8-foot) fence located approximately 20 feet from the tower base. However, a grounded person within the outer exclusionary (4-foot) fence located approximately 330 feet from the tower base who touches an ungrounded object while the tower was transmitting would experience only a mild shock, sufficient to cause the individual to break contact but not cause harm. Furthermore, because the transmission periods would total between 6 and 8 seconds per hour during normal operations, the risk of even these mild shocks would be insignificant. Only a determined effort to enter the inner exclusionary zones, within the 8-foot fence, would put a person at increased risk of higher shock and a higher specific absorption rate, dependent on the period of prolonged grasping contact with an ungrounded metallic object. Fire hazards at the relay node facility would be low, as discussed in Section 4.12.1.1, page 4.12-1 of the FEIS. Radio-frequency emissions would not cause adverse health effects, as discussed in Section 4.4.1.6, pages 4.4-6 and 4.4-7 of the FEIS. Subsequent to the publication of the FEIS, further study confirmed the conclusion of the FEIS that there is no evidence of adverse effects of GWEN radio-frequency emissions on public health (NRC, 1992).

The relay node would operate in the LF band and therefore would not interfere with pacemakers, emergency communications, commercial and amateur radios, televisions, or garage door openers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

Except for the Harrison site (CGS-8), impacts on **archaeological resources** would not be significant. The Arkansas SHPO reviewed the Phase I archaeological survey and concurred with the assessment that the GWEN project would not impact cultural resources on the four sites surveyed (Appendix C, Buford, 1990, page C-6 of this EA). Impacts on archaeological resources at the Harrison site (CGS-8) are unknown because the site was withdrawn before the survey was undertaken. If any archaeological resources are found during construction, work that might affect them will be suspended while the Arkansas SHPO is notified, in accordance with the provisions of 16 USC 470, *et seq.*, at 470f.

Impacts on **historic properties** would not be significant. The Arkansas SHPO has determined that no property listed, eligible for listing, or potentially eligible for listing on the NRHP exists within 1.5 miles of any of the sites (Buford, 1990).

Significant impacts on **Native American traditional, religious, or sacred sites** are not anticipated. According to the BIA, no federally recognized tribes currently live in Arkansas (Sutherland, 1992). Three tribes were historically in the area and based on BIA recommendations, the Quapaw Tribal Business Committee, the Caddo Tribal Council, and the Osage Tribe of Indians were notified of the GWEN project and information was requested regarding traditional, religious, or sacred sites within the SSA. A representative of the Caddo Tribe stated that the tribe had no concerns about cultural resources in the project area (Clark, 1993). No response has been received to the letter or several attempts at phone communication from the Quapaw Tribal Business Committee or the Osage Tribe.

Visual impacts associated with a GWEN tower are discussed in Sections 3.8 and 4.8, pages 3.8-1 and 4.8-1, respectively, of the FEIS. The significance of a visual impact would depend on the visual dominance of the GWEN facility and the sensitivity of the affected views. Visual dominance is the degree to which a GWEN facility would compete with other features of the existing landscape for the attention of the viewer. Section 3.8.4, page 3.8-3 of the FEIS defines four levels of dominance, called Visual Modification Classes (VMC):

- VMC 1, not noticeable: the tower would be overlooked by all but the most interested viewers

- VMC 2, noticeable, visually subordinate: the tower would be noticeable to most viewers without being pointed out but would not compete with other features for their attention

- VMC 3, distracting, visually codominant: the tower would compete with other features in the landscape for the viewer's attention

- VMC 4, visually dominant, demands attention: the tower would be the focus of attention and tend to dominate the view.

Visual sensitivity is a measure of the public's reaction to a proposed change of the affected view and is a function of the viewer's activity, awareness, goals, and values. Consequently, the more sensitive the view, the stronger will be the public reaction to any alteration of it. Areas defined in the FEIS as having high visual sensitivity include national and state parks; designated scenic routes; designated national, state, or local historic sites where setting is important to their historic significance; and travel routes providing access to these sites. Examples of areas having medium visual sensitivity would be locally popular, but undesignated, beaches or public use areas and the travel routes that provide primary access to them. Low visual sensitivity includes those views from sites, areas, travel routes, and sections of travel routes not identified as medium and high in sensitivity.

Significant visual impacts would occur if the relay node facility were to dominate or codominate (VMC 4 or 3) a high-sensitivity view or dominate (VMC 4) a medium-sensitivity view. If the relay node facility cannot be seen from medium-to-high sensitivity routes or areas, then visual impacts are not considered significant. Distance is the primary factor in determining visual dominance and therefore visual impacts. At distances greater than 3 miles, a GWEN tower would not be visible to the unaided eye. At 1.5 to 3 miles, the tower would be visually subordinate if noticeable (VMC 2) but more usually would not be noticed (VMC 1) because of its grey color and lack of mass. If a viewer at this distance actively sought the tower, it would appear as a thin vertical line on the horizon. Within 1.5 miles, the tower becomes a more important component of the view. In addition, other aspects of the tower's setting, such as focal point sensitivity, skyline complexity, competing feature interest, and topographic and vegetative screening, become important considerations in determining the level of visual impact. The visual impacts associated with each site are discussed in Sections 4.2 to 4.6 of this EA.

USGS topographic maps and a windshield survey were used to determine whether high or medium sensitivity views were within 1.5 miles of the CGSs. The visual impacts associated with each site are discussed in Sections 4.2 to 4.6 of this EA.

4.2 Alternative 1: Ellis Site (CGS-2)

No significant impacts are expected.

Visual impacts would not be significant because there are no high or medium sensitivity views within 1.5 miles of the site. Bodcaw, the nearest residential community, is more than 5.5 miles south.

4.3 Alternative 2: Henry Site (CGS-3)

No significant impacts are expected.

Visual impacts would not be significant because there are no high or medium sensitivity views within 1.5 miles of the site. Rosston, the nearest residential community, is 7 miles southeast.

4.4 Alternative 3: Vandiver Site (CGS-6)

No significant impacts are expected.

Impacts on **surface water or wetlands** would not be significant. Although the site is within 300 feet of an intermittent stream and a pond and the soil is acidic (pH 7.3 to 5.1), the seasonally high water table is 6 feet below the surface and the soil will be limed to bring the pH to 6.5. Under conditions of neutral soil and a deep water table, the potential for transport of copper away from the immediate area of the ground plane and into surface water would be negligible. Liming—a process described in Section 4.2.4.1, page 4.2-7 of the FEIS—would raise the pH above 6.5, rendering the copper relatively immobile. Liming would not affect any vegetation because most of the site is a cleared field of mowed grasses. The remainder is made up of small wooded areas of pine and deciduous trees that will be cleared and grubbed. Lime would not travel from the site boundary, so surrounding vegetation would not be affected. The liming program will be adjusted to local conditions, as site-specific as possible, to reflect soil, vegetative, climatological, and

topographic features of the site. Frequency and rate of application will reflect such conditions.

Visual impacts would not be significant because there are no high or medium sensitivity views within 1.5 miles of the site. Prescott, the nearest residential community, is 6 miles north.

4.5 Alternative 4: Harrison Site (CGS-8)

Complete impacts are unknown.

Impacts on **archaeological resources** are unknown because the site was withdrawn before the archaeological survey was undertaken.

Visual impacts would not be significant because there are no high or medium sensitivity views within 1.5 miles of the site. Bodcaw, the nearest residential community, is 2.5 miles southwest.

4.6 Alternative 5: Butler Site (CGS-10)

No significant impacts are expected.

Visual impacts would not be significant. Bodcaw, the nearest residential community, a high sensitivity view, is approximately 1.0 mile north of the site. The wooded area around the site is sufficiently dense and tall to screen the lower two-thirds of the tower from view of the town's residents. In addition, pine stands and other vegetation between the site and the town provide some competing feature interest. The skyline complexity is relatively low, but there is no focal point sensitivity, resulting in a view of the tower that is noticeable but visually subordinate (VMC 2). The tower would therefore not cause significant visual impacts when viewed from the town.

4.7 No Action Alternative

No environmental impact would result from adoption of the no action alternative.

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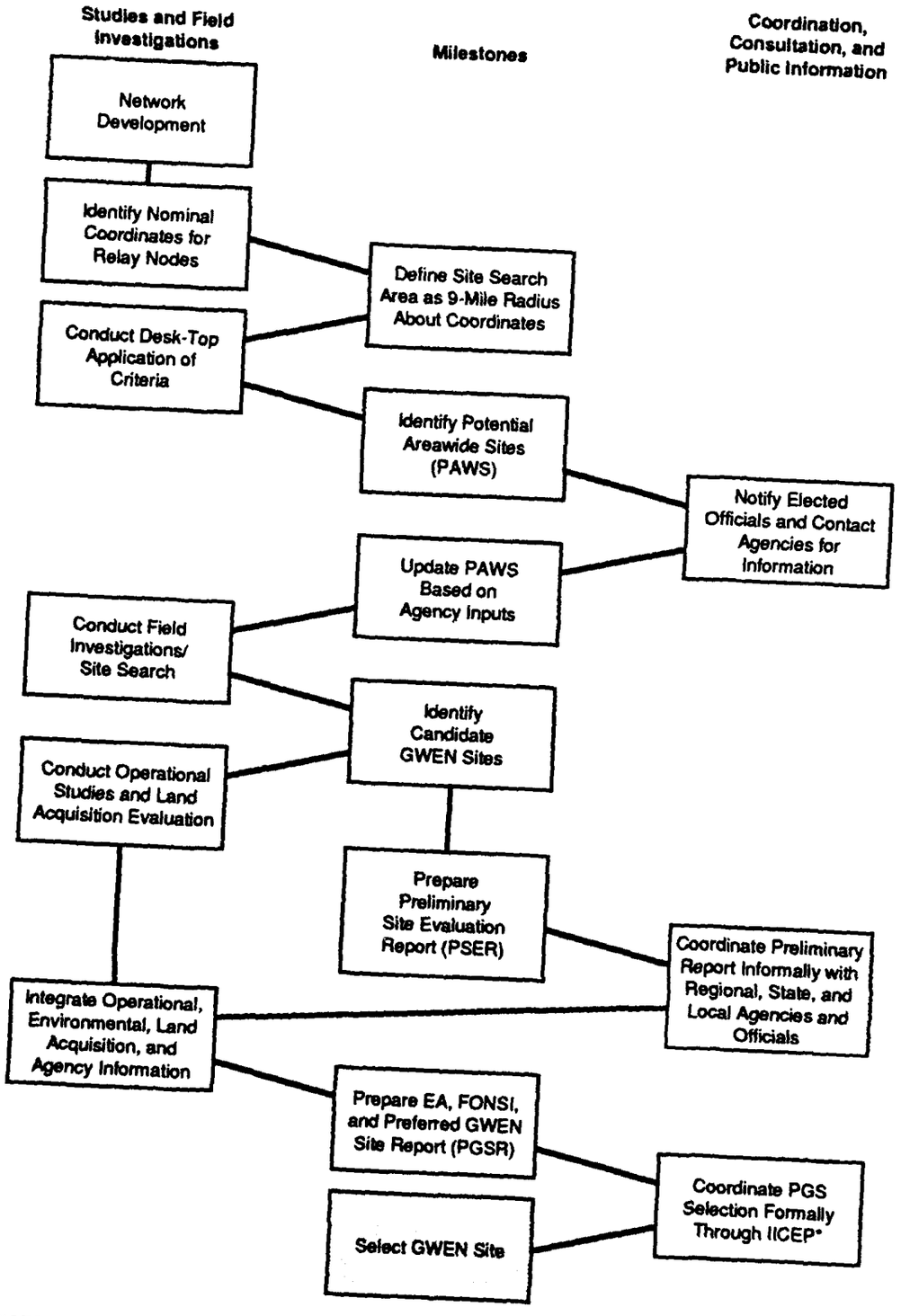
APPENDIX A

SITE SELECTION PROCESS

SITE SELECTION PROCESS

Figure A.1 of this EA shows the sequence of events during the selection of individual GWEN sites. Figure A.2 of this EA describes the screening process used during the field investigation to choose the candidate GWEN sites (CGSs). The environmental siting criteria applied in the site selection process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.



*IICEP = Interagency/Intergovernmental Coordination for Environmental Planning.

FIGURE A.1 GROUND WAVE EMERGENCY NETWORK SITE SELECTION PROCESS

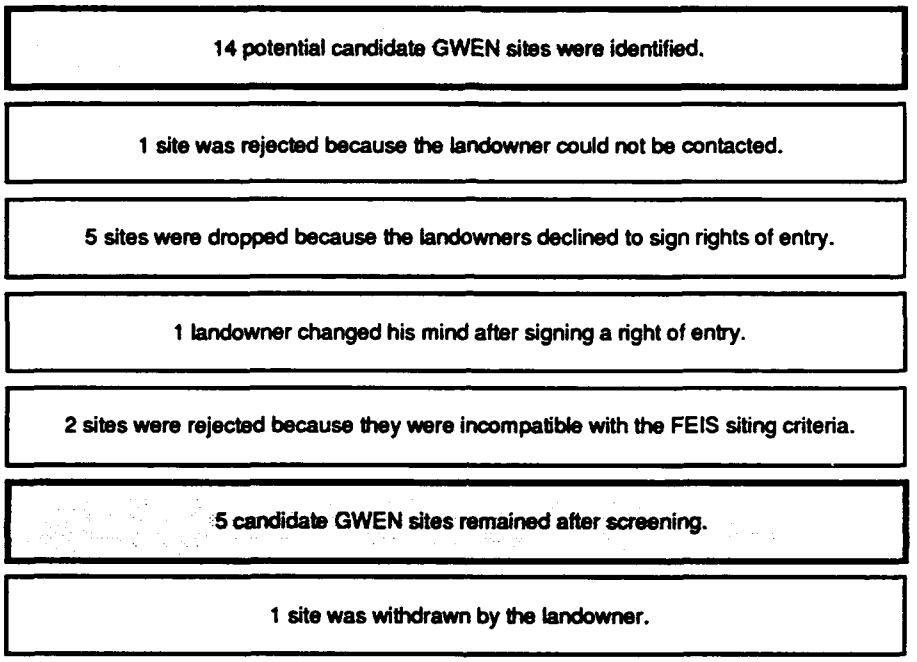


FIGURE A.2 RESULTS OF USING FEIS SITING CRITERIA TO SCREEN POTENTIAL CANDIDATE GWEN SITES IN THE SOUTHERN ARKANSAS SITE SEARCH AREA

APPENDIX B

TOPOGRAPHIC SETTINGS OF CANDIDATE GWEN SITES

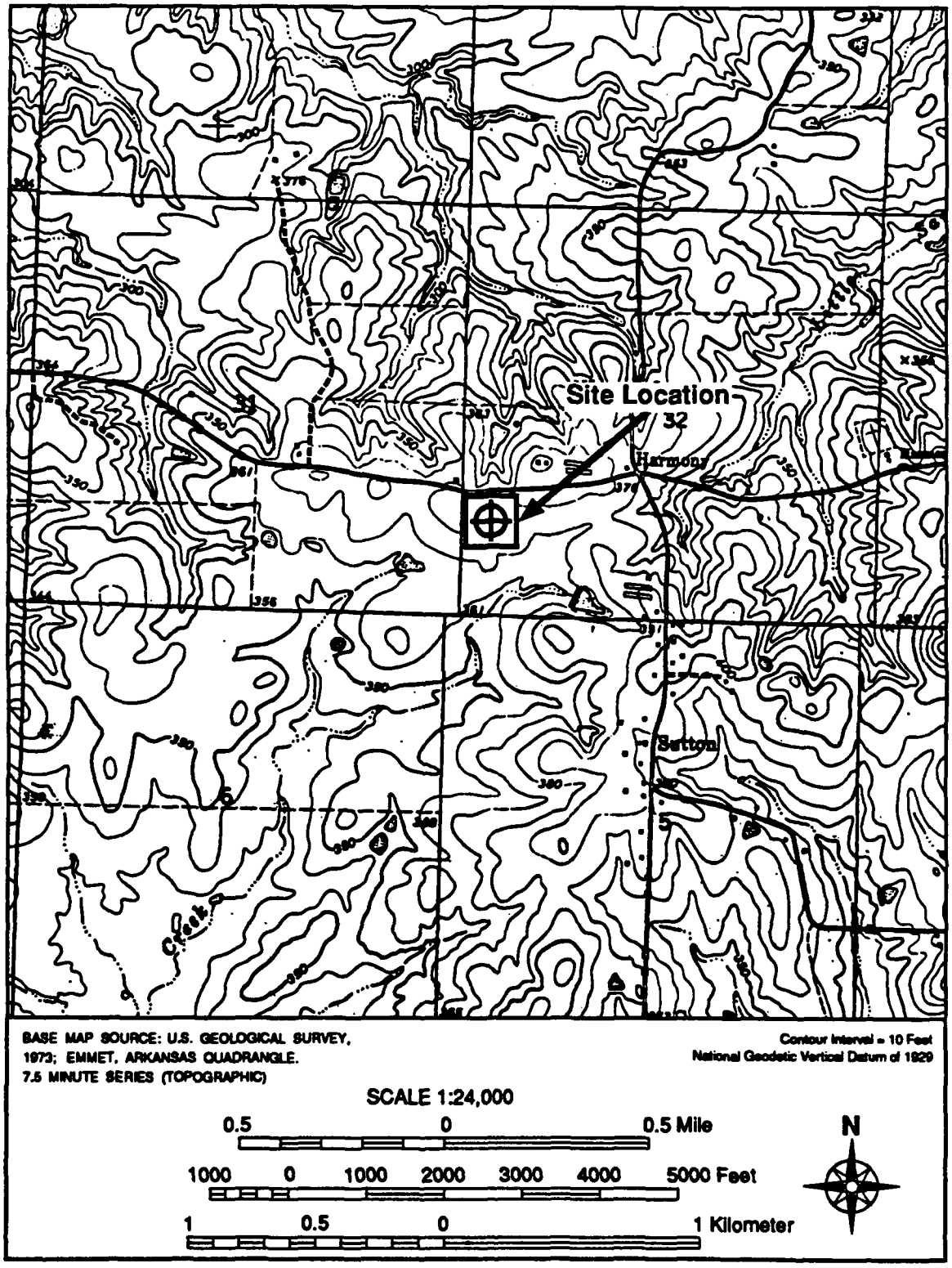


FIGURE B.1 TOPOGRAPHIC SETTING OF THE ELLIS SITE (CGS-2)

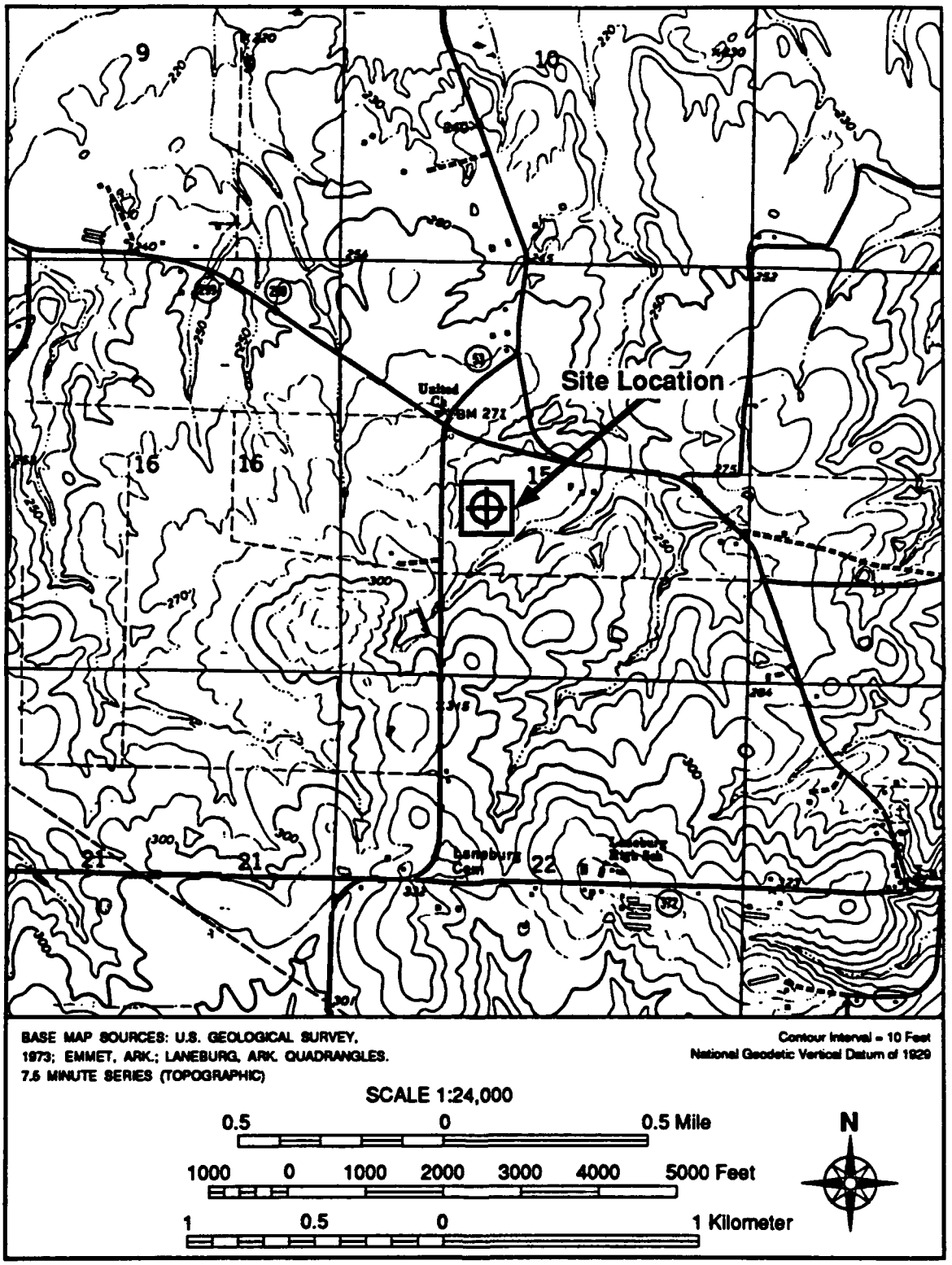


FIGURE B.2 TOPOGRAPHIC SETTING OF THE HENRY SITE (CGS-3)

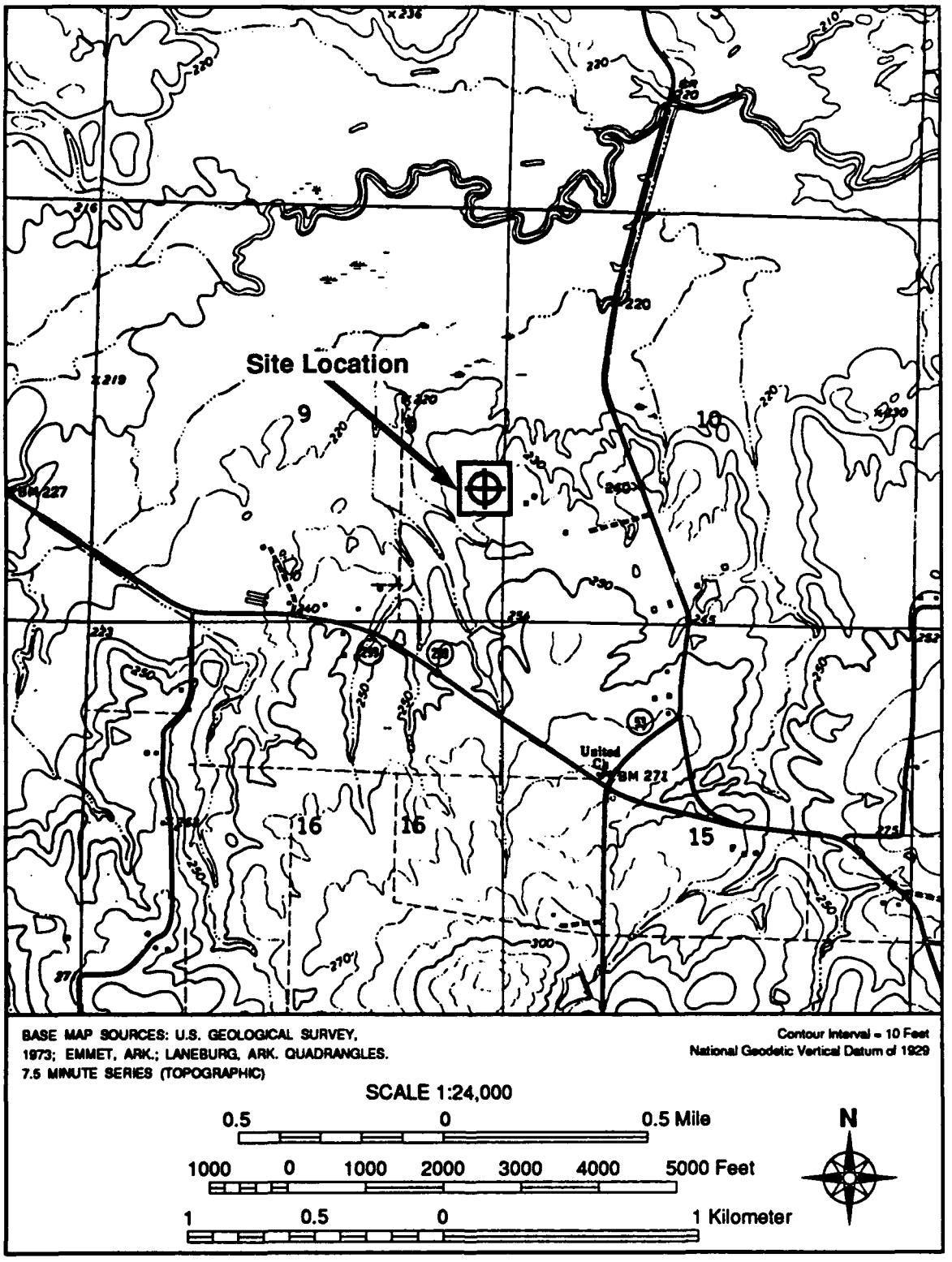


FIGURE B.3 TOPOGRAPHIC SETTING OF THE VANDIVER SITE (CGS-6)

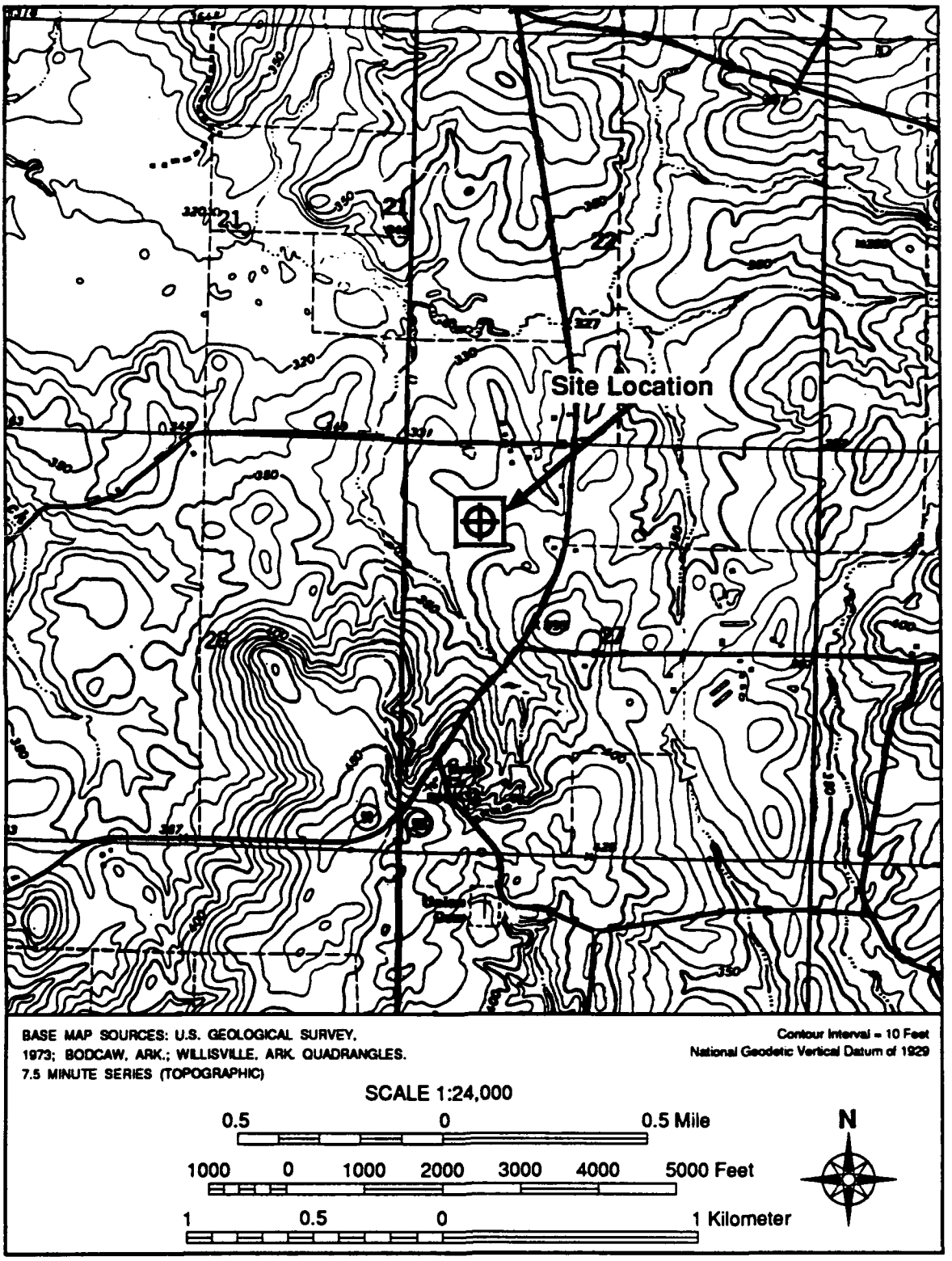


FIGURE B.4 TOPOGRAPHIC SETTING OF THE HARRISON SITE (CGS-8)

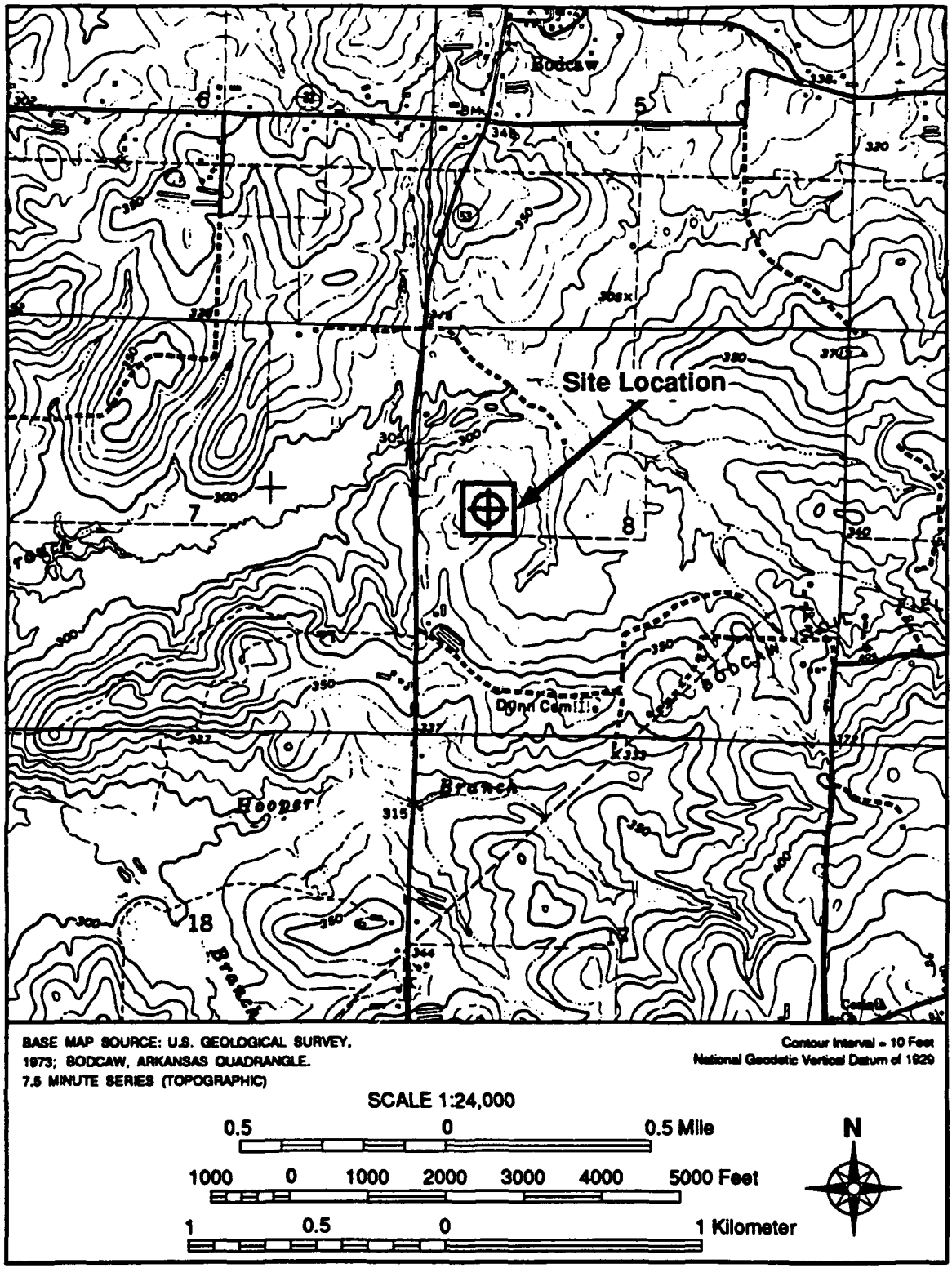


FIGURE B.5 TOPOGRAPHIC SETTING OF THE BUTLER SITE (CGS-10)

APPENDIX C

CORRESPONDENCE

CORRESPONDENCE

Appendix C documents contacts with the following federal and state agencies and Native American groups:

Individual	Agency	Date	Response
Curtis B. James, Environmental Coordinator	U.S. Department of the Interior, Fish and Wildlife Service	11-17-89 12-18-92	Attached Attached
Cathy Buford, State Historic Preservation Officer	Arkansas Historic Preservation Program	04-11-90 06-08-90	Attached Attached
K.P. Mosley, Chief	Enforcement Section, Regulatory Branch, U.S. Army Corps of Engineers	07-27-90	Attached
Lisa Hemesath, Environmental Coordinator	U.S. Department of the Interior, Fish and Wildlife Service	04-27-92	Attached
W.H. Mathews, Jr., Chairman	Quapaw Tribal Business Committee, Quapaw, Oklahoma		Letter sent on 08-25-92, but no response has been received to the letter or to several attempts at phone communication.

Individual	Agency	Date	Response
L. Williams, Chairman	Caddo Tribal Council, Binger, Oklahoma	Letter sent on 08-25-92.	No written response has been received. Phone communication with E. Clark, new Chairman on 01-07-93 (see page 5-1 of this EA).
C. O. Tillman, Jr., Principal Chief	Osage Tribe of Indians, Pawhuska, Oklahoma	Letter sent on 08-25-92.	but no response has been received to the letter or to several attempts at phone communication.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
900 Clay Street, Room 235
Vicksburg, Mississippi 39180
November 17, 1989

Mr. John Chamberlain
Environmental Consultant
SRI International
333 Ravenswood Avenue
Menlo Park, California 94025

Dear Mr. Chamberlain:

Thank you for your letter of October 19, 1989, concerning a proposal by the U.S. Air Force to construct a radio communications relay tower south of Hope, Nevada County, Arkansas. We have the following comments provided in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

As discussed with you by telephone on November 16, the alternative sites would be located primarily in upland pastures and woods of low to medium value for wildlife resources. Furthermore, none of the sites would involve endangered or threatened species. Therefore, the U.S. Fish and Wildlife Service has no objections to the proposed radio communications project.

We appreciate the opportunity to provide our comments.

Sincerely yours,

Curtis B. James

Curtis B. James
Environmental Coordinator

ARKANSAS
HISTORIC
PRESERVATION
PROGRAM

April 11, 1990

Mr. John A. Chamberlain
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025

Dear Mr. Chamberlain:

This letter is written in response to your inquiry regarding properties of archeological, historical, or architectural significance in the area of the proposed referenced project.

The staff of the Arkansas Historic Preservation Program has reviewed the available material that pertains to the area in question. Potentially significant archeological sites occur within the boundaries of two optional relay node locations. Previously recorded archeological sites are not evident for the remaining three optional locations including:

1) The Ellis Site (CGS-2)
2) The Harrison Site (CGS-8)
3) The Butler Site (CGS-10)

We therefore favor selection of one of these referenced locations. Because our records are incomplete and the potential for archeological sites exist at each of these locations, we recommend that a cultural resources survey of the preferred relay node location be conducted.

If you have any questions, please contact Roger Coleman of my staff at (501) 371-2763.

Sincerely,

Cathy Buford

Cathy Buford
State Historic Preservation Officer

CB/RC/slm

cc: State Archeologist
United States Air Force

ARKANSAS
HISTORIC
PRESERVATION
PROGRAM

June 8, 1990

Mr. John A. Chamberlain
SRI International
333 Ravenwood Avenue
Menlo Park, CA 94025

RE: Nevada County - General
Environmental Review - USAF
Report Entitled "A Cultural Resources Survey of Four Proposed Ground Wave Emergency Network Sites, Nevada County, Arkansas"

Dear Mr. Chamberlain:

My staff has reviewed the above referenced report. It is thorough and well written. We concur with the conclusions and recommendations of the consulting archeologist and have no objection to construction of the ground wave emergency network relay node.

Thank you for the opportunity to review this report. If you have any questions, please contact Roger Coleman of my staff at (501) 371-2763.

Sincerely,

Cathy Buford

Cathy Buford
State Historic Preservation Officer

CB:RC:dg

cc: State Archeologist
Arkansas Technical Review Committee
Ark. Archeological Survey, Sponsored Research Program
U.S. Department of the Air Force

Suite 200 • Heritage Center • 225 East Markham • Little Rock, Arkansas 72201 • Phone (501) 371-2763
A Division of the Department of Arkansas Heritage

DEPARTMENT OF THE ARMY
VICKSBURG DISTRICT, CORPS OF ENGINEERS
P O BOX 60
VICKSBURG, MISSISSIPPI 39181-0060

REPLY TO
ATTENTION OF

July 27, 1990

Operations Division
Regulatory

SUBJECT: Ground Wave Emergency System - Nevada County, Arkansas

Mr. John Chamberlain
SRI International
333 Ravenswood Avenue
Menlo Park, California 94025

Dear Mr. Chamberlain:

I refer to your correspondence addressed to the Little Rock District, concerning possible Department of the Army Section 10/404 permit requirements for the proposed installation of a Ground Wave Emergency Network by the U.S. Air Force. The information was forwarded to this office for response since the proposed activity falls within the geographic boundary of the Vicksburg District.

Based upon information contained in your Preliminary Site Evaluation Report and other information available to this office, we have determined that wetlands do not occur in the areas identified in your correspondence as CGS-2, CGS-3, CGS-6, CGS-8 and CGS-10. Therefore, a Department of the Army Section 10/404 permit will not be required.

I must emphasize the statements contained herein do not convey any property rights, either in real estate or material, or any exclusive privileges, and do not authorize any injury to property or invasion of rights or local laws or regulations, or obviate the requirement to obtain State or local assent required by law for the proposed property development.

Thank you for advising us of these plans. Should there be any changes in the locations specified or if you have any questions, please contact Mr. David Lofton of this office, telephone (601) 631-5147 or telefax (601) 631-6316.

Sincerely,

Kenneth P. Mosley
Chief, Enforcement Section
Regulatory Branch

Copy Furnished:

Mr. William N. Kirchner (6E-FT)
Environmental Protection Agency
Federal Activities Branch
1445 Ross Avenue
Dallas, Texas 75202-2733

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS ELECTRONIC SYSTEMS DIVISION (AFSC)
HANSCOM AIR FORCE BASE, MASSACHUSETTS 01731-5000

United States Department
of the Interior
Fish and Wildlife Service
Attn: Mr Curtis B. James
900 Clay Street, Room 235
Vicksburg, MS 39180

Dear Mr James

I am writing to advise you of progress on the U.S. Air Force's Ground Wave Emergency Network (GWEN) project in Southern Arkansas since we last corresponded. Completion of the Environmental Assessment (EA) has been delayed while the National Academy of Sciences conducts a study on the human health effects of electromagnetic radiation from the GWEN system. This study is expected to be completed in May 1992. Because of the length of time that has elapsed since preparation of the draft EA for Southern Arkansas, we are currently updating the EA and wish to verify previously obtained information.

In correspondence dated November 17, 1989 (see enclosed), you determined there were no federally-designated threatened, endangered, or candidate species likely to be found within our project area. Because of the passage of time since we received this determination, we wish to verify that it is still accurate. If changes have been made to the list of federally-designated threatened, endangered, and candidate species which would result in the likelihood of such species occurring within our project area, please send us a list of such species.

For your convenience, we have enclosed a reply form. We would appreciate your reply as soon as possible to enable us to complete preparation of the Environmental Assessment.

If you have any questions, please contact Mr Grady Thompson at (617) 271-3630.

Sincerely

STEPHEN T. MARTIN, Lt Col, USAF
Program Manager, GWEN

2 Atch
1. U.S. Fish & Wildlife Service letter dated November 17, 1989
2. Reply Form

☑ No Significant adverse wetland impacts
☑ No listed, proposed or candidate species present

Environmental Coordinator
U.S. Fish & Wildlife Service

Log No. 92-401

4/27/92

United States Department
of the Interior
Fish and Wildlife Service
Attn: Ms Lisa Hemesath
900 Clay Street, Room 235
Vicksburg, MS 39180

RE: U.S. Air Force Ground Wave Emergency Network (GWEN) Project in Southern Arkansas

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This is to verify that there are no federally-designated threatened, endangered, or candidate species likely to be found within the GWEN project area as stated in our letter of April 27, 1992.

Curtis B. James

Curtis B. James
Environmental Coordinator

12/18/92
Date

Changes have been made to the list of federally-designated threatened, endangered, or candidate species since our correspondence to you on April 27, 1992. Enclosed is a new list of species likely to be found in the GWEN project area and which may be affected by the project.

Lisa Hemesath

Date

APPENDIX D

GLOSSARY

GLOSSARY

Abbreviations and Units of Measure

AM	Amplitude Modulation
ANHC	Arkansas Natural Heritage Commission
ASHTD	Arkansas State Highway and Transportation Department
ATU	Antenna tuning unit
BIA	Bureau of Indian Affairs
Btu	British thermal unit
BUPG	Back-up power group
CFR	Code of Federal Regulations
CGS	Candidate GWEN site
dBA	Decibels on the A-weighted scale, which is a measure of the intensity of the sounds people can hear
EA	Environmental Assessment
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration

FEIS	Final Environmental Impact Statement; in this document, the term refers to the FEIS for the GWEN Final Operational Capability that was released in September 1987 by the U.S. Air Force, Electronic Systems Division, Hanscom Air Force Base, Massachusetts
FEMA	Federal Emergency Management Agency
FICWD	Federal Interagency Committee for Wetland Delineation
FOC	Final Operational Capability, the third phase of development of GWEN
FONSI	Finding of No Significant Impact
GWEN	Ground Wave Emergency Network
HEMP	High-altitude electromagnetic pulse
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning, the formal review process for the EA
kHz	Kilohertz
LF	Low frequency
mg/l	Milligrams per liter
MM	Modified Mercalli, a scale of the severity of earthquake effects
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council, the principle operating agency of the National Academy of Sciences and the National Academy of Engineering

NRHP	National Register of Historic Places
PAWS	Potential areawide sites; the portion(s) of an SSA left after application of those siting criteria that do not require a field survey, such as the location of national and state parks
PCGS	Potential candidate GWEN site; any site that is identified from roadside surveys as suitable for further investigation
PGS	Preferred GWEN site; the CGS identified by the Government that represents the Government's preferred location for a relay tower
PSER	Preliminary Site Evaluation Report
µg/l	Micrograms per liter
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer; the person responsible for administering the National Historic Preservation Act at the state level, reviewing National Register of Historic Places nominations, maintaining data on historic properties that have been identified but not yet nominated, and consulting with federal agencies concerning the impacts of proposed projects on known and unknown cultural resources
SSA	Site search area; the 250-square-mile area within which four to six CGSs are identified; the SSA is the area within a 9-mile radius of a set of nominal coordinates in the network design. It is used as a manageable range in which to conduct siting investigations.

TLCC	Thin Line Connectivity Capability; the second phase of development of GWEN
UHF	Ultrahigh frequency (band); specifically 300 to 3,000 megahertz
USAF	United States Air Force
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMC	Visual Modification Class

Definitions

Air pollutant	An atmospheric contaminant, particularly the 15 atmospheric contaminants specified in federal and most state regulations
Candela	A unit of measure of the intensity of light equal to the brightness of one candle
Cultural resource	Prehistoric, Native American, and historic sites, districts, buildings, structures, objects, and any other physical evidence of past human activity
Evaluative criteria	Applied to portions of a potential siting area for a GWEN facility to determine its suitability. Areas that rank low against evaluative criteria may be excluded from consideration, or given a low priority in the site selection process

Exclusionary criteria	Criteria used to eliminate or exclude highly sensitive areas or areas that do not meet the limits of acceptable performance from consideration for GWEN facilities
Federal jurisdictional wetland	As defined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (GPO 1989-236-985/00336), a wetland is a class of habitats that are distinguished by the presence of saturation to the surface or standing water during at least 1 week of the growing season (wetland hydrology), a soil type characteristic of saturated or poorly drained conditions (hydric soils), and the predominance of plants that only or mostly occur on wet sites (hydrophytic vegetation)
Floodplain	Land adjacent to a river that is commonly covered by water during high flow periods
Ground plane	A part of the antenna system consisting of buried copper wires that extend radially from the base of a GWEN tower for a distance of approximately 330 feet
Historic properties	Those cultural resources that are listed, or eligible for listing, on the National Register of Historic Places

Modified Mercalli scale	A measure of the intensity of seismic activity based on human perception of the event and potential for damage; the intensity scale is rated on a Roman numeral scale ranging from I to XII. An earthquake of MM intensity I would be detectable only by seismographs; MM intensity V would shake buildings, break dishes and glassware, and cause unstable objects to fall; MM intensity X would destroy most masonry and frame structures, bend railroad rails slightly, and cause tidal waves and landslides; MM intensity XII would cause nearly total destruction of all buildings. Another commonly used seismic intensity scale, based on readings from a seismograph, is the Richter scale, which was developed in 1935. The Modified Mercalli scale is often used when the historic period to be covered includes data prior to 1935.
Paleonto-logical	Pertaining to fossils or the study of fossils
Paleozoic era	Geologic period of time from 230 million to 620 million years ago
pH	A measure of acidity in which the lower the number, the more acid the substance; 7 represents neutrality
Phase I archaeological survey	A survey conducted by a trained archaeologist that is designed to test for the presence or absence of archaeological resources; it involves walking an area at predetermined intervals and may involve digging small shovel pits if ground visibility is low
Prime farmland	Land that contains soils having high crop production either naturally or through modification; the U.S. Soil Conservation Service is responsible for designating prime farmland

Swale	A land depression that receives intermittent runoff from the immediately surrounding area. When moist, it may contain vegetation, planktonic animals, and small amphibians, but it does not support significant aquatic life, such as fish
Tectonics	A branch of geology concerned with structures, especially with folding and faulting
Tertiary period	Geologic period of time from 2 million to 66 million years ago
Top-loading element	Portions of the GWEN antenna that extend diagonally from the top of the tower, which strengthen the signal and provide additional structural support like guy wires