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GROUND WAVE EMERGENCY NETWORK
FINAL OPERATIONAL CAPABILITY

ENVIRONMENTAL ASSESSMENT
FOR
NORTHWESTERN NEBRASKA RELAY NODE
SITE NO. RN 8C930NE

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Electronic Systems Center
Air Force Material Command, USAF
Hanscom AFB, Massachusetts 01731-1623

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FINDING OF NO SIGNIFICANT IMPACT

NAME OF ACTION: GROUND WAVE EMERGENCY NETWORK
NORTHWESTERN NEBRASKA RELAY NODE

DESCRIPTION OF PROPOSED ACTION ALTERNATIVES:

The U.S. Air Force plans to construct a radio communications relay node in northwestern Nebraska (Dawes County) as part of the Ground Wave Emergency Network (GWEN) communications system. Five action alternatives associated with five candidate GWEN sites (CGSs) in northwestern Nebraska 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 northwestern Nebraska 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 northwestern Nebraska. Regional screening resulted in the identification of five CGSs in northwestern Nebraska 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 northwestern Nebraska 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 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.

Five action alternatives are discussed in this Finding of No Significant Impact (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.

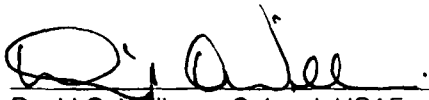
The project would have no significant impacts on physical resources. Erosion and increased runoff would be minimized by using proper erosion control techniques during construction and by replanting the site afterwards. Impacts on mineral resources would be minor. Paleontological resources are not likely to occur on any of the sites; therefore significant impacts to them are not anticipated. A maximum of 11 acres of 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. 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 farmland and do not contain sensitive wildlife habitat. None of the sites is within 300 feet of wetlands or is subject to flooding. Informal consultation with the U.S. Fish and Wildlife Service indicated that the project would not adversely affect any threatened or endangered species. The Nebraska Game and Parks Commission indicated that no state-listed threatened or endangered species 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 Nebraska Historical Society was consulted and 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 Brecht, (CGS-2), Rook (CGS-3), West (CGS-4), McCafferty (CGS-8), and Junge (CGS-12) sites. Therefore, an environmental impact statement for a GWEN relay node at the cited locations in northwestern Nebraska is not required.



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

4 Mar 93
Date

PREFERRED GWEN SITE REPORT NORTHWESTERN NEBRASKA

The U.S. Air Force is proposing to construct a relay node for the Ground Wave Emergency Network (GWEN) in northwestern Nebraska. 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 northwestern Nebraska are referred to as the Brecht, Rook, West, McCafferty, and Junge sites.

This report summarizes the process of selecting the preferred site from 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).

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 northwestern Nebraska to the GWEN network cannot be achieved. Ground conductivity measurements are acceptable at all five CGSs. During the site-specific studies, no radio frequency interference was detected in the GWEN frequency bands which would interfere with the operation of the GWEN receiver at the West, McCafferty, and Junge sites. Also, operations at any of these sites would pose no interference with other known systems. Radio frequency interference was detected in GWEN frequency bands at the Brecht and Rook sites. The signals were not present long enough to identify their source; further testing would be required before the operational suitability of these sites can be determined. Therefore, the West, McCafferty, and Junge sites are operationally suitable.

The next major factor considered in the selection of the preferred site was **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. The environmental analysis found that no significant impacts would result from construction of a GWEN relay node at any of the five CGSs. A FONSI for the five sites was completed on 4 March 1993. Thus, all five CGSs are environmentally suitable.

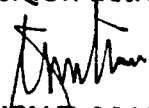
All five sites are **suitable for development** as a GWEN relay node. The FAA has approved construction of the GWEN relay node at any of these five CGSs. **Construction cost** is also a consideration in the selection of the preferred site. Construction costs for the operationally, environmentally, and developmentally suitable sites are nearly equivalent and are, therefore, not a major factor in the selection of a preferred GWEN site.

Real estate negotiations have been completed for the West and Junge sites; the landowners prefer to lease their property. The West site is slightly favored because of lower acquisition costs. The owners of the Rook and McCafferty sites announced their desires to be withdrawn from consideration during negotiations and, therefore, a negotiated amount for either lease or purchase could not be reached.

Negotiations have been suspended for the Brecht site. Thus, of the two sites for which negotiations have been completed, the West site is favored.

With operational, environmental, and developmental factors evaluated and acquisition and construction costs considered, the Air Force prefers the West site. The West site is preferred because it is operationally, environmentally, and developmentally suitable, has acceptable construction costs, and has the lowest real estate acquisition costs.

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


STEPHEN J. MARTIN, LT COL, USAF
Program Manager, GWEN

12 March 93
(Date)

GROUND WAVE EMERGENCY NETWORK
FINAL OPERATIONAL CAPABILITY

ENVIRONMENTAL ASSESSMENT
FOR
NORTHWESTERN NEBRASKA RELAY NODE
SITE NO. RN 8C930NE

19 February 1993

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Air Force Material Command, USAF
Hanscom AFB, Massachusetts 01731-1623

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
	SUMMARY	v
1.0	PURPOSE AND NEED FOR ACTION	1-1
2.0	ALTERNATIVES INCLUDING THE PROPOSED ACTION	2-1
2.1	Common Features of the Action Alternatives	2-1
2.1.1	Site Selection Process	2-1
2.1.2	Relay Node Construction and Operation	2-5
2.2	Alternative 1: Brecht Site (CGS-2)	2-9
2.3	Alternative 2: Rook Site (CGS-3)	2-10
2.4	Alternative 3: West Site (CGS-4)	2-10
2.5	Alternative 4: McCafferty Site (CGS-8)	2-11
2.6	Alternative 5: Junge Site (CGS-12)	2-11
2.7	No Action Alternative	2-12
3.0	AFFECTED ENVIRONMENT	3-1
3.1	Site Search Area	3-1
3.1.1	Physical Setting	3-1
3.1.2	Biological Setting	3-4
3.1.3	Socio-Cultural Setting	3-10
3.2	Alternative 1: Brecht Site (CGS-2)	3-14
3.3	Alternative 2: Rook Site (CGS-3)	3-15
3.4	Alternative 3: West Site (CGS-4)	3-15
3.5	Alternative 4: McCafferty Site (CGS-8)	3-16
3.6	Alternative 5: Junge Site (CGS-12)	3-17

TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
4.0	ENVIRONMENTAL CONSEQUENCES OF ACTION ALTERNATIVES.....	4-1
4.1	Common Features.....	4-1
4.1.1	Physical.....	4-1
4.1.2	Biological.....	4-4
4.1.3	Socio-Cultural	4-8
4.2	Alternative 1: Parkhurst Site (CGS-5).....	4-12
4.3	Alternative 2: Baragiola Site (CGS-6).....	4-12
4.4	Alternative 3: Edmond Site (CGS-10).....	4-13
4.5	Alternative 4: Lewis Site (CGS-12)	4-13
4.6	Alternative 5: Hallows Site (CGS-16)	4-13
4.7	No Action Alternative.....	4-13
5.0	REFERENCES	5-1
APPENDIX A:	Site Selection Process	A-1
APPENDIX B:	Topographic Settings of Candidate GWEN Sites	B-1
APPENDIX C:	Correspondence	C-1
APPENDIX D:	Glossary.....	D-1

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1.1	Northwestern Nebraska Site Search Area (SSA), Dawes County, Nebraska	1-2
2.1	Locations of Candidate GWEN Sites (CGSs) Relative to Selected Major Features and Roads within the Northwestern Nebraska Site Search Area	2-2
2.2	Locations of Five Candidate GWEN Sites (CGSs) in Dawes County	2-3
2.3	Typical Layout of FOC Relay Node Station	2-6

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 northwestern Nebraska, 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 near the village of Whitney in Dawes County, in northwestern Nebraska, at latitude 42.80°N and longitude

103.18°W. The city of Chadron extends slightly into the eastern portion of the SSA, and the city of Crawford is 7 miles southwest of the SSA.

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 northwestern Nebraska was conducted in August 1989. Twelve 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 six PCGSs. Following evaluation against the environmental siting criteria set forth in the FEIS, five of the six PCGSs were recommended as candidate GWEN sites (CGSs) for further review. These CGSs were described in the Preliminary Site Evaluation Report (FSER) of September 10, 1989.

Subsequent to the PSER being issued, and site-specific studies being accomplished, two CGS landowners withdrew two sites from consideration (Rook, CGS-3, and McCafferty, CGS-8). These landowners are no longer interested in leasing or selling land to the Air Force. However, since all site-specific studies had been accomplished on these sites prior to the owners' withdrawal and because these sites continue to be considered as viable alternatives, the Air Force has presented this data on the withdrawn sites 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 northwestern Nebraska. 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.

This EA shows that construction and operation of a GWEN relay node on any of the five candidate sites would have no significant impacts. 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 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 northwestern Nebraska (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.

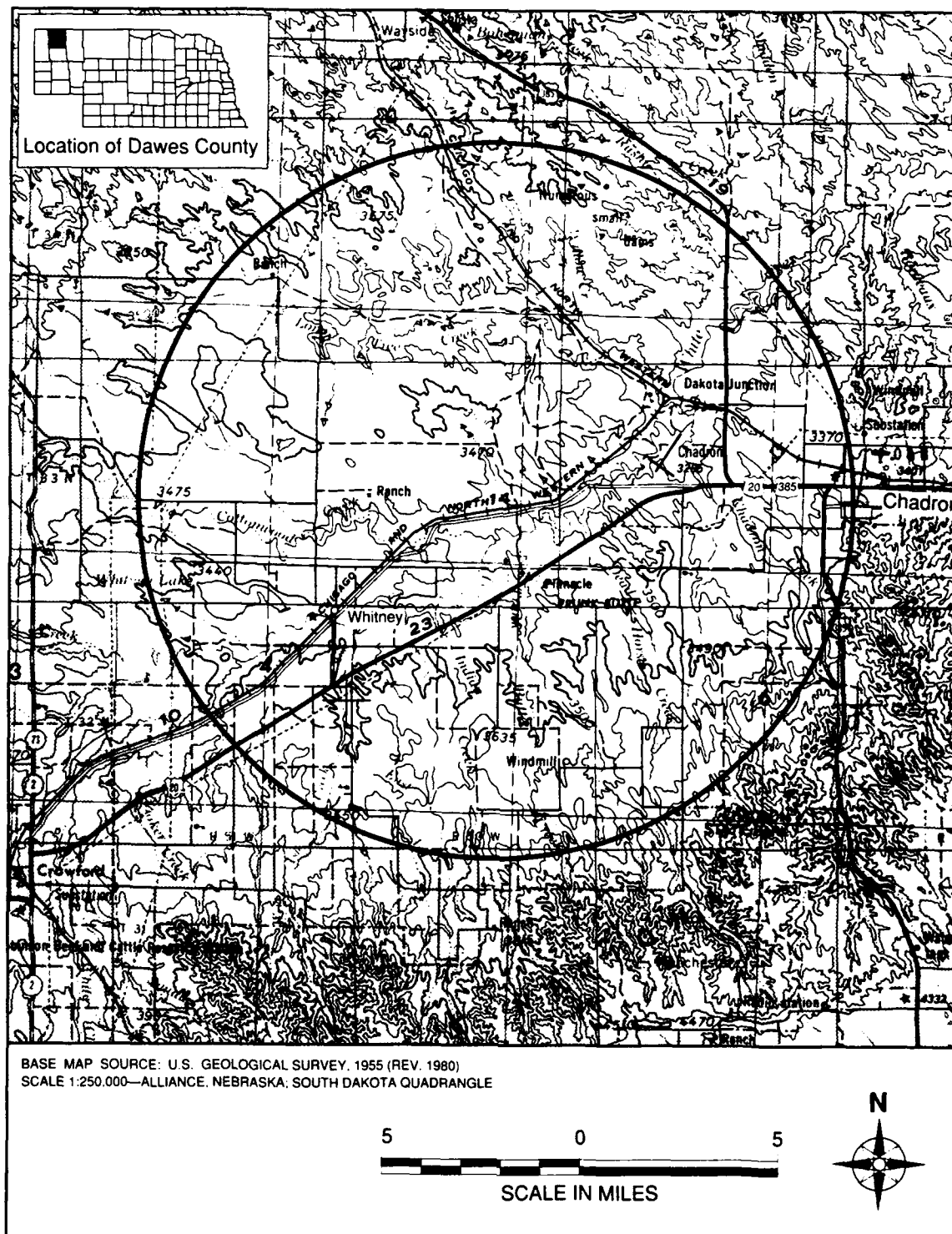


FIGURE 1.1 NORTHWESTERN NEBRASKA SITE SEARCH AREA (SSA), DAWES COUNTY, NEBRASKA

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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.

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 August 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 Section 5, 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.

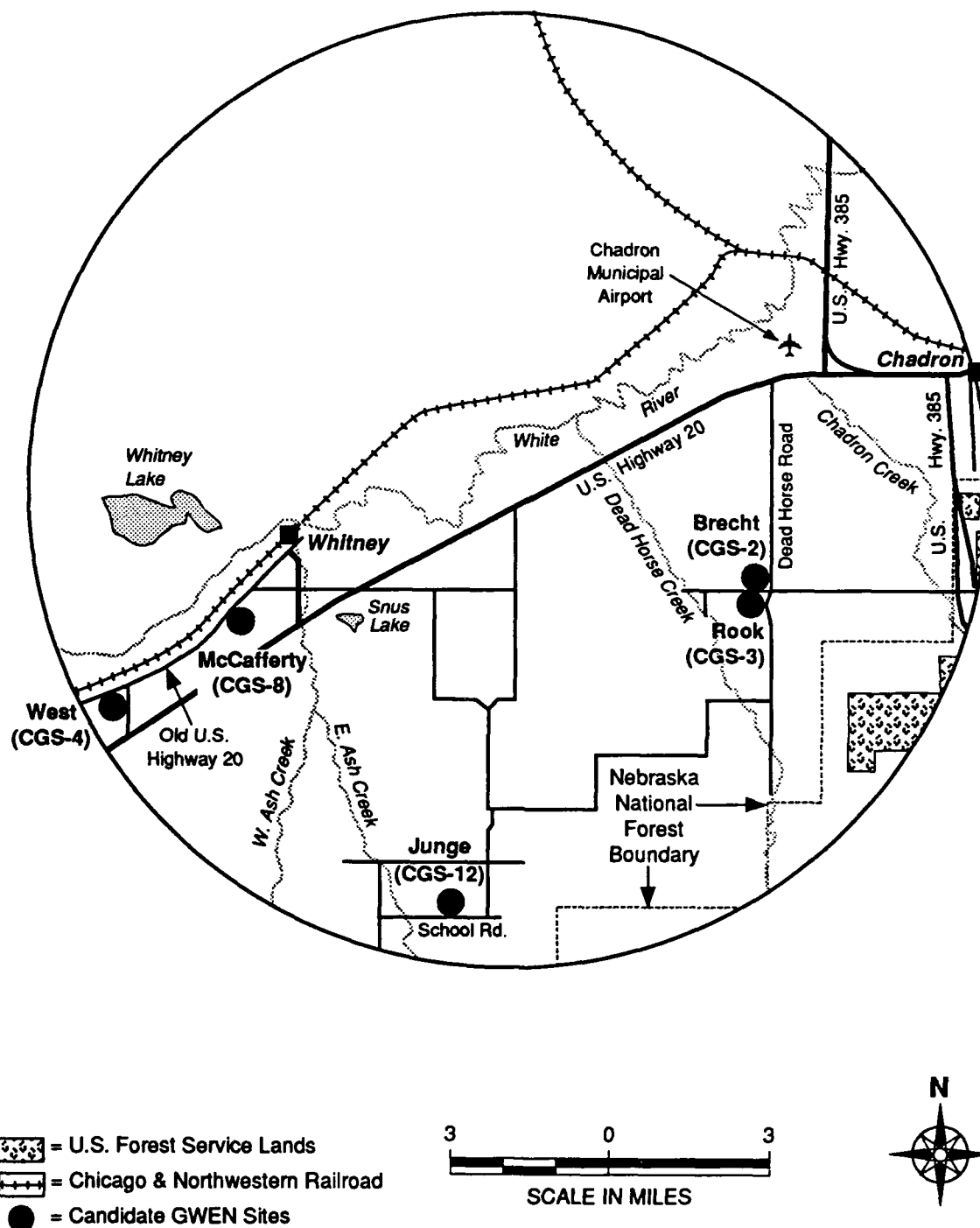


FIGURE 2.1 LOCATIONS OF CANDIDATE GWEN SITES (CGSs) RELATIVE TO SELECTED MAJOR FEATURES AND ROADS WITHIN THE NORTHWESTERN NEBRASKA SITE SEARCH AREA

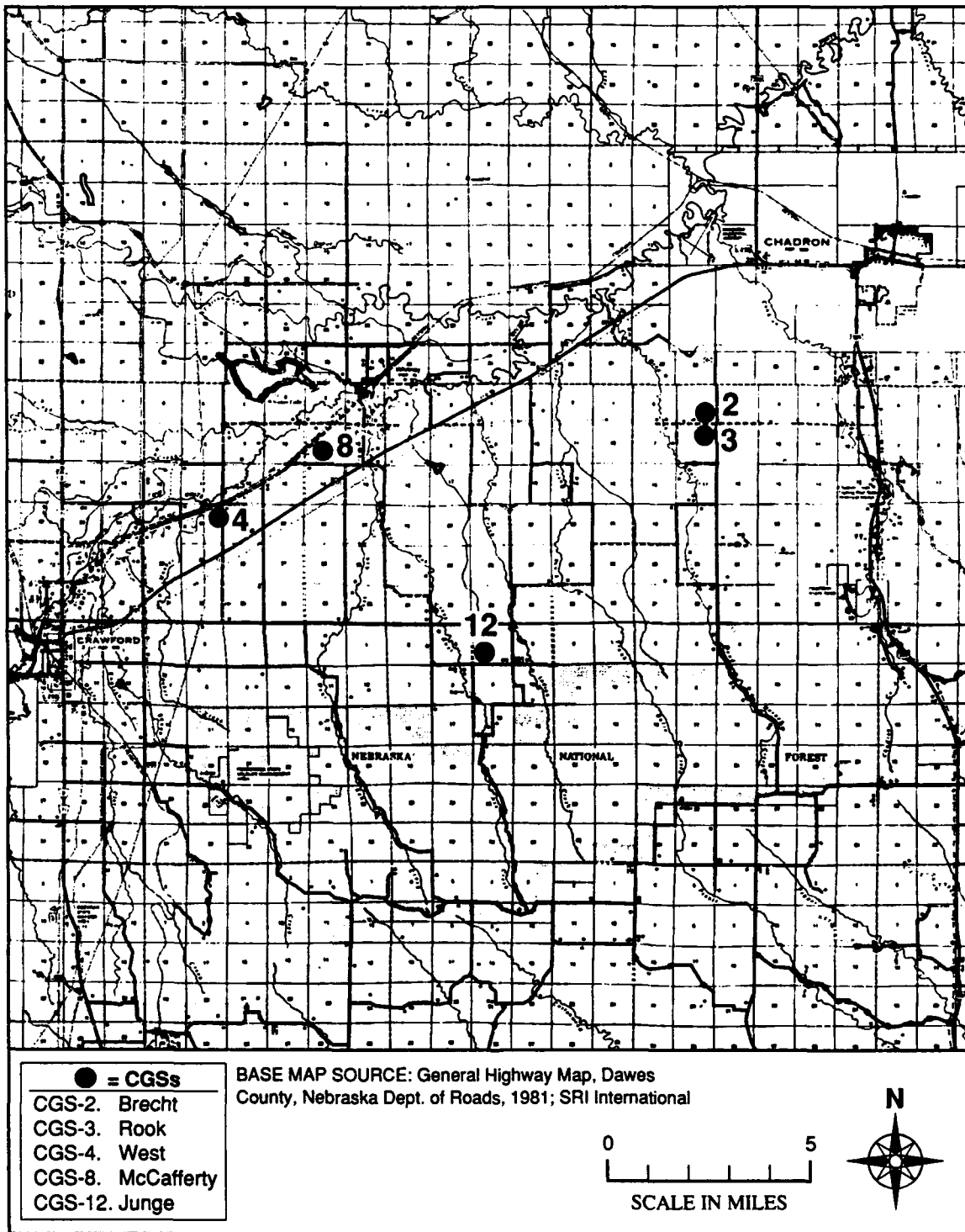


FIGURE 2.2 LOCATIONS OF FIVE CANDIDATE GWEN SITES (CGSs) IN DAWES COUNTY

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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 northwestern Nebraska was conducted in August 1989. Twelve 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 six PCGSs. 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 site-specific studies being accomplished, two CGS landowners withdrew two sites from consideration (Rook, CGS-3, and McCafferty, CGS-8). These landowners are no longer interested in leasing or selling land to the Air Force. However, since all site-specific studies had been accomplished on these sites prior to the owners' withdrawal and because these sites continue to be considered as viable alternatives, the Air Force has presented this data on the withdrawn sites 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 northwestern Nebraska. 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.

The 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 vary 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 100 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. 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.

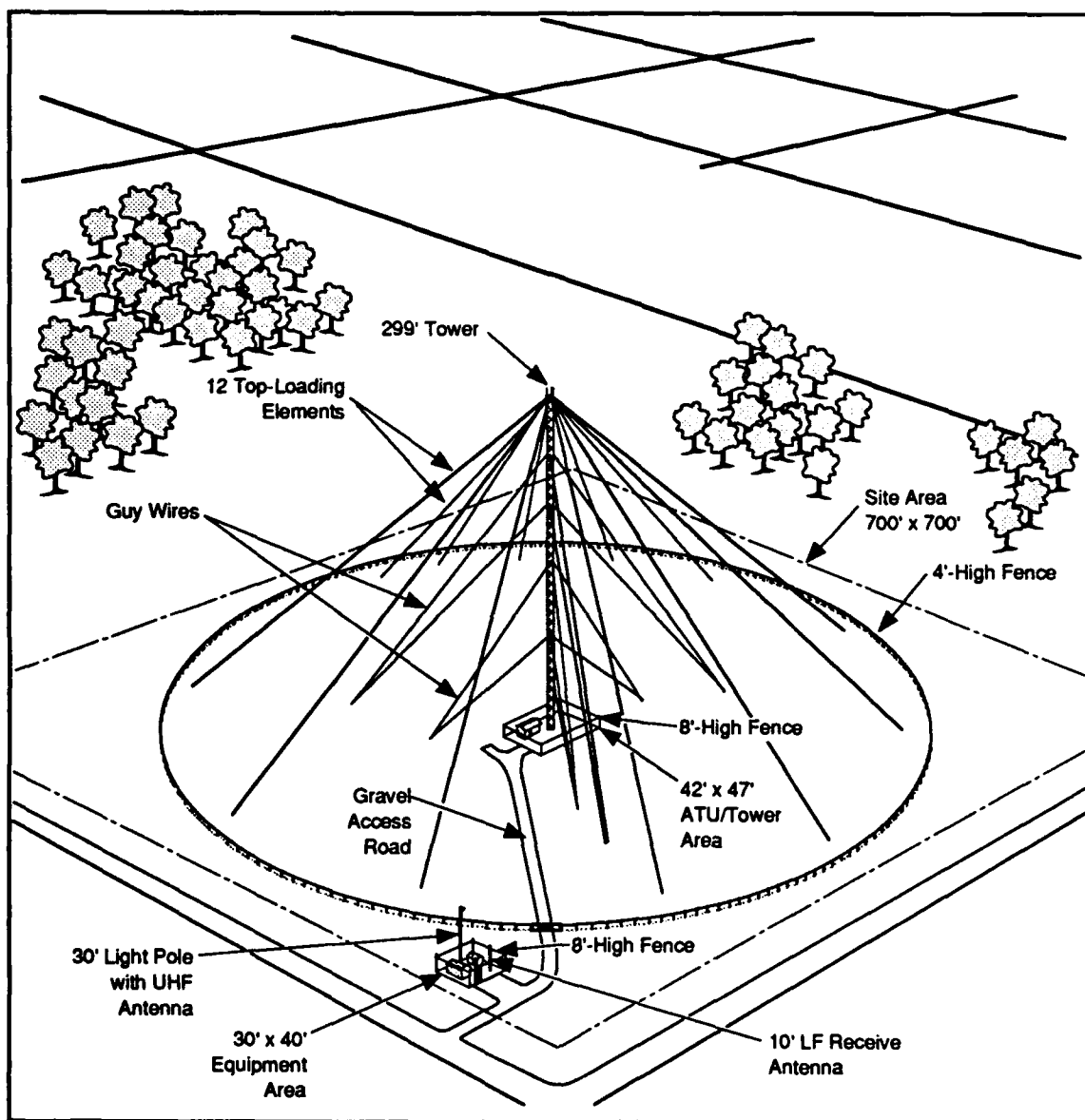


FIGURE 2.3 TYPICAL LAYOUT OF FOC RELAY NODE STATION

The siting and design of the tower are coordinated with the Federal Aviation Administration (FAA) 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 between 6 and 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, beginning on 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. Minimal grading will be required, and erosion control techniques that are consistent with local practices will be used during construction. Vegetation removal at all of the sites will be minimal. 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: Brecht Site (CGS-2)

The Brecht site is in the southeast quarter of the southeast quarter (SE1/4 SE1/4) of Section 5, Township 32N, Range 49W. It is 4 miles south of U.S. Highway 20 and approximately 6 miles southwest of the city limits of Chadron, at the intersection of Dead Horse Road and an unnamed gravel road. Access would be from Dead Horse Road. Nineteen feet of road would be required. A 3.5-inch gas pipeline lies on the surface at the southern edge of the Brecht property. If necessary, this pipeline would be buried.

Three-phase power would be obtained from overhead lines east of Dead Horse Road. Telephone service is available from underground lines south of the unnamed gravel road at the southern edge of the CGS.

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

2.3 Alternative 2: Rook Site (CGS-3)

The Rook site is in the NE1/4 NE1/4 of Section 8, Township 32N, Range 49W. It is at the intersection of Dead Horse Road and an unnamed gravel road 4 miles south of U.S. Highway 20 and approximately 6 miles southwest of the city limits of Chadron. The site is irregularly shaped, with an 800-foot-long northern border and a 630-foot-long southern border. Access would be from Dead Horse Road and would require 22 feet of road.

Three-phase power would be obtained from overhead lines east of Dead Horse Road, and telephone service would be obtained from underground lines along either the eastern or the northern edges of the site. An existing gas pipeline now lying on the surface along the northern side of the unnamed section line road would be buried if necessary.

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

2.4 Alternative 3: West Site (CGS-4)

The West site is in the NE1/4 NE1/4 of Section 20, Township 32N, Range 51W. The site is beside Old U.S. Highway 20, approximately 5 miles southwest of Whitney and 1 mile north of the new U.S. Highway 20. The site would occupy the northeastern corner of Section 20 at the intersection between Old U.S. Highway 20 and an unnamed north-south section line road. The site has an irregular shape. The southern border would be only 560 feet long. The site would also be set back 50 feet from an existing stock fence along the section line road to give cattle access to an existing water supply. Access to the CGS would be from Old U.S. Highway 20. This would require a 120-foot road to allow an adequate setback from an existing railroad for satisfactory antenna performance.

Three-phase power would be obtained from overhead lines along the southern edge of the old highway. Telephone service would be obtained from underground lines along either of the two roads. An existing gas pipeline now lying on the surface of the West property parallel to Old U.S. Highway 20 would be buried if necessary.

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

2.5 Alternative 4: McCafferty Site (CGS-8)

The McCafferty site is in the SE1/4 NW1/4 of Section 11 of Township 32N, Range 51W. The site is beside Old U.S. Highway 20, 1 mile north of U.S. Highway 20 and approximately 1.5 miles southwest of Whitney. Because the highway cuts diagonally across Section 11, the CGS would be five-sided. Access would be from Old U.S. Highway 20. This would require 120 feet of access road to allow an adequate setback from existing railroad tracks for satisfactory antenna performance.

Three-phase power would be obtained from overhead lines along the southern side of the road. Telephone service would be obtained from underground lines, also along the southern side of the road. An existing gas pipeline lying on the surface of the McCafferty property parallel to Old U.S. Highway 20 would be buried if necessary.

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

2.6 Alternative 5: Junge Site (CGS-12)

The Junge site is in the SW1/4 SW1/4 of Section 4 of Township 31N, Range 50W. It is 9 miles south of U.S. Highway 20 and approximately 15 miles southwest of Chadron, near a gravel section line road known as School Road. Site preparation would require removal of the remains of an old home site and some of the small elm trees that comprise the remains of an old shelterbelt. Access would be from School Road. Thirty-seven feet of access road would be required.

Three-phase power would be obtained from overhead lines along the northern side of School Road, and telephone service would be available from an underground line on the opposite side of School Road that terminates in the northeastern corner of Section 8.

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 northwestern Nebraska 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 northwestern Nebraska. 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 August 1989. U.S. Geological Survey 7.5 minute topographical maps were used as data sources for distances, physiographic features, and topography (USGS, 1970a and 1980b-i).

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 is a circular, 250-square-mile area in Dawes County, Nebraska, centered 3.4 miles northeast of the village of Whitney in the Central Lowlands physiographic province of the United States. The SSA, which occupies a portion of the White River Valley just below the South Dakota border, is a broad expanse of gently rolling, grassy uplands bisected from southwest to northeast by the White River. South of the river, at intervals of 1 to 5 miles, are northward-flowing mostly intermittent, creeks and riparian woodlands. North of the White River, the land is drained by somewhat more widely spaced streams that flow toward the southeast. The most conspicuous exception to this pattern of gently rolling grassland and riparian forest is the line of low but very rugged cliffs known as the Pine Ridge Escarpment. This extends along the southern and eastern edges of the SSA, represented in Figure 1.1 of this EA by the closely spaced contour lines at the bottom of the figure.

The rock formations underlying the SSA are flat-lying beds of sandstones, siltstones, and shales of Tertiary and Cretaceous age. These are often overlain by recent deposits of silts, sands, or gravels (King, 1977; Ragon *et al.* 1977).

No active faults are known to exist in the SSA (Howard *et al.*, 1978), but earthquakes have occurred nearby. In 1920, an earthquake of Modified Mercalli (MM) intensity III was centered 17 miles north of the SSA. During the 1930s, two earthquakes with MM intensities of IV and VI, strong enough to be felt by many, had epicenters within 4 miles of the SSA. In 1964, a cluster of eight events with MM intensities up to V were centered 38 miles north of the SSA, and one earthquake of MM intensity VII, strong enough to alarm all and to moderately damage well-built buildings, was centered 71 miles east of the SSA. An earthquake of MM intensity IV, centered 27 miles northwest of the SSA, occurred in 1975 (Reagor *et al.*, 1981a; Reagor *et al.*, 1981b; Stover *et al.*, 1986). These historical data indicate that an earthquake of MM intensity VII might occur in the SSA (Manitakos, 1989).

No significant mining or oil and gas production activities are currently conducted in the SSA. The SSA has several sand and gravel pits, and sandstone is mined south of Crawford (Burchett, 1987). Uranium mining is contemplated for areas near Crawford, a few miles west of the SSA. Bentonite, gypsum, lignite, halite, and anhydrite deposits are also present in the region, but they do not appear to be economically recoverable at this time (USFS, 1984). There is oil and gas leasing activity near Whitney (Sandford, 1989), and low-temperature geothermal fluids (140°F to 160°F) are thought to be present in Dawes County (Gosnold and Eversoll, 1982).

No known paleontological resources occur on any of the sites (Carlson, 1989).

Soils within the SSA are typically deep, well drained, and moderately alkaline with pH levels generally between 7.4 and 8.4. Loamy and silty soils derived from weathered sandstone occur on the steeper slopes just below the Pine Ridge Escarpment; silty soils derived from loess occur on the broad, gentle slopes between the escarpment and the floodplain of the White River; silty and sandy soils cover the floodplain; and clayey soils derived from weathered shales occur north of the White River. All these soils are deep, moderately well drained, and of low to medium natural fertility, suitable for either dryland or irrigated farming. They have some shrink-swell potential and are susceptible to frost action. They are easily eroded if left unvegetated. The West (CGS-4) and Junge (CGS-12) sites are entirely on soils classified as prime farmland (Bouc, 1990). Portions of the

Brecht (CGS-2), Rook (CGS-3) and McCafferty (CGS-8) sites contain prime farmland (Ragon *et al.*, 1977). None of the soils is hydric (SCS, 1987), and each has seasonally high water tables that are more than 10 feet beneath the soil surface (Ragon *et al.*, 1977). The specific soils on each CGS are discussed in Sections 3.2 to 3.6 of this EA.

Permanently flowing streams are clearly the exception rather than the rule. Most, perhaps all, of the streams in the SSA, including the White River, are intermittent in one or more areas downstream of their headwaters, although the USGS topographic maps and the Water Resource District's surveys differ in their designations of permanent and intermittent segments. There are no official maps of 100-year floodplains. The West (CGS-4) and McCafferty (CGS-8) sites are at the edges of the lowlands bordering the White River, the largest river in the SSA, and are more than 20 feet above and 0.4 mile from the river channel. The sites are therefore outside the areas at significant risk of flooding by the White River, a relatively small stream whose flow is intermittent in the vicinity of CGS-8 and within a mile of CGS-4 (Williams *et al.*, undated). Flooding risks at the other three sites (CGSs-2, -3, and -12) are also not significant. Although they are less than 20 feet above the White River, they are at least 4 miles from the river. The nearest streams to these sites are all small, intermittent creeks.

Lakes and ponds are uncommon in the SSA and vicinity, but those that do exist are concentrated in the western half of the SSA, south of Whitney Lake, a reservoir with a surface area of roughly 2 square miles. However, Chadron Reservoir, about 40 acres in area, is 0.5 mile east of the SSA. Details of the distances from each CGS to the nearest surface water or wetlands are given in Section 3.2 to 3.6 of this EA.

Drinking water quality within the SSA is good (Kromm and White, 1985).

Surface water quality is sufficiently high enough to support trout. The White River is designated a Warmwater Aquatic Life (Class A) stream with respect to fisheries, and a Coldwater Aquatic Life (Class B) stream with respect to recreation (Nebraska Department of Environmental Control, Title 117, Chapter 6, Section 004). These designations indicate that these waters could provide habitat for year-round populations of warm water plants and animals and could have a high potential for use in forms of recreation in which the

body does not come into prolonged or intimate contact with the water. The principal tributaries of the White River within the SSA (Dead Horse Creek, Chadron Creek, and both branches of Ash Creek) are protected for Class B use. These waters could provide habitat for year-round populations of some coldwater fish and support seasonal migration of trout, although they do not support natural reproduction of trout (NDEC, 1988). Suspended sediment loads in surface waters exceed 1,900 parts per million (ppm) and concentrations of dissolved solids are between 120 and 350 ppm. Both surface and groundwaters are hard, with calcium and magnesium carbonate concentrations greater than 240 ppm (Geraghty *et al.*, 1973).

The climate of the SSA is characterized by light precipitation, low humidity, hot summers and cold winters. The frost-free season typically extends from mid-May to late September, for a 140- to 150-day growing season. Most precipitation occurs during the warm season (April to September), and stream flows and risks of flooding are highest then. Warm season precipitation averages 14 inches, and the average annual total is 18 inches. Temperatures range from -31°F to 111°F, with a January average of 24°F and a July average of 76°F. Winds sufficient to damage trees, but not buildings, occur occasionally during summer thunderstorms. Hail heavy enough to damage crops may also occur during such storms (USDA, 1941). Several tornadoes typically occur each year in Nebraska, and the probability of a tornado in the SSA is one every 5 to 10 years (USGS, 1970b). Wind directions are variable throughout the year, but prevailing winds are from the south or southeast from May to September and from the north or northwest during the rest of the year (Ruffner and Bair, 1978).

Air quality in the area is good and meets the National Primary and Secondary Ambient Air Quality Standards, which have been adopted by the State of Nebraska (NDEC, 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

The vegetation of the SSA consists of a mosaic of grassland, riparian woodland, and open-canopy ponderosa pine forest. The grassland vegetation includes species characteristic of both short- and tall-grass prairies, including blue grama, buffalo grass, needle and

thread, little bluestem, western wheatgrass, and side-oats grama. The riparian woodlands have green ash, box elder, hackberry, willow, cottonwood, and elm in the canopy, and species such as chokecherry, wild rose, currant, snowberry, and poison ivy in the understory in areas that are not heavily grazed. The ponderosa pine forests are drier, have more open canopies, and only a discontinuous understory of low shrubs. Cultivated lands predominate south of the White River, and rangelands predominate north of the river. The croplands extend across the SSA in a band from just north of the White River to 8 or 9 miles south of the river (Remote Sensing Center, 1974).

The wildlife populations are fairly diverse. White-tailed deer, mule deer, and pronghorn antelope are the principal big-game species. The small-game species include cottontail and jack rabbits, foxes, turkeys, sharp-tailed grouse, and squirrels. Waterfowl occur in the SSA, primarily as migrants; the more common of these are Canada geese, mallard and redhead ducks, and the lesser scaup (USFS, 1970). These waterfowl use Whitney Lake, particularly during migration, and many Canada geese and mallards stop there. The waterfowl roost on the lake and feed in surrounding cropland and pastures until the lake freezes, usually in mid-December. Sandhill cranes are most often seen in the Whitney Lake area during fall migrations, when they sometimes roost in the lake's shallow water and, on rare occasions, feed on cropland within the SSA (Appendix C, McCue, 1989, pages C-4 to C-7 of this EA). The most common passerines in the area, based on observations at the Lacreek National Wildlife Refuge about 75 miles northeast of the SSA, are typical prairied species such as the horned lark, western meadowlark, western kingbird; and marsh and riparian woodland species such as the yellow warbler, red-winged blackbird, marsh wren, and yellow-headed blackbird. Similarly, the most common raptors are the northern harrier, great horned owl, red-tailed hawk, rough-legged hawk, and golden eagle (Jones, 1990). Golden eagle and prairie falcon nests have been sighted near each of the CGSs; however, none of the nests occurs within 3 miles of any CGS (Appendix C, McCue, 1989, pages C-8 to C-10 of this EA).

Wetlands within the SSA consist of riparian forests of cottonwoods and willows and possibly the fringes of the permanent water bodies. 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 determination. Based on field investigations (Holt, 1989) and soils data (Ragon *et al.*, 1977; SCS, 1987), none of the CGSs meets these three criteria, nor do areas within 300 feet of the CGSs.

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 obtained during informal consultation with the U.S. Fish and Wildlife Service (USFWS). Several species of concern may reside in or migrate through the SSA, but suitable breeding habitat is absent from the CGSs and no species of concern is expected to reside there. Federally listed species that may sometimes be present are the bald eagle (*Haliaeetus leucocephalus*), the peregrine falcon (*Falco peregrinus*), the whooping crane (*Grus americana*), and the black-footed ferret (*Mustela nigripes*) (Appendix C, Anschutz, 1992, pages C-15 to C-17 of this EA; Appendix C, McCue, 1989, 1992 pages C-4 to C-7, and C-14 of this EA).

Bald eagles are primarily spring and fall migrants through the SSA, although they occasionally migrate there in the winter. They use mature riparian timber near streams and lakes and may be attracted by the concentrations of waterfowl that occur on water bodies such as Whitney Lake (Appendix C, McCue, 1989, pages C-4 to C-7 of this EA).

Peregrine falcons may be found in western Nebraska as rare fall and winter migrants. They are generally associated with wetlands and open areas such as cropland and grassland. There is one record of a peregrine falcon nest in Nebraska; that nest was observed in Dawes County, 8 miles west of Fort Robinson, in August 1903 (Appendix C, McCue, 1989, pages C-4 to C-7 of this EA). The nearest CGS (West, CGS-4) is at least 14 miles from the nest sighting.

Whooping cranes rarely migrate through northwestern Nebraska, and no sightings have been confirmed in Dawes County (Appendix C, McCue, 1989, pages C-3 to C-6 of this EA). They use shallow, sparsely vegetated streams and wetlands with good horizontal visibility for roosting and feeding sites during migration. These types of habitats are

uncommon in the SSA, except possibly in the area surrounding Whitney Lake, which is 1.3 miles from the nearest CGS (McCafferty, CGS-8).

Because black-footed ferrets are dependent on prairie dogs, the Nebraska Game and Parks Commission considers all prairie dog towns to be potential habitats for the ferret. A probable sighting of a black-footed ferret in Dawes County, 7 miles west of Chadron, was reported on July 20, 1979 (Lock, 1989), but no prairie dog towns are present at any of the CGSs.

According to the latest list, the 13 candidates for federal listing include the ferruginous hawk (*Buteo regalis*), the northern goshawk (*Accipiter gentilis*), the mountain plover (*Charadrius montanus*), the loggerhead shrike (*Lanius ludovicianus*), the black tern (*Chlidonias niger*), the Harlequin duck (*Histrionicus histrionicus*), the swift fox (*vulpes velox*), the plains spotted skunk (*Spilogale putorius interruptus*), the fringed-tailed myotis (*Myotis thysanodes pahasapensis*), the yellow mud turtle (*Kinosternon flavescens flavescens*), Blanding's turtle (*Emydoides blandingii*), Beltragi's chlorocroan bug (*chlorochroa beltragi*), and a milk vetch (*Astragalus barrii*) (Appendix C, Auschutz, 1992, pages C-15 to C-17 of this EA).

The ferruginous hawk is a species of semi-arid lands, primarily semi-arid grasslands. The hawk specializes in hunting rodents and rabbits, only occasionally taking birds or reptiles. Its preferred nesting sites are junipers at the interface of pinyon-juniper and desert shrub communities. Its hunting patterns vary but emphasize short or low flights. Its usual hunting pattern involves low flights over open ground in which the bird flaps its wings several times and then glides, although it occasionally hunts by hovering and on rare occasions by soaring (Herron *et al.*, 1985). It also forages from perches or from flight altitudes up to 100 meters above the ground (Johnsgard, 1990). Breeding habitat is absent from the CGSs, all of which lack the juniper habitat and are covered with short-grass prairie or have been cultivated. However, the hawk could forage on the CGSs.

Although the wintering range of the northern goshawk lies within the SSA, its breeding range lies outside SSA boundaries. The northern goshawk has highly variable breeding requirements but exhibits a preference for older, denser stands of conifers that are

imbedded in areas of younger conifer growth. Typically it nests near a water source and forages by short, fast searching flights or by perch-and-watch techniques. Foraging activity is highest in woodlands or at woodland fringes, suggesting this is a species adapted to use of forest edges rather than the open prairies found on the CGSs. Prey consists of moderate to large birds and mammals (Johnsgard, 1990). The CGSs lie outside the breeding range of the goshawk and do not contain the preferred foraging habitat of forests or forest edges.

The mountain plover is a gregarious species of dry fields, plains, prairies, and grassy deserts. Its nests are typically on flat ground between grass hummocks but will occasionally be found among cacti or scattered shrubs. Often located near old cow droppings, the nests are lined with cow chips, rootlets, and grasses. Insects are the principal prey of this species, which forages by gleaning. It relies on cryptic coloration and motionlessness rather than flight for protection (Ehrlich *et al.*, 1988; Ransom, 1981). Plover habitat is present on all of the unplowed CGSs and is potentially present on the other CGSs.

The loggerhead shrike is found throughout the United States in a variety of habitats, primarily open country with sparse vegetation of low shrubs and herbs. It prefers areas with nearby perching sites such as fences, woody vegetation, or hedgerows. It forages for insects, small mammals, and small birds using short, straight flight from these perches (Ehrlich *et al.*, 1988; Ransom, 1981). Shrikes nest near water in broad-leaved trees and shrubs, generally 3 to 30 feet high. Breeding pairs occupy areas of 13 to 40 acres although solitary birds probably defend somewhat smaller territories (Ehrlich *et al.*, 1988; Jaeger, 1961). The shrike forages in northern California and adjacent areas from March through October and overwinters in the southern United States and areas further south. It breeds in April, May, and June (Thomas, 1979). The shrike could forage on the CGSs, but the absence of trees, shrubs, and other perching sites make the CGSs relatively low quality habitat. Shrike breeding habitat is absent from the CGSs.

The black tern is an insectivorous species that nests in marshes, sloughs, and wet meadows. It forages in open meadows, marshes, and freshly plowed fields, frequently

following the plow (Ehrlich *et al.*, 1988). Although the black tern might forage on the CGSs, particularly the two plowed CGSs, nesting habitat is absent.

The Harlequin duck is a species associated with fast-flowing streams, usually those draining lakes. It feeds on crustaceans, mollusks, aquatic insects, and occasionally fish, and nests under shrubs within 90 feet of such streams (Ehrlich *et al.*, 1988). This habitat is absent from the CGSs.

The swift fox, which is also a state-listed species, is a nocturnally active species that occurs in short-grass prairie habitat in western Nebraska. It typically uses dens excavated in relatively flat ground away from human activity. Presence of the dens is the best indicator of the foxes' presence (Lock, 1989). However, no structures resembling the multiple-entrance dens of the swift fox were seen at any of the CGSs during the field investigation in August 1989.

The plains spotted skunk is a subspecies of the smallest of the North American skunks, the eastern spotted skunk. It is a nocturnal animal that moves freely among dens and will move from farm to farm if harassed by a farmer's dogs. It will den in almost any location from piles of hay to burrows, buildings, and rock crevices but seems to require safe accessibility to foraging grounds, usually along a fence row or other cover. It feeds on beetles, worms, carrion, rodents, rabbits, eggs, frogs, lizards, and fruit (Chapman and Feldhamer, 1982; Schwartz and Schwartz, 1981). Skunk habitat could exist on all the CGSs, although fence rows on the sites are lacking.

Very little is known of the natural history of the fringed-tailed myotis. It is a highly colonial species that prefers to roost in caves, mines, rock crevices, and buildings (Maser *et al.*, 1981; Burt and Grossenheider, 1976). Its habitat is absent from the CGSs.

The yellow mud turtle is a highly aquatic turtle of semi-arid grasslands and open woodlands. It frequents both permanent and intermittent streams with mud bottoms (Stebbins, 1966). This habitat is absent from the CGSs. The CGSs are at least 400 feet from the nearest stream.

Blanding's turtle is primarily aquatic but frequently comes ashore to feed or bask (Behler and King, 1979). However, it rarely ventures from wet, marshy areas where it prowls the undergrowth, feeding on shoots, berries, and insect larvae (Ditmars, 1936). Wetlands habitat is absent from the CGSs.

Belfragi's chlorocroan bug is a stinkbug of the Tribe Pentatomini, a generally plant-eating group, many of which feed on grasses (McPherson, 1982). Habitat for this bug is present on all of the CGSs.

The candidate milk vetch is a species of dry, rocky prairie knolls, hillsides, and barren areas. It is known to occur in several states but seems to have rather limited distribution within those states (GPFA, 1986). As hilly and rocky sites were avoided during the site selection process, habitat for this species does not occur on the CGSs.

No threatened or endangered plant species were identified by either the USFWS or the Nebraska Game and Parks Commission as known to occur or to have the potential for occurring in the SSA (Lock, 1989; Appendix C, McCue, 1989, pages C-4 to C-7 of this EA). The lack of known or probable occurrences of such species in the areas under consideration was also confirmed with a local expert (Weedon, 1989).

Except for the swift fox, discussed above, no state-listed species occur in the project area (Lock, 1989).

There are no designated natural areas, such as tracts of undisturbed prairie or wildlife refuges, in the SSA (USGS, 1970a; USGS 1980b-i).

3.1.3 Socio-Cultural Setting

Human occupation of western Nebraska and surrounding areas began 10,000 to 12,000 years ago, although few substantial archaeological assemblages from this period have been discovered in this region. The subsequent period is also poorly represented in western Nebraska, possibly because of a reduction in the use of the High Plains between

3,000 to 7,000 years ago during a dry climatic period (Jepson, 1989). Late prehistoric (400 to 1,800 years ago) and historic occupation of the region by nomadic groups is much better documented, particularly along the major watercourses. During historic times, the area was occupied by the Sioux which consisted of at least seven sub-bands. A historic period Dakota (Sioux) group may have used the SSA or its immediate vicinity for a ritual sun dance, although this report has not been substantiated. Other historic period peoples known to have briefly occupied or passed through the SSA and adjacent lands include the Cheyenne, Apache, Arapaho, Arikara, and Pawnee. All of these tribes were removed to reservations in the late 1800s. The Sioux were removed to the Pine Ridge Reservation, 12 miles north of the SSA (Jepson, 1989).

Early historic period Anglo-American use of the general area is also well documented, but no archaeological evidence of use has been found in the SSA itself. Direct physical evidence of historic occupation and use generally postdates 1860, although earlier military and fur trading activities, as well as emigrant trails and associated sites, are known in the area. With the exception of Fort Robinson, 9 miles west of the SSA, the great majority of known historic period sites for the region are homesteads of the post-1880 period (Jepson, 1989).

No prior archaeological surveys had been conducted in the immediate vicinity of the CGSs and few archaeological resources had been found in the immediate area (Jepson, 1989). The Nebraska State Historic Preservation Officer (SHPO) was consulted, as required by the National Historic Preservation Act (16 USC 470, *et seq.*). The Nebraska SHPO recommended that, based on survey information from other portions of the county, an archaeological survey be conducted at the West (CGS-4), McCafferty (CGS-8), and Junge (CGS-12) sites. No surveys were required at the Brecht (CGS-2) and Rook (CGS-3) sites (Appendix C, Steinacher/Murphy, 1989, page C-12 of this EA).

A Phase I archaeological survey was conducted in December 1989 on three sites (West, CGS-4; McCafferty, CGS-8; Junge, CGS-12). Each site was surveyed by a professional archaeologist qualified in the State of Nebraska, using systematic zig-zag transect coverage of each site. No prehistoric archaeological sites or isolated artifacts that were eligible for the National Register of Historic Places (NRHP) were found. A archaeological

site (25DW38) was found at the Junge site (CGS-12), but was deemed ineligible for listing on the NRHP (Jepson, 1989). The Nebraska SHPO concurred with this determination (Appendix C, Steinacher/Puschendorf, 1990, page C-13 of this EA).

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 literature search revealed that no known historic properties occur in the sections containing CGSs or in the adjacent sections (Jepson, 1989). No properties listed on the NRHP are found within the SSA, but several listed properties are located on the Chadron State College campus immediately east of the SSA. The Nebraska SHPO concluded that no historic properties would be affected by the project (Appendix C, Steinacher/Puschendorf, 1990, page C-13 of this EA).

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. According to the BIA, the Sioux are the only federally recognized tribe living in Nebraska today, but the Pawnee tribe historically occupied the area (Sutherland, 1992). Based on BIA recommendations, the Oglala Sioux Tribal Council, Rosebud Sioux Tribal Council, Santee Sioux Tribal Council, and Pawnee Business Council were notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites located within the SSA. A representative of the Oglala Sioux responded that the tribe has no concerns with the GWEN project in northwestern Nebraska (Mousseau, 1989). A representative of the Pawnee Business Council stated that the tribe wishes to be notified if any human remains are found; the tribe has no other concerns (Chapman, 1993). No response has been received from the Rosebud Sioux or Santee Sioux tribes to letters or to numerous attempts at phone communication.

Land use in the area is predominantly agricultural. Livestock ranching dominates, although winter wheat, alfalfa, and oats are grown (Ragon *et al.*, 1977). About 4 percent of the SSA is in the Nebraska National Forest; no part of the SSA is in the Oglala National Grassland, which is 0.5 mile west of the SSA. All of the CGSs are located within unzoned areas (Brown, 1989).

The transportation network consists of two federal highways and a grid of mostly gravel roads that divides the area into 1-mile-square sections. The main east-west road is U.S. Highway 20, a two-lane paved road. The main north-south road is U.S. Highway 385, also a two-lane paved road which crosses the easternmost portion of the SSA. Segments of an old alignment of U.S. Highway 20 (Old U.S. Highway 20) parallel the White River and are still in use. Air transportation is available at the Chadron Municipal Airport.

Sources of ambient noise are limited primarily to the operation of farm equipment and to 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, Dawes County does not have a local noise ordinance (Mikesell, 1991).

The population of the SSA resides primarily in the Whitney precinct of Dawes County, which had a population of 285 people and a median age of 35.9 years in 1980 (Census Bureau, 1982). The county's population has declined slightly in recent years, but population projections through the year 2020 show essentially no change (NDED, 1987). The population declined by 0.9 percent between 1970 and 1980 (Census Bureau, 1982) and by 1.1 percent between 1980 and 1984 (Rand McNally, 1990).

The economy is agriculturally based although 77 percent of the labor force is in the nonfarm wage and salary employment category, primarily in retail and wholesale trade. Personal income in 1984 was \$10,347 per capita; the unemployment rate was 3.3 percent in 1985 (NDED, 1987).

The area is rural in character. The largest settlement wholly within the SSA is Whitney, with a population of less than 300 people. Outside the SSA's communities, the density of residences is low, less than one house per square mile.

Recreational resources within the SSA are primarily confined to private lands and Lake Whitney, but more extensive recreational resources are available in Chadron State Park and the Nebraska National Forest, just south of the SSA. The Oglala National Grasslands

lie just to the northwest of the SSA, but these lands are managed primarily as grazing, not recreational, lands (USFS, 1984). Small game hunting is the most probable recreational use of lands considered for CGSs.

Visual resources are consistent with the area's rural character and level topography. Apart from the Pine Ridge Escarpment, a particularly rugged line of low cliffs immediately south of the SSA, the primary vertical elements are farm buildings, power lines, windbreaks composed of trees, and riparian forests. Patterns tend to be simple geometrical shapes, and the complexity of the skyline is generally low, as defined in Section 4.8.1.3, page 4.8-10 of the FEIS, except for views that include towns.

3.2 Alternative 1: Brecht Site (CGS-2)

The Brecht site is a flat tract that slopes gently to the northeast. The soils on 95 percent of the site are Keota-Epping silt loam which is not prime farmland (Ragon *et al.*, 1977; Ragon, 1990), but the remaining 5 percent, Keota and Kadota silt loams, is classified as prime farmland (Bouc, 1990). These soils are moderately alkaline (pH 7.9 to 8.4). Bedded siltstone, the local bedrock, is at depths of 20 to 40 inches (Ragon *et al.*, 1977). Permeability is moderately slow to moderate, and fertility is medium to low.

The nearest surface water is a small pond 1,400 feet southeast of the site. Chadron Reservoir, a pair of ponds totaling approximately 40 acres in size, is 4.7 miles southeast of the site; Dead Horse Creek, an intermittent stream, is 1.2 miles west; and the White River, also intermittent in the SSA, is 3.8 miles northwest. The site is remote from large water bodies suitable for migratory waterfowl.

The vegetation on the site is short-grass prairie, a major portion of which had recently been burned at the time of the field investigation.

The site is isolated. The nearest residential community is Chadron, more than 5 miles northeast of the site. Chadron State Park is 4.7 miles to the southeast. The boundary of the Nebraska National Forest is 1.3 miles southeast, but the federally owned lands within the National Forest are 2.4 miles southeast (USFS, undated).

3.3 Alternative 2: Rook Site (CGS-3)

The Rook site is a flat tract. The principal surface feature is a shallow swale in the western portion of the site. The soils on 86 percent of the site are Keota-Epping, which is not classified as prime farmland (Ragon *et al.*, 1977; Ragon, 1990); the remaining 14 percent are either Keota silt loam or Kadota silt loam, both of which are classified as prime farmland (Bouc, 1990). The depth of the siltstone bedrock is 20 to 40 inches on the Keota silt loam and 40 to 60 inches on the Kadota silt loam. The soils range from mildly to moderately alkaline (pH 7.4 to 8.4), but generally are moderately alkaline (pH 7.9 to 8.4) (Ragon *et al.*, 1977).

The nearest surface water is a small pond 1,400 feet east of the site. Chadron Reservoir is 4.6 miles northeast; Dead Horse Creek is 1.0 mile west.

Vegetation is short-grass prairie except in the shallow swale which contains a clump of low shrubs.

The site is isolated. The nearest residential community is Chadron, more than 5 miles northeast of the site. The boundary of the Nebraska National Forest is 1.3 miles southeast, but the federally owned lands within the National Forest are 2.4 miles southeast (USFS, undated).

3.4 Alternative 3: West Site (CGS-4)

The West site is a level tract. The soils on the site are derived from alluvium, colluvium, and eolian sands, and they are deep and well drained. Most are in the Vetol and Bayard series, but some Jayem loamy very fine sands and a small area of Bufton silty clay loam are present. Vetol and Bayard series soils are classified as prime farmland (Bouc, 1990). The soils are mildly to strongly alkaline (pH 7.4 to 9.0) and have medium fertility. Much of the area has soils that are mildly alkaline (pH 7.4 to 7.8) in the upper 15 inches, and moderately alkaline (pH 8.4) in the 15- to 60-inch depth interval (Ragon *et al.*, 1977).

The nearest surface water is an intermittent tributary of the White River, 1,200 feet northwest of the site. The site is roughly centered in a 4-mile-diameter cluster of stock ponds. Whitney Lake is 3 miles north, the nearest permanent pond is 1.3 miles northwest, and the nearest large seasonal pond is 1.0 mile northwest.

The vegetation is short-grass prairie. The nearest woodlands capable of providing cover for deer are the riparian woodlands along the White River 0.2 mile north of the site.

The site does not have exceptional features that would attract wildlife, but migratory birds may pass repeatedly over the site during migration because the site lies between Whitney Lake, which is 3 miles north, and possible feeding areas in grain fields to the south.

The site is beside Old U.S. Highway 20 and 1 mile north of new U.S. Highway 20, the region's main east-west route, and 4.3 miles southeast of the Oglala National Grassland. The nearest residential community is Whitney, 4.4 miles northeast of the site. The Nebraska National Forest is 5 miles south of the site.

3.5 Alternative 4: McCafferty Site (CGS-8)

The McCafferty site is a flat tract. The soils on the site are Keith and Ulysses silt loams except for a narrow strip of Bufton silty clay loam beside Old U.S. Highway 20. The Keith and Ulysses soils are deep, well-drained upland soils formed from loess, and cover 82 percent of the site. The parent material is calcareous, and the permeability and natural fertility are medium. These soils are classified as prime farmland. The Bufton soils, although they are also deep and well drained, are not classified as prime farmland (Bouc, 1990). Permeability is slow to moderately slow, and natural fertility is low. The soils are mildly alkaline (pH 7.4 to 7.8) (Ragon *et al.*, 1977).

The nearest surface water is an intermittent tributary of the White River, 400 feet west of the site. Few lakes and stock ponds are near this site. The site is 1.3 miles south of the nearest portion of Whitney Lake and 1.9 miles northwest of Snus Lake, the second largest

lake in the SSA (about 80 acres). Several small ponds, less than 10 acres in size, but in line with the proposed tower site and Whitney Lake, are 2.4 to 4.3 miles southeast.

The vegetation in the immediate vicinity of the site is short-grass prairie, and riparian woodlands along the White River are 0.5 mile to the north. The site itself is cultivated and was freshly plowed during field investigations in August 1989.

The site does not have exceptional features that would attract wildlife, but migratory birds may pass repeatedly over the site during migration because the site lies between Whitney Lake to the northwest and possible feeding areas in grain fields to the south.

The nearest residential community is Whitney, 1.5 miles northeast of the site. The Oglala National Grassland is 4.7 miles to the northwest outside of the SSA. The Nebraska National Forest is 6.7 miles to the south of the site, on the edge of the SSA.

3.6 Alternative 5: Junge Site (CGS-12)

The Junge site is in gently rolling terrain. The soils on the site are Keith and Ulysses silt loams, except for small amounts of Bridget silt loams that occur at the southern edge of the site. The pH values of Bridget silt loam range from neutral to moderately alkaline (pH 6.6 to 8.4) depending on the depth within the soil. The Keith and Ulysses silt loams are generally mildly alkaline (pH 7.4 to 7.8), although values in the lower portions of the Keith silt loams may reach moderate alkalinity (pH 8.4) (Ragon *et al.*, 1977). Both Keith and Ulysses silt loams and Bridget silt loams are classified as prime farmland (Bouc, 1990).

The nearest surface water is an unnamed intermittent stream 700 feet northwest of the site. The nearest perennial stream is East Ash Creek, 0.4 mile west. A 9-acre pond is located 1.5 miles northeast.

The vegetation on the site consists of native grassland communities. Hayfields and cultivated fields predominate in the adjacent areas.

The site was freshly plowed when it was observed in August 1989, except for a shelterbelt of small elm trees approximately 33 feet wide by 330 feet long, an old house site, and the residue of a crop of straw, all on the eastern half. The house site consists of the remnants of a concrete foundation, a well, assorted wood stove and gas range parts, and fragments of glass and porcelain. However, the site retains no structural integrity and is not unique for the area (Jepson, 1989).

The site is isolated from major roads and settlements. The nearest residential community is Whitney, 7 miles northwest of the site. The boundary of the Nebraska National Forest is 1.4 miles to the southeast, but the federally owned lands within the National Forest are more than 1.5 miles southeast (USFS, undated).

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 northwestern Nebraska. Several impacts common to all of the action alternatives are discussed in Section 4.1 of this EA. There would be no significant impacts to any of the sites, as indicated in Sections 4.2 through 4.6 of this EA.

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. Installation of utility lines and construction of the off-site access road would have no significant impacts because they would cover less than 1,550 square feet (0.04 acre) of land along the previously graded public highway right-of-way. At those sites where utilities would have to be brought across a road, the lines would be buried or would be brought overhead at the utility company's discretion, in conformance with local practice. Neither method would have a significant impact on visual resources or public safety. The Junge site (CGS-12) would require minor site preparation because portions of the existing shelterbelt and the remains of the old home site would have to be removed. This would not cause any significant impacts.

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 it

would not significantly disturb the existing vegetation or create a significant erosion hazard.

Impacts on **mineral resources** would be minor, as indicated in Section 4.1.1.4, page 4.1-2 of the FEIS. No significant mining or oil and gas production activities are currently conducted in the SSA (Burchett, 1987). If any resources are present under a 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 no significant paleontological resources are known to occur on any CGS (Carlson, 1989). However, if any fossils are found during construction, work that might affect them will be suspended while the Nebraska State Geologist 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 less than 8 percent, so any required grading to level the site would be minimal. In addition, standard measures for erosion control would be used during and after site construction, including replanting the site.

There are no official maps of **100-year floodplains**. The West (CGS-4) and McCafferty (CGS-8) sites are at the edges of the lowlands bordering the White River, the largest river in the SSA, and are more than 20 feet above and 0.4 mile from the river channel. The sites are therefore outside the areas at significant risk of flooding by the White River, a relatively small stream whose flow is intermittent in the vicinity of CGS-8 and within a mile of CGS-4 (Williams *et al.*, undated). Flooding risks at the other three sites (CGSs -2, -3, and -12) are also not significant. Although they are less than 20 feet above the White River, they are at least 4 miles from the river. The nearest streams to the sites are all small, intermittent creeks.

A maximum of 11 acres of **prime farmland** would be removed from production for the duration of the project. However, impacts of GWEN development on agricultural land would not be significant, as discussed in Section 4.1.1.3, page 4.1-2 of the FEIS.

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 micrograms per liter ($\mu\text{g/l}$). 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) and the State of Nebraska's standard for groundwater (Nebraska Department of Environmental Control, Title 118, Chapter 4, Section 002). 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. Such impacts are not expected at any of the CGSs. There is no surface water within 300 feet of the ground plane, the soils are alkaline, and none is characterized by a high water table. Under these conditions, the maximum increase in copper concentrations would be insignificant, as discussed in Section 4.2.1.1, page 4.2-3 of the FEIS.

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 Nebraska (NDEC, 1989).

4.1.2 Biological

Impacts on other **wetlands and other wildlife habitats** would not be significant. Each CGS is farmland, is at least a mile from extensive areas of permanent surface water, and is at least 0.2 mile from riparian forests or other SSA woodlands. None of the CGSs contains wetlands or is within 300 feet of wetlands, so no impacts on wetlands are anticipated. The 4-foot-high fence will not exclude deer but might impede the movement of antelope. All small game would move freely through or under the 4-foot-high fence. All but the smallest mammals would be excluded by the 8-foot-high fence. However, the area of habitat lost would not be significant.

Bird collisions with the tower or its guy wires may occur but are not expected to be significant. Section 4.4.1.5, beginning on page 4.4-5 of the FEIS states that the majority of 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 majority of collisions occur with towers greater than 300 feet in height, as noted in Section 4.4.1.5, page 4.4-5 of the FEIS. Areas with high concentrations of bird flight activity, feeding and nesting habitats, known migration corridors, raptor roosting areas, and prominent topographical features such as high ridges and waterways that could concentrate avian flight lanes were avoided. None of the CGSs is in constricted flight corridors where the potential for bird collisions would be high. Impacts on passerines therefore are not expected to be significant.

Impacts on raptors from bird collisions are also not expected to be significant, for the same reasons outlined for passerines, and, because of the rarity of collision of these agile flyers with towers, as noted in Section 4.4.1.5, page 4.4-5 of the FEIS. The tower would also not provide any attractive nesting or roosting sites for hawks and other large birds because the top of the tower is occupied by a strobe light in a housing with a pointed roof.

Impacts to waterbirds are not expected to be significant because the sites are set back at least 1.3 miles from Whitney Lake, the major lake in the region. However, the potential for impacts to waterbirds, which migrate at night when visibility is reduced, is probably higher

than the potential for impacts to passerines or raptors. The SSA lies within a broad zone of exceptionally heavy duck migration (Bellrose, 1980). However, the tower would be set back 1.3 mile from Whitney Lake and at least 1 mile from other large bodies of water which form attractive resting areas for migrants and potential feeding and nesting areas for resident waterfowl. Moreover, the cultivated fields in which migratory birds might forage extend east and west along the White River for at least 10 miles on either side of the CGSs (Remote Sensing Center, 1974), creating a widespread feeding area rather than a concentrated patch. Therefore, waterbirds are likely to be widely dispersed when feeding, and large numbers of foraging birds are unlikely to pass repeatedly over the site. The area also has no topographic features that would tend to channel bird flight paths over the CGSs.

No federally listed **threatened or endangered species** or candidates for listing would be adversely affected. 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, McCue, 1991, page C-11 of this EA). The federally listed and candidate species most likely to occur at any of the sites are birds that are resident in or migrating through the SSA, primarily raptors and passerines.

Raptors are not at significant risk of collision because they are agile, daytime flyers noted for their visual acuity. Although raptor nests occur within 3 miles of the CGSs (Appendix C, McCue, 1989, pages C-8 to C-10 of this EA), each CGS is at least 1.5 miles from the Pine Ridge Escarpment, whose cliffs and trees comprise the best raptor nesting habitat (Ehrlich *et al.*, 1988). This setback is expected to be adequate to prevent injury, as noted in Section 4.4.4.5, page 4.4-11 of the FEIS. In addition, few reports exist of injury to raptors resulting from radio towers, as noted in Section 4.4.1.5, page 4.4-5, of the FEIS.

No impacts are expected on the whooping crane, whose migratory paths lie mainly to the east of the SSA. There have been no confirmed sightings of a whooping crane in Dawes County (Appendix C, McCue, 1989, pages C-4 to C-7 of this EA).

Prairie dog towns, the habitat for the remaining federally listed species, the black-footed ferret, are absent from the CGSs, and thus no impact on the black-footed ferret is expected.

No candidates for federal listing would be affected. No significant impacts are expected on the ferruginous hawk. The pinyon-juniper forest breeding habitat for the hawk is absent from the CGSs, all of which are short-grass prairie or cultivated fields. The Pine Ridge Escarpment, the best nesting habitat for hawks, is at least 1.5 miles from the nearest CGS. A windbreak of small elms exists on CGS-12, but this is not prime habitat for the hawk. It is possible that non-breeding individuals may forage in the area on a seasonal basis, and they could collide with a GWEN tower or its associated wires. But given the brevity of the typical foraging flight and the use of perches, the probability is low that a foraging ferruginous hawk would be involved in prolonged pursuit of prey that might prevent detection of the tower and its wires in time to take evasive action. Thus, the tower is not expected to significantly impact either nesting or foraging activities.

The forest habitats preferred for breeding and foraging by the northern goshawk are absent from the CGSs. The nearest trees are in limited riparian habitat along the White River, at least 0.2 mile from the nearest CGS. The northern goshawk is therefore unlikely to occur at any of the CGSs, even as a transient.

No significant impacts are expected on the mountain plover or its habitat. The native vegetation will be retained on the GWEN site, if present, or if a site is selected that is cultivated, it will be planted to grass. Therefore, the habitat quality with respect to this species would remain substantially unchanged. The risk of collision of these birds with the guy wires would be low given their ground-based foraging patterns.

No significant impacts are expected on the loggerhead shrike. Shrikes nest in trees and shrubs near water and no streams or ponds lie on or within 300 feet of the CGSs. The shrike could forage near the CGSs, which are cultivated or covered with short-grass prairie. However, given the foraging behavior of the shrike, which consists of short, straight flights from nearby perches, the probability of a shrike colliding with a guy wire is low, so the tower would not pose a significant hazard to the foraging shrike.

No significant impacts are expected on the black tern. Breeding and foraging habitat for this species are wet meadows and marshes, habitats absent from the CGSs.

No significant impacts are expected on the Harlequin duck. It is associated with fast-flowing streams, and the CGSs are at least 400 feet from streams.

No significant impacts are expected on the swift fox. Dens are the best indicator of the foxes' presence, and no structures resembling the multiple-entrance dens of the swift fox were seen at any of the CGSs during the field investigation in August 1989.

No significant impacts are expected on the plains spotted skunk. The skunk feeds on a variety of prey and will den in almost any location from piles of hay to burrows, buildings, and rock crevices; it prefers to forage in areas that provide some cover, such as along fence rows. Construction of the tower will not modify any fence rows and will either leave the native vegetation essentially intact or will plant the plowed fields to grass. Because the project will not adversely affect the skunk's habitat and because the skunk appears to adapt well to human structures, no adverse effects to this species or its habitat are expected.

No impacts are expected on the fringed-tailed myotis because the CGSs are located on flat to gently sloping lands that are free of rock outcrops that contain the cave and fissure roosting habitats required for this species. In addition, if the bat were near the site, it would be unlikely to collide with a wire because of its superb echolocation abilities.

No significant impacts are expected on the yellow mud turtle or on Blanding's turtle. Both species are aquatic and require either streams or wet marshy areas, habitats absent from the CGSs.

No significant impacts are expected on Belfragi's chlorocroan bug, a stinkbug that feeds on plants and grasses. Because each of the CGSs is covered with short-grass prairie typical of the region or has been plowed, there is no reason to expect the available habitat at these sites to differ from that of the surrounding landscape. Construction of the tower will leave the native vegetation essentially intact and any plowed fields will be planted to grass, so no impacts are expected to the bug or its habitat.

No significant impacts are expected on the candidate milk vetch. Its habitat is dry-rocky prairie knolls, hillsides, or barren areas, and all the CGSs are either short-grass prairie or plowed fields.

The Nebraska Game and Parks Commission stated that the swift fox was the only state-listed species potentially occurring in the SSA. Consequently no impacts are expected on state-listed species.

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. Dawes County is not zoned (Brown, 1989). All sites would comply with Dawes County land use codes and road access requirements. 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 back-up 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 Dawes County has no noise ordinance (Mikesell, 1991), 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.

Impacts on **archaeological resources** would not be significant. No known archaeological resources that are listed or eligible for listing on the NRHP occur on or near the sites (NRHP, 1989). The Nebraska SHPO did not require that surveys be conducted at the Brecht (CGS-2) or Rook (CGS-3) sites but did request that surveys be conducted at the West (CGS-4), McCafferty (CGS-8), and Junge (CGS-12) sites. The survey revealed no archaeological resources eligible for listing on the NRHP on any of the sites surveyed.

The Nebraska SHPO concurs that no archaeological resources would be affected by the proposed action (Appendix C, Steinacher/Puschendorf, 1990, page C-13 of this EA). However, if any archaeological resources are found during construction, work that might affect them will be suspended while the Nebraska SHPO and the Office of the State Archaeologist are notified in accordance with the provisions of 16 USC 470, *et seq.*, at 470f.

Impacts on **historic properties** would not be significant. No known historic buildings listed or eligible for listing on the NRHP occur on or near the sites (NRHP, 1989). Moreover, all properties listed or eligible for listing on the NRHP are at least 5 miles from any CGS. The Nebraska SHPO did not require that surveys be conducted at the Brecht (CGS-2) or Rook (CGS-3) sites but did request that surveys be conducted at the West (CGS-4), McCafferty (CGS-8), and Junge (CGS-12) sites. The survey revealed no properties potentially eligible for the NRHP near the CGSs. The Nebraska SHPO concurs that no historic properties will be affected by the proposed action (Appendix C, Steinacher/Puschendorf, 1990, page C-13 of this EA).

Significant impacts to **Native American traditional, religious, or sacred sites** are not anticipated. At the recommendation of the BIA, the Oglala Sioux, Rosebud Sioux, Santee Sioux, and Pawnee tribes were notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites within the SSA. A representative of the Oglala Sioux responded that the tribe has no concerns with the GWEN project in northwestern Nebraska (Mousseau, 1989). A representative of the Pawnee Business Council stated that the tribe wishes to be notified if any human remains are found; the tribe has no other concerns (Chapman, 1993). No response has been received from the Rosebud Sioux or Santee Sioux tribes to letters or to numerous attempts at phone communication.

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, beginning

on 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 primary access to these sites. Examples of areas having medium visual sensitivity would be locally popular, but undesignated, beaches and 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 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.

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: Brecht Site (CGS-2)

No significant impacts are expected.

Visual impacts would not be significant because there are no medium or high sensitivity views within 1.5 miles of the site. Although the boundary of the Nebraska National Forest is only 1.3 miles from the site, the federally owned, publicly accessible and visually sensitive portions of the forest are more than 1.5 miles from the site.

4.3 Alternative 2: Rook Site (CGS-3)

No significant impacts are expected.

Visual impacts would not be significant because there are no medium or high sensitivity views within 1.5 miles of the site. Although the boundary of the Nebraska National Forest is only 1.3 miles from the site, the federally owned, publicly accessible and visually sensitive portions of the forest are more than 1.5 miles from the site.

4.4 Alternative 3: West Site (CGS-4)

No significant impacts are expected.

Visual impacts would not be significant because there are no medium or high sensitivity views within 1.5 miles of the site.

4.5 Alternative 4: McCafferty Site (CGS-8)

No significant impacts are expected.

Visual impacts would not be significant. A small portion of the corporate boundary of the village of Whitney is within 1.5 miles of the tower, but that portion of Whitney is within the riparian forest along the White River and contains no homes. The closest house in Whitney is 2.0 miles northeast of the site.

4.6 Alternative 5: Junge Site (CGS-12)

No significant impacts are expected.

Visual impacts would not be significant because there are no medium or high sensitivity views within 1.5 miles of the site. Although the boundary of the Nebraska National Forest is only 1.4 miles from the site, the federally owned, publicly accessible and visually sensitive portions of the forest are more than 1.5 miles from the site.

4.7 No Action Alternative

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

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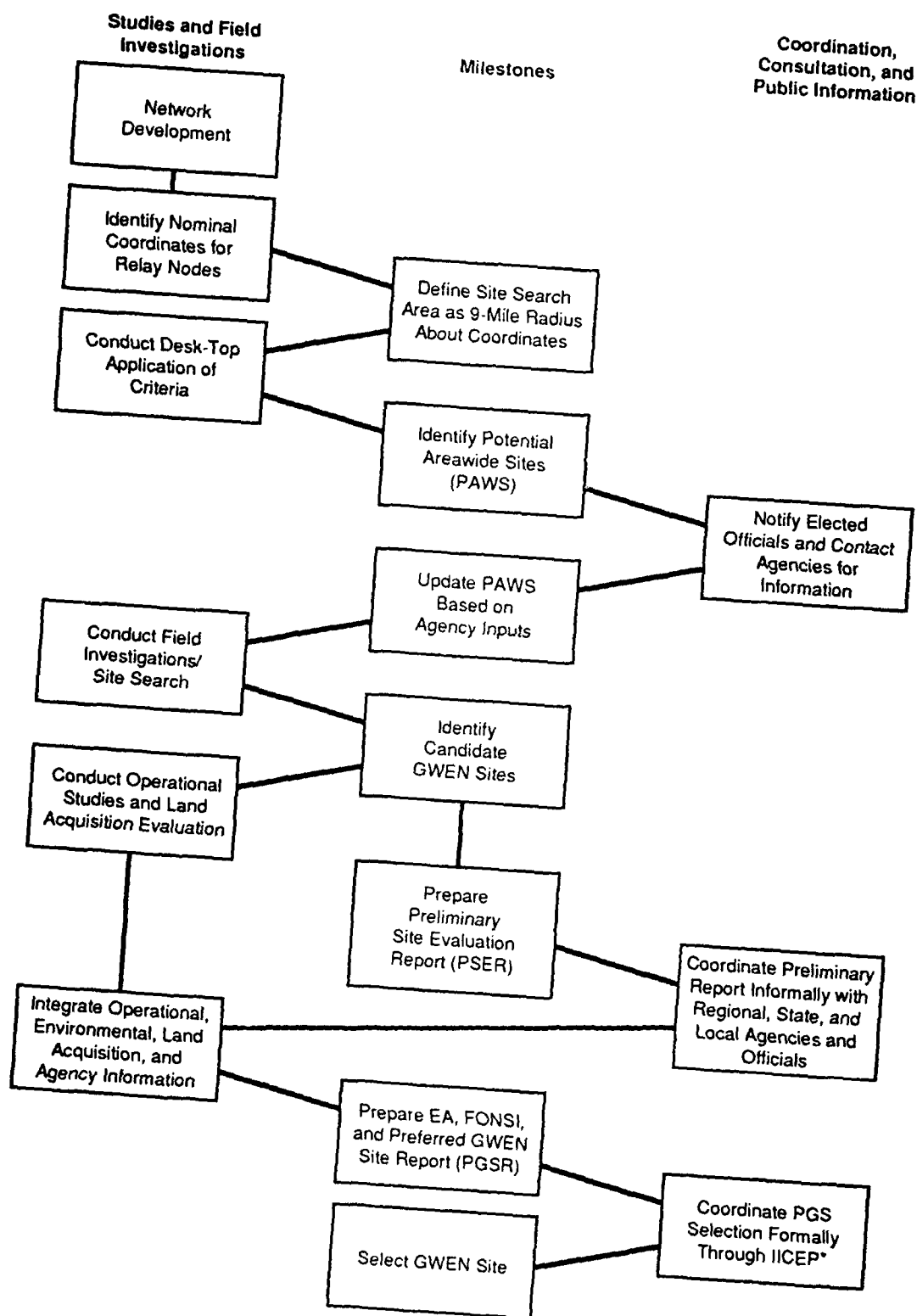
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APPENDIX A

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

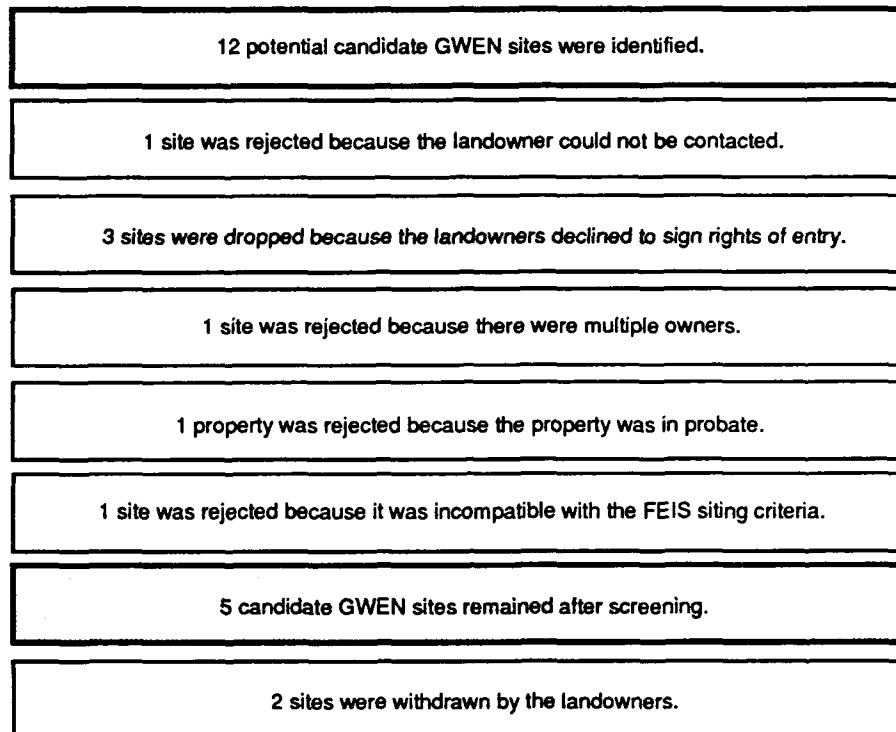


FIGURE A.2 RESULTS OF USING FEIS SITING CRITERIA TO
SCREEN POTENTIAL CANDIDATE GWEN SITES
IN THE NORTHWESTERN NEBRASKA SITE
SEARCH AREA

APPENDIX B

TOPOGRAPHIC SETTINGS OF CANDIDATE GWEN SITES

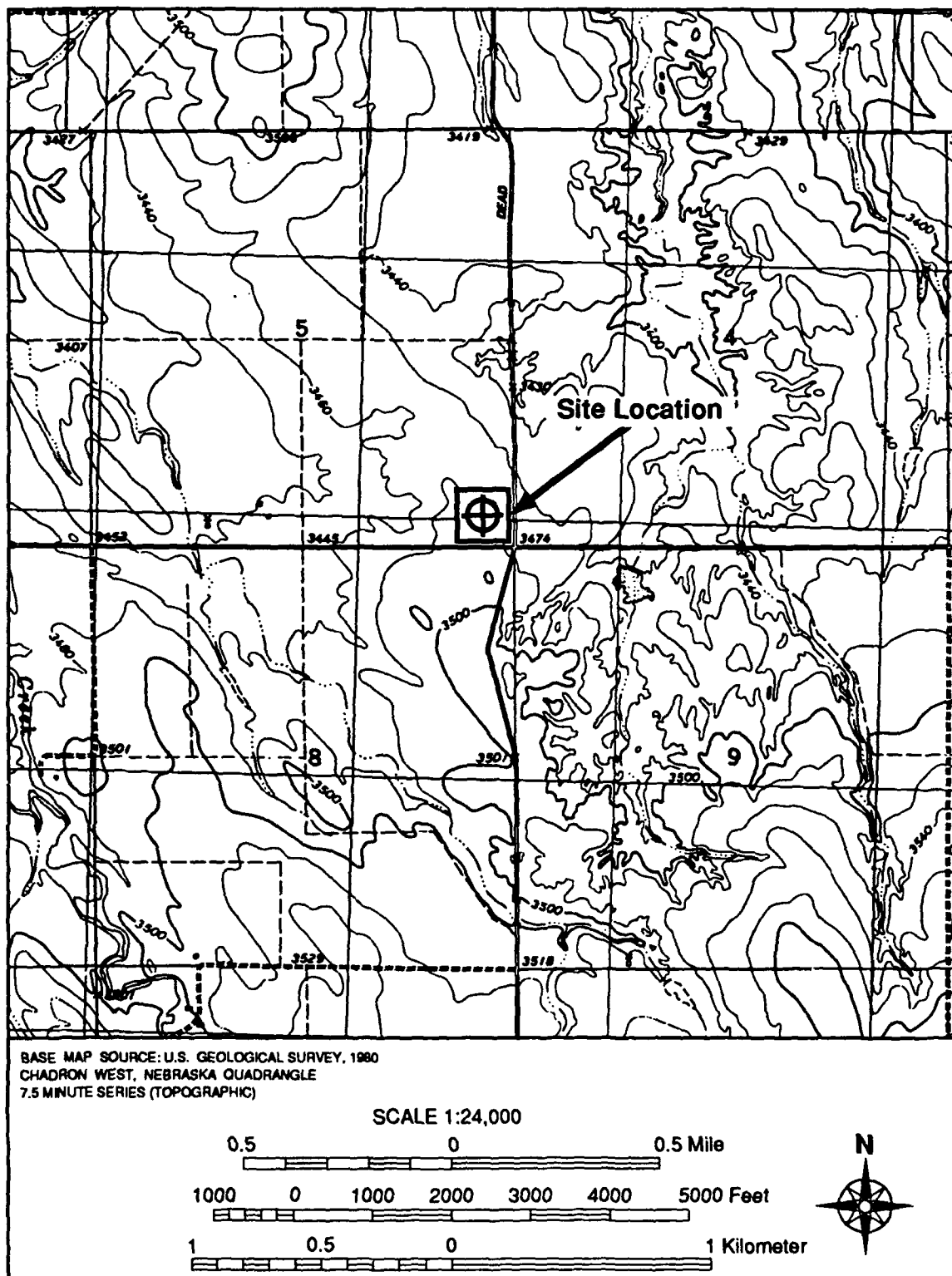


FIGURE B.1 TOPOGRAPHIC SETTING OF THE BRECHT SITE (CGS-2)

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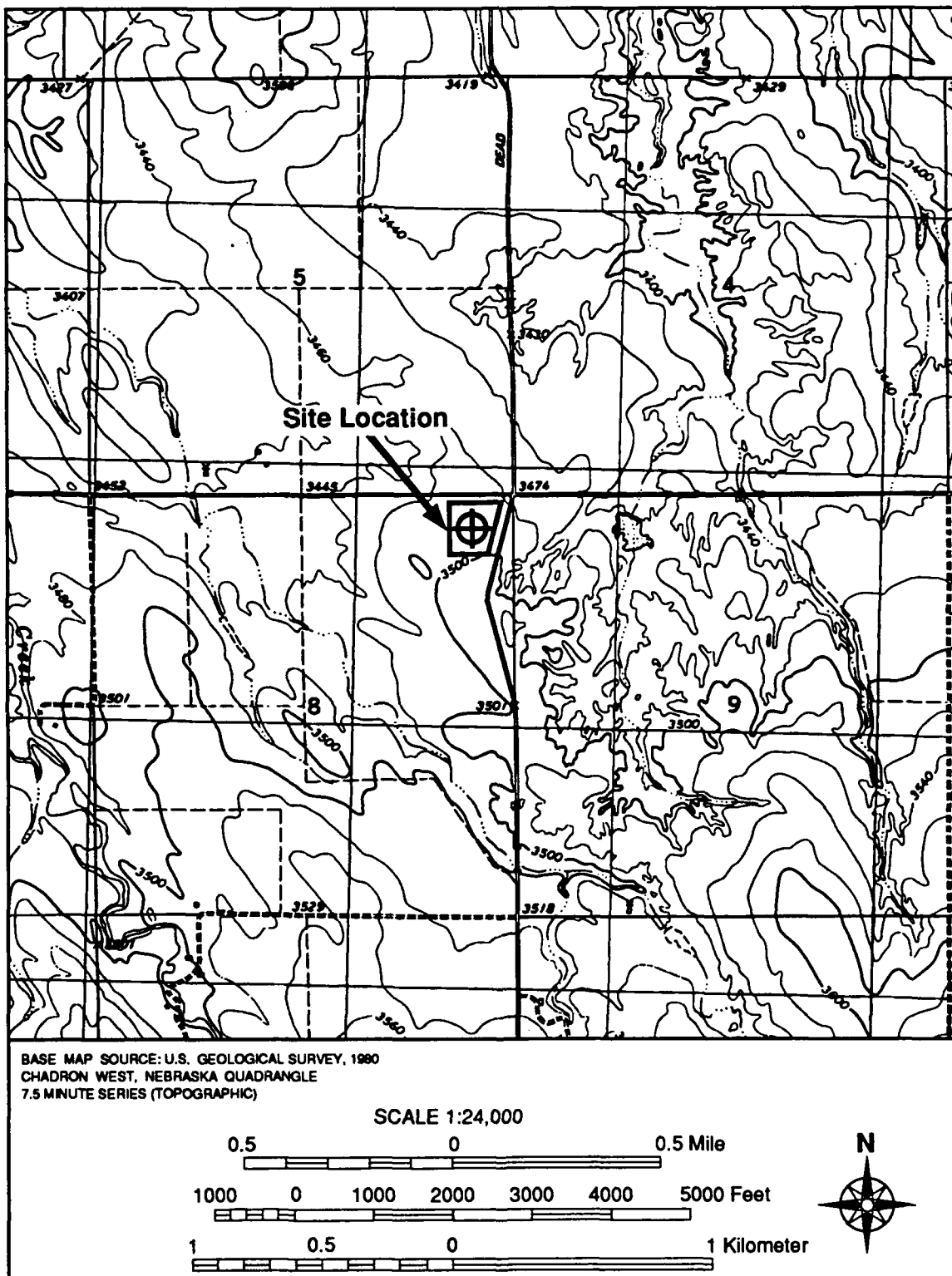


FIGURE B.2 TOPOGRAPHIC SETTING OF THE ROOK SITE (CGS-3)

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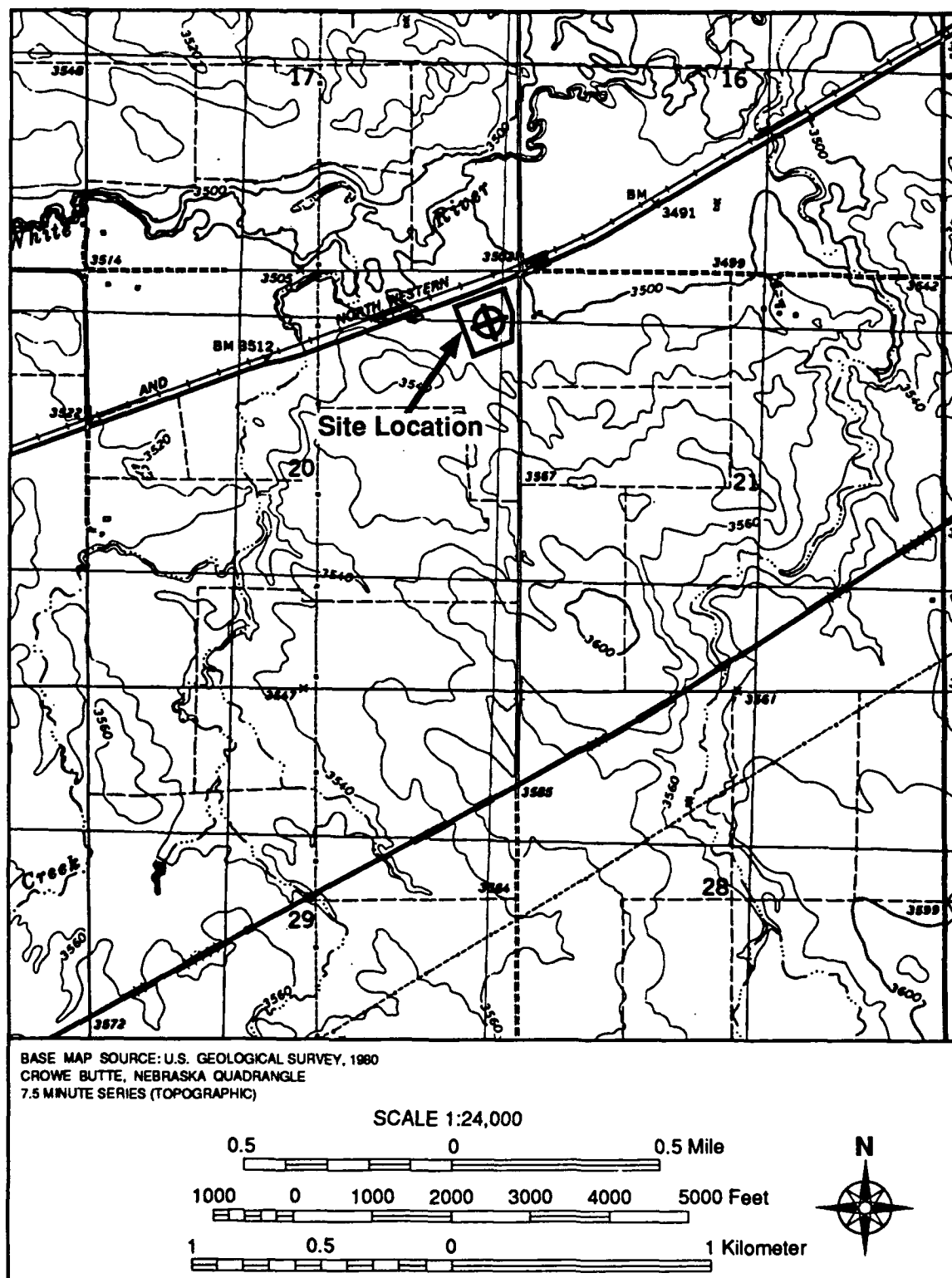


FIGURE B.3 TOPOGRAPHIC SETTING OF THE WEST SITE (CGS-4)

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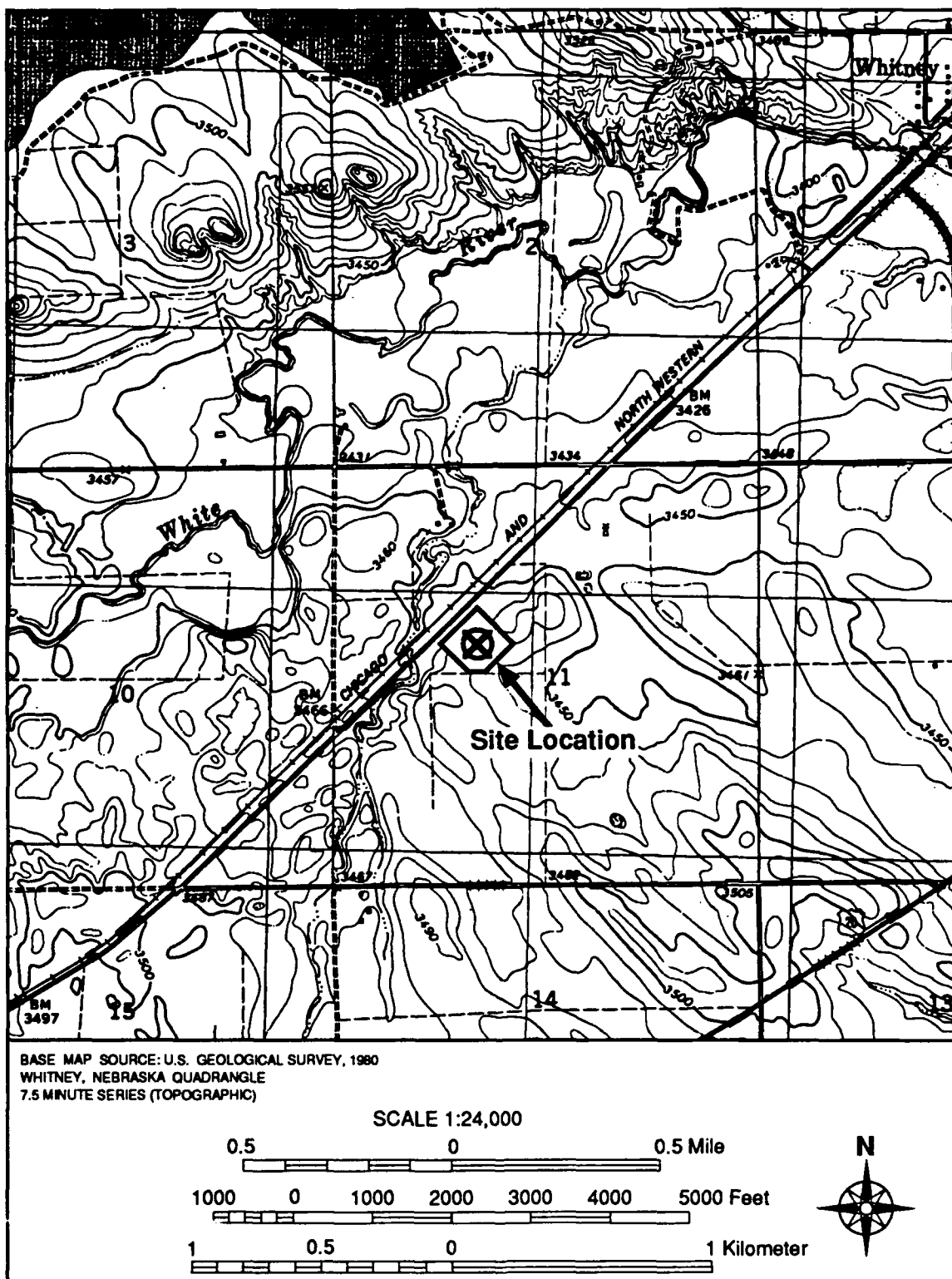


FIGURE B.4 TOPOGRAPHIC SETTING OF THE McCAFFERTY SITE (CGS-8)

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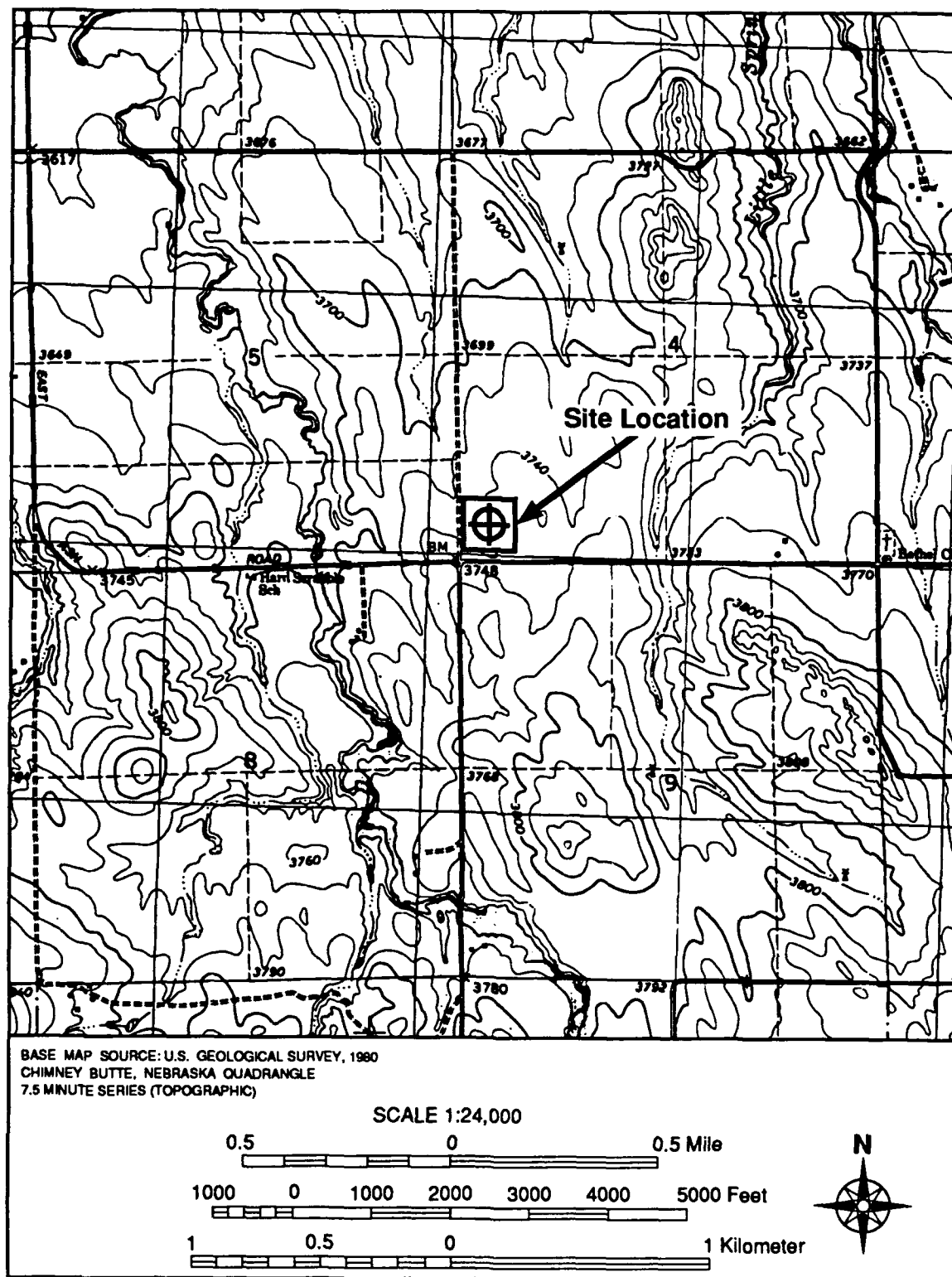


FIGURE B.5 TOPOGRAPHIC SETTING OF THE JUNGÉ SITE (CGS-12)

COPY AVAILABLE TO DTIC DOES NOT PERMIT FULLY LEGIBLE REPRODUCTION

APPENDIX C

CORRESPONDENCE

CORRESPONDENCE

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

<u>Individual</u>	<u>Agency</u>	<u>Date</u>	<u>Response</u>
Robert L. McCue, Field Supervisor	U.S. Department of the Interior, Fish and Wildlife Service	08-22-89	Attached
		11-20-89	Attached
		03-25-91	Attached
		04-30-92	Attached
T. Steinacher H. P. Archaeologist/ D. Murphy, Deputy SHPO	Nebraska State Historical Society	10-06-89	Attached
T. Steinacher, H. P. Archaeologist/ L. Pushchendorf, Deputy SHPO	Nebraska State Historical Society	01-02-90	Attached
Steven Anschutz, State Supervisor	U.S. Dept. of the Interior, Fish and Wildlife Service	12-23-92	Attached
J. Mousseau, Director, Resources Regulatory Agency	Oglala Sioux Tribe	Letter was sent 09-05-89. No written response was received. Phone commu- nication on 09-29-89 (see page 5-4 of this EA).	

<u>Individual</u>	<u>Agency</u>	<u>Date</u>	<u>Response</u>
R. L. Chapman, President	Pawnee Business Council, Pawnee, Oklahoma		Letter sent on 08-25-92. Phone communication on 01-12-93 (see page 5-2 of this EA).
R. Moran, President	Rosebud Sioux Tribal Council, Rosebud, South Dakota		Letter sent on 08-25-92; no response has been received to letter or several attempts at phone communication.
D. Denney, Sr., Chairman	Santee Sioux Tribal Council, Niobrara, Nebraska		Letter sent on 08-25-92; no response has been received to letter or several attempts at phone communication.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
203 WEST SECOND STREET
FEDERAL BUILDING, SECOND FLOOR
GRAND ISLAND, NEBRASKA 68801



COMM: (308) 381-5571
FAX: (308) 381-5512

August 22, 1989

Mr. Buford Holt
Senior Consultant
SRI International
333 Ravenswood Ave.
Menlo Park, CA 94025

Dear Mr. Holt:

This is in response to your letter, dated August 8, 1989, requesting our comments on a candidate Ground Wave Emergency Network (GWEN) communications relay node site near Whitney, Dawes County, Nebraska. You were interested especially in the occurrence of federally listed threatened and endangered species; critical avian habitats and riparian corridors; avian flyways, stopover, and foraging areas; and sensitive wetlands or Fish and Wildlife Service (Service) management areas.

In accordance with Section 7(c) of the Endangered Species Act, we have determined that the following federally listed endangered species may occur in the project area.

<u>Listed Species</u>	<u>Expected Occurrence</u>
Bald eagle (<u>Haliaeetus leucocephalus</u>)	Migration, winter resident
Peregrine falcon (<u>Falco peregrinus</u>)	Migration
Whooping crane (<u>Grus americana</u>)	Migration, spring and fall
Black-footed ferret (<u>Mustela nigripes</u>)	Possible inhabitant

If the Federal action agency determines that a project may affect listed species, or critical habitat, formal Section 7 consultation should be requested from this office. If you determine that there will be no effect, further consultation is not necessary.

Bald eagles utilize mature riparian timber near streams and lakes. Eagles occur primarily as spring and fall migrants through the project area. Wintering birds have been observed within and near the project area during the Annual Mid-Winter Eagle Surveys conducted each January by the National Wildlife Federation. We suspect that the concentrations of waterfowl, which occur on water bodies such as Whitney Lake, may attract bald eagles.

Peregrine falcons generally are associated with wetlands and open areas such as cropland and grassland. Falcons may occur in western Nebraska as a rare fall and winter migrant. There is one nesting record from Nebraska, in Dawes County, 8 miles west of Fort Robinson, August, 1903.

Whooping cranes utilize shallow, sparsely vegetated streams and wetlands, with good horizontal visibility, during migration, for roosting and feeding sites. Whooping cranes rarely migrate through northwestern Nebraska, and no sightings have been confirmed in Dawes County.

All prairie dog towns are considered to be potential habitat for the black-footed ferret. If prairie dogs will be affected by any construction activities, this office should be contacted regarding the need to do black-footed ferret surveys. A probable ferret sighting was reported in Dawes County, 7 miles west of Chadron, on July 20, 1979.

We are also including a list of the Category 2 candidate species which may occur on or near the project area. Category 2 candidate species are those for which the Service is seeking additional information in order to determine their biological status; few Category 2 candidate species are proposed for listing. Candidate species have no legal protection under the Endangered Species Act and are included in this document for planning purposes only.

The White River and its numerous tributaries are the primary riparian corridors located within the project area. Riparian areas are a high value and relatively scarce resource in Dawes County. They are commonly used as movement and migratory corridors by birds. Selection of a GWEN site should take into consideration the riparian corridors.

Whitney Lake is the largest water area located within the project area. Numerous Canada geese and mallards use the lake as a stopover site during spring and fall migrations. The waterfowl roost on the lake and feed in surrounding cropland and pastures. Waterfowl continue to use the lake until freezeup, which usually occurs about mid-December. Sandhill cranes are most often seen in the Whitney Lake area during fall migrations. Cranes may rarely roost in the lakes shallow water and feed in cropland located within the project area.

All bird species except the house sparrow, rock dove, and European starling are protected by the Migratory Bird Treaty Act (MBTA). Collisions by protected birds, such as waterfowl and sandhills cranes, with a man-made structure can be considered a taking activity under MBTA. We recommend that in order to reduce

the likelihood of collision mortality among protected bird species that the tower facilities be adequately marked with materials to enhance their visibility to birds in flight. This office will be able to help you in the design of an appropriate marking scheme if you so desire.

There are no Service facilities located within the project area. Impacts to any wetlands should be avoided to the maximum extent possible.

Should you have further questions, please contact Mr. Wally Jobman of our staff at 308/381-5571. Thank you for the opportunity to offer comments.

Sincerely,

A handwritten signature in dark ink, appearing to read 'R. L. McCue', written in a cursive style.

Robert L. McCue
Field Supervisor

Enclosure

cc: NGPC; Lincoln, NE (Attn: Gerald Chaffin)

WGJ:nn(60)HOLT.LTR

Category II Candidate Species Found in Dawes County, Nebraska

Vertebrate and Invertebrate Wildlife Listing

(Federal Register, Volume 54, No. 4, January 6, 1989, Pages 554-579)

Category	Common Name	Scientific Name	Family
2	Ferruginous hawk	<u>Buteo</u> <u>regalis</u>	Accipitridae
2	Mountain plover	<u>Charadrius</u> <u>montanus</u>	Charadriidae
2	Long-billed curlew	<u>Numenius</u> <u>americanus</u>	Scolopacidae
2	Migrant loggerhead shrike	<u>Lanius</u> <u>ludovicianus</u> <u>migrans</u>	Laniidae
2	Swift fox	<u>Vulpes</u> <u>velox</u>	Canidae
2	Yellow mud turtle (northern population)	<u>Kinosternon</u> <u>flavescens</u> <u>flavescens</u>	Kinosternidae



United States Department of the Interior

FISH AND WILDLIFE SERVICE
203 WEST SECOND STREET
FEDERAL BUILDING, SECOND FLOOR
GRAND ISLAND, NEBRASKA 68801



November 20, 1989

COMM: (308) 381-5571
FAX: (308) 381-5512

Major Robert T. Veale
Deputy Program Manager, GWEN
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base, Massachusetts 01731-5000

Dear Major Veale:

This responds to your October 30, 1989, letter requesting the comments of the Fish and Wildlife Service (Service) on five candidate Ground Wave Emergency Network (GWEN) relay node sites which have been identified in Dawes County, Nebraska. In a letter dated August 22, 1989, to Mr. Buford Holt (SRI International), we commented on the 250 square mile Site Search Area in which the five candidate sites were selected. The information in our August letter is still applicable to each candidate site.

These comments are provided as technical assistance and predevelopment consultation and do not constitute a Service report under authority of the Fish and Wildlife Coordination Act (Coordination Act) (16 U.S.C. 661 et seq.) on any required Federal environmental review or permit.

The Service has responsibility under a number of authorities for conservation and management of fish and wildlife resources. Chief among the Federal statutes with which our office deals are the Fish and Wildlife Coordination Act, Endangered Species Act, and the National Environmental Policy Act. The Coordination Act requires that fish and wildlife resources be given equal consideration in the planning, implementation, and operation of Federal and federally funded, permitted, or licensed water resource developments. Section 7 of the Endangered Species Act outlines procedures for interagency consultations on the effects of Federal actions on federally listed threatened and endangered species. The Service participates in scoping and review of actions significantly affecting the quality of the environment under authority of the National Environmental Policy Act. In addition to these statutes, the Service has authority under several other legislative, regulatory, and executive mandates to promote conservation of fish and wildlife resources for the benefit of the public.

In Nebraska, the Service has special concerns for migratory birds (in particular waterfowl), endangered and threatened species, and other important fish and wildlife resources. We also are concerned about any impacts on Federal and State wildlife refuges and management areas and other public lands, as well as to other areas that support sensitive habitats. Habitats frequently associated with important fish and wildlife resources are wetlands, streams, and riparian (streamside) woodlands. Special attention is given to proposed developments that include modification of wetlands, stream

alteration, or contamination of important habitats. The Service recommends ways to avoid, minimize, rectify, reduce, or compensate for damaging impacts to important fish and wildlife resources and their habitats that may be attributed to land and water resource development proposals.

We have reviewed the plans for the five candidate sites and offer the following comments:

1. None of the sites appear to impact Federal or State fish and wildlife management facilities.
2. Included in our August 22 letter was a list of federally listed endangered species which may occur in the Site Search Area. This list is applicable to each candidate site.
3. It does not appear that any of the sites would affect wetlands or riparian corridors. Sites CGS-2 and 3 are within one-half mile of a wetland located in Section 9.
4. The location of known golden eagle nests and prairie falcon eyries in relation to each site are as follows:
 - a. within a 4-mile radius of site CGS-2 and 3 there are two golden eagle and three prairie falcon nests;
 - b. one golden eagle nest 4 miles east of Site CGS-4;
 - c. one golden eagle nest 3 miles southeast of site CGS-8; and
 - d. five golden eagle and 3 prairie falcon nests within a 4-mile radius of Site CGS-12.

In the United States, all bird species except the house sparrow (Passer domesticus), European starling (Sternus vulgaris), and rock dove (Columba livia) are afforded protection under the Migratory Bird Treaty Act (16 U.S.C. 703-711) (the Act). The Act states in part that "it shall be unlawful at any time, by any means, or in any manner to...take..., any migratory bird, any part, nest, or eggs of any such bird..." which is protected by the Act. The provisions of the Act may impact the GWEN project in two ways. First, collisions of birds with man-made structures can and may be considered a taking activity under the Act. Accordingly, we recommend that (1) the towers be painted a fluorescent color to enhance their visibility to birds in flight, and (2) that the guy wires and other structures $\geq$ 50 feet above ground be marked to enhance their visibility to flying birds. Commonly used marking materials include yellow aviation marker balls, yellow plastic plates, or spiral vibration dampers.

Further, because the provisions of the Act extend to the nests, eggs, or young of birds, we recommend that project activities that could result in the taking of a migratory bird nest, egg, or young, be conducted only after nesting surveys are conducted by the applicant during the primary nesting season from April 1 to July 15. Any active nests, eggs, or dependent young should be reported immediately to this office.

Should you have further questions, please contact Mr. Wally Jobman of our staff at 308/381-5571. Thank you for the opportunity to offer comments.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. L. McCue', with a long horizontal flourish extending to the right.

Robert L. McCue
Field Supervisor

cc: NGPC; Lincoln, NE (Attn: Gerald Chaffin)
Special Agent, Omaha, NE

WGJ:CAF:jh(C)Veale.ltr



United States Department of the Interior

FISH AND WILDLIFE SERVICE
203 WEST SECOND STREET
FEDERAL BUILDING, SECOND FLOOR
GRAND ISLAND, NEBRASKA 68801



COMM: (308) 381-5571
FAX: (308) 381-5512

March 25, 1991

Mr. Buford Holt
Senior Consultant
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025

Dear Mr. Holt:

This is in response to your March 14, 1991, letter regarding the U.S. Air Force's Northwestern Nebraska relay node for the Ground Wave Emergency Network, Dawes County, Nebraska. We concur with your conclusion that the proposed project will not adversely affect federally listed threatened and endangered species or their critical habitat. It does not appear that any of the Candidate Species would be adversely affected by the project.

Should you have further questions, please contact Mr. Wally Jobman of our staff at 308/381-2391.

Sincerely,

Robert L. McCue
Field Supervisor

cc: Mr. Ross Lock, NGPC; Lincoln, NE

WGJ:jh(B70)Holt.1tr



NEBRASKA STATE HISTORICAL SOCIETY

1500 R STREET, BOX 82554, LINCOLN, NE 68501
DIRECTOR: JAMES A. HANSON (402) 471-3270

6 Oct. 1989

Buford Holt
Senior Consultant
SRI International
333 Ravenswood Ave.
Menlo Park, CA 94025

Re: GWEN System
Dawes Co., NE
H.P. #8908-024-01

Dear Mr. Holt:

The referenced project site locations have been reviewed by this office. None of the site areas contain currently recorded historic resources. No surveys for historic resources have been conducted on any of the sites. Based on survey information from other portions of the County, it is recommended that Sites 4, 8, and 12 be surveyed for archaeological resources. No survey is recommended for Sites 1 - 3. Enclosed is a list of cultural resource contractors.

Sincerely,

Terry Steinacher
H.P. Archaeologist

308-665-2852

Concurrence:

D. Murphy
Deputy NeSHPO



NEBRASKA STATE HISTORICAL SOCIETY

1500 R STREET, BOX 82554, LINCOLN, NE 68501

DIRECTOR: JAMES A. HANSON (402) 471-3270

2 January 1990

Buford Holt
Senior Consultant
SRI International
333 Ravenswood Ave.
Menlo Park, CA 94025

Re: GWEN System
Dawes Co., NE
Cultural Resource Survey Report
H.P. #8908-024-01

Dear Mr. Holt:

The cultural resources survey report (Jepson 1989, Centennial Archaeology, Inc.) on the above referenced project has been reviewed by this office. We concur with the findings that no cultural resources are present in tower locations CGS-4 and CGS-8. It is our determination that archaeological site 25DW38 located within CGS-12 is not eligible for nomination to the National Register of Historic Places. Therefore, no historic property will be effected by the proposed project and according to 36 CFR 800, the project may proceed as planned.

Sincerely,

Terry L. Steinacher
H.P. Archaeologist

Concurrence:

L. Robert Puschendorf
Deputy NeSHPO

United States Department
of the Interior
Fish and Wildlife Service
Attn: Mr Robert L. McCue
203 West Second Street
Federal Building, Second Floor
Grand Island, NE 68801

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

This is to verify that no changes have been made to the list of
federally-designated threatened, endangered, or candidate species
sent on August 22, 1989.

for Steven Anschutz
Robert L. McCue

30 Apr 92
Date

Changes have been made to the list of federally-designated threat-
ened, endangered, or candidate species since our correspondence
to you on August 22, 1989. Enclosed is a new list of species.

Robert L. McCue

Date

United States Department
of the Interior
Fish and Wildlife Service
Attn: Mr Robert L. McCue
203 West Second Street
Federal Building, Second Floor
Grand Island, NE 68801

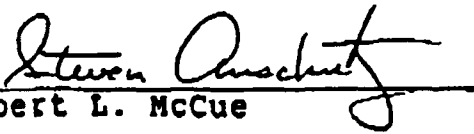
RE: U.S. Air Force Ground Wave Emergency Network (GWEN) Project
in Northwestern Nebraska

This is to verify that no changes have been made to the list of
federally-designated threatened, endangered, or candidate species
sent on April 30, 1992.

Robert L. McCue

Date

Changes have been made to the list of federally-designated
threatened, endangered, or candidate species since our
correspondence to you on April 30, 1992. Enclosed is a new list
of species.

for 
Robert L. McCue

23 Dec 92
Date

Note: An updated candidate species list is enclosed.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Nebraska/Kansas Field Office
203 West Second Street
Grand Island, Nebraska 68801

December 23, 1992

Stephen T. Martin, Lt Col, USAF
Program Manager, GWEN
Headquarters Electronic Systems Division
Hanscom Air Force Base, MA 01731-5000

Dear Sir:

In response to your letter dated December 17, 1992, regarding a proposed Ground Wave Emergency Network (GWEN) project near Whitney, Nebraska; I have enclosed a signed form along with requested information regarding a revised list of candidate species which may occur in the affected area. Information provided to you in our August 22, 1989, letter regarding federally listed species remains unchanged.

Any questions or need for additional information regarding this matter should be referred to Mr. Wally Jobman within our office at (308)382-6468.

Sincerely,

Steven Anschutz
Nebraska State Supervisor

Enclosures

Category 2 Candidate Species Which May Occur In Dawes County, Nebraska

Vertebrate and Invertebrate Wildlife Listing

(Federal Register, Volume 56, No. 225, November 21, 1991,
Pages 58804-58836)

<u>Category</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Family</u>
2	Belfragi's chlorochroan bug	<u>chlorochroa belfragi</u>	Pentatomidae
2	Ferruginous hawk	<u>Buteo regalis</u>	Accipitridae
2	Northern goshawk	<u>Accipiter gentilis</u>	Accipitridae
2	Mountain plover	<u>Charadrius montanus</u>	Charadriidae
2	Loggerhead shrike	<u>Lanius ludovicianus</u>	Laniidae
2	Black tern	<u>Chlidonias niger</u>	Laridae
2	Harlequin duck	<u>Histrionicus</u> <u>histrionicus</u>	Anatidae
2	Swift fox	<u>Vulpes velox</u>	Canidae
2	Fringed-tailed myotis	<u>Myotis thysanodes</u> <u>pahasapensis</u>	Vespertilionidae
2	Plains spotted skunk	<u>Spilogale putorius</u> <u>interrupta</u>	Muridae
2	Yellow mud turtle (northern population)	<u>Kinosternon flavescens</u> <u>flavescens</u>	Kinosternidae
2	Blanding's turtle	<u>Emydoidea blandingii</u>	Emydidae

Plant Listing

(Federal Register, Volume 55, No. 35, February 21, 1990, Pages 6184-6229)

<u>Category</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Family</u>
2	Milk Vetch	<u>Astragalus barrii</u>	Fabaceae

APPENDIX D

GLOSSARY

GLOSSARY

Abbreviations and Units of Measure

AM	Amplitude modulation
ATU	Antenna tuning unit
BIA	Bureau of Indian Affairs
Btu	British thermal unit
BUPG	Back-up power group
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

FICWD	Federal Interagency Committee for Wetland Delineation
FOC	Final Operational Capability, the third phase of development of GWEN
FONSI	Finding Of No Significant Impact
GPFA	Great Plains Flora Association
GPO	Government Printing Office
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 (1 mg/l = 1 ppm)
MM	Modified Mercalli, a scale of the severity of earthquake effects
µg/l	Micrograms per liter (1 µg/l = 1 ppb)
NDEC	Nebraska Department of Environmental Control
NDED	Nebraska Department of Economic Development

NDNR	Nebraska Department of Natural Resources
NDR	Nebraska Department of Roads
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	<i>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</i>
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
ppb	Parts per billion
ppm	<i>Parts per million</i>
PSER	Preliminary Site Evaluation Report
SCS	Soil Conservation Service, a unit of the United States Department of Agriculture

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

Anaerobic	Occurring in the absence of free oxygen
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
Cretaceous	The geologic period from 144 to 65 million years ago.
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 <i>Federal Manual for Identifying and Delineating Jurisdictional Wetlands</i> (GPO 1989-236-985/00336), a wetland is a class of habitats 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	For the purposes of this EA, historic properties are those aboveground structures and resources that are listed or eligible for listing on the National Register of Historic Places
Hydric soil	A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part
Modified Mercalli scale	A measure of the intensity of seismic activity based on human perception of the event and the potential for damage; the intensity 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
Paleontological	Pertaining to fossils or the study of fossils
pH	A measure of acidity in which the lower the number, the more acidic the substance; 7 represents neutrality

Phase I survey	A survey designed to identify properties that are listed, eligible for listing, or potentially eligible for listing on the National Register of Historic Places within the area that would be affected by the proposed project
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
Sedimentary rock	Rock formed by the consolidation or cementation of particles deposited by water or wind
Shelterbelt	A strip of trees grown for protection against the wind, often consisting of 5 to 10 rows of plants varying in height to form a dense windbreak
Swale	A land depression that receives intermittent runoff from the <i>immediately surrounding area</i> . When moist, it may contain vegetation, planktonic animals, and small amphibians, but does not support significant aquatic life, such as fish
Tertiary	The geologic period from 65 to 2 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