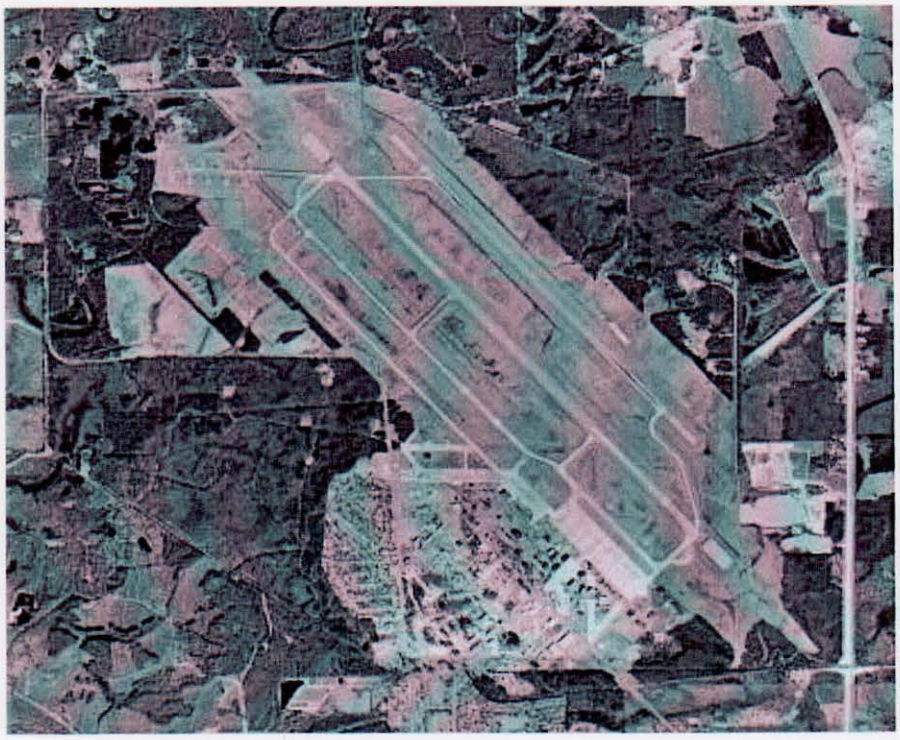
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EA's

COLUMBUS AIR FORCE BASE

DIGITAL AIRPORT SURVEILLANCE RADAR

ENVIRONMENTAL ASSESSMENT

FINAL



Prepared for:

Hanscom AFB, Massachusetts

February 3, 2003

Metcalf & Eddy

Report Documentation Page

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February 25, 2003

Mr. Frank Lockhart
14 CES/CEV
555 Simlar Blvd
Columbus AFB, MS 39710-6010

Subject: Columbus AFB DASR Final Environmental Assessment and Signed FONSI

Dear Mr. Lockhart:

On behalf of the Digital Airport Surveillance Radar Program Office (ESC/GAA), enclosed please find two (2) copies of the Final EA and signed FONSI. The signed FONSI has been bound inside the front cover of the EA. Please note that the date on the cover of the Final EA was changed to the date on the signed FONSI to avoid confusion with any previous versions of the document.

Thank you again for all of your help and cooperation during preparation and review of the DASR EA. If you have any questions, please feel free to call me at (781) 224-6069.

Very truly yours,
METCALF & EDDY

Christina C. Hoffman
Senior Environmental Scientist

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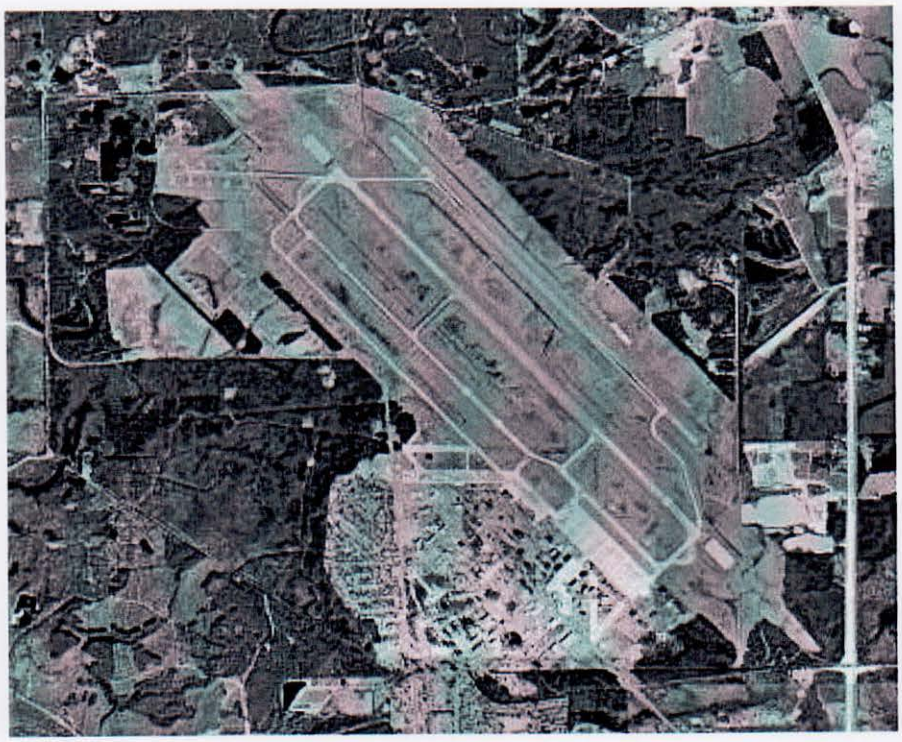
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COLUMBUS AIR FORCE BASE

DIGITAL AIRPORT SURVEILLANCE RADAR

ENVIRONMENTAL ASSESSMENT

FINAL



Prepared for:

Hanscom AFB, Massachusetts

February 3, 2003

Metcalf & Eddy

FINDING OF NO SIGNIFICANT IMPACT

Name of Action: Columbus Air Force Base Digital Airport Surveillance Radar

The Department of Defense (DoD) proposes to construct a Digital Airport Surveillance Radar (DASR) system at Columbus Air Force Base (AFB) in Mississippi. This proposed action is part of the National Airspace System (NAS) Program, developed by the Federal Aviation Administration in cooperation with the DoD to modernize approach control systems in the United States and its territories. DASR is a DoD-lead contract to replace analog air traffic control systems with state-of-the-art digital air traffic control equipment on U.S. Army, U.S. Navy, and U.S. Air Force bases throughout the country. The implementation of the NAS program, which also includes the installation of DoD Advanced Automation System digital radar display terminals and Voice Communications Switching Systems at DoD bases, was previously evaluated in a programmatic Environmental Assessment and Finding of No Significant Impact (1995).

The environmental assessment for Columbus AFB addresses the site-specific impacts of locating a DASR system on Columbus AFB, and evaluates the consequences of the DASR system construction on both the natural and man-made environments. The Automation System and Voice Switch components of the NAS program at Columbus AFB would be located within existing buildings, and impacts are anticipated to be minor. The primary consequences of the DASR system evaluated in the environmental assessment involve the construction and operation of a DASR system on Columbus AFB.

The proposed DASR system, designated as model ASR-11, is needed to replace the existing AN/GPN-20 airport surveillance radar at Columbus AFB. The ASR-11 will improve system reliability, provide additional weather data, reduce maintenance cost, improve performance, and provide digital data input to proposed new digital automation system air traffic controller displays. The ASR-11 will take advantage of the significantly increased capabilities of digital technology. The proposed new DASR system will serve to accurately locate aircraft in terms of range, azimuth, and latitude; provide information regarding aircraft identification code; identify emergency conditions; and report six discrete weather precipitation levels.

The No Action alternative would be to continue use of the existing AN/GPN-20 radar. This alternative would deny Columbus AFB the improved system reliability, additional weather data, and improved performance offered by the new DASR system; thus, this alternative was not chosen. Three alternative sites (Site 2, Site 4, and Site 5) were evaluated for location of the ASR-11. All three alternative sites are located to the northeast of the existing airfield, specifically, along the northeastern portion of Perimeter Road. Due to the location of an existing roadway (Perimeter Road) immediately adjacent to the sites, construction of an access road would not be required, regardless of which site is chosen. Walkers and joggers use Perimeter Road as a passive recreation area. Upon recommendation by the United States Fish and Wildlife Service, Columbus AFB conducted a survey for bald eagle nests and activity within 1,500 feet of the candidate sites. Results of the survey indicate that no evidence of bald eagles was found. Site 2 is within a forested area approximately 2,000 feet northeast of the Ground to Air Transmit/Receive (GATR) radio facility. Site 4 lies within an area that is dominated by grasses and shrubs approximately 1,000 feet north of the GATR. Site 5 is located in a

forested area approximately 1,000 feet south-southeast of the GATR. Any of the three sites would be acceptable from an environmental perspective. Due to operational and other base considerations, the USAF has selected Site 5 as the preferred ASR-11 location.

If Site 2 were selected as the preferred alternative, no significant adverse impacts associated with socioeconomics, noise, air quality, soils, surface water, cultural resources, or hazardous waste would be anticipated. Site 2 abuts Perimeter Road approximately 1,800 feet east of Runway 13L/31R. The site is wooded and lies on the opposite side of Perimeter Road from a former landfill that has been designated as an Installation Restoration Program site. Long-term monitoring is in place at the former landfill site and excavation for an ASR-11 at Site 2 is not anticipated to encounter contaminated groundwater. A wetland area is located approximately 150 feet from the site. If Site 2 were chosen, clearing would be required both on the site itself and along the proposed utility corridors. Each of the electric, telephone and fiber optic service connections would be located approximately 1,700 feet from Site 2.

If Site 4 were selected as the preferred alternative, no significant adverse impacts associated with socioeconomics, transportation, noise, air quality, soils, surface water, cultural resources, or hazardous waste would be anticipated. Site 4 is located within a cleared area that is surrounded by tall pine trees adjacent to Perimeter Road. The area was cleared during a previous natural attenuation study performed in conjunction with the Tennessee Valley Authority. A former landfill lies approximately 200 feet to the west of Site 4. Long-term monitoring is in place at the landfill site and excavation for an ASR-11 at Site 4 is not anticipated to encounter contaminated groundwater. Connection to the nearest suitable telephone service would be at a distance of approximately 100 feet, while connections to the nearest electric and fiber optic routes would both occur at a distance of approximately 1,300 feet from Site 4.

If Site 5 were selected as the preferred alternative, no significant adverse impacts associated with socioeconomics, transportation, noise, air quality, soils, surface water, cultural resources, or hazardous materials would be anticipated. Site 5 is located adjacent to Perimeter Road within a wooded area approximately 250 feet west of the base property boundary. The site is bordered to the east by Perimeter Road and to the south by an unnamed gravel/dirt road. Connections to the nearest electric and fiber optic routes would occur at a distance of approximately 1,200 feet, while the nearest suitable connection for telephone would be approximately 30 feet.

Operation of the DASR system is anticipated to have minimal long-term impacts to the natural and human environments. The radar would generate radio frequency radiation while operating. However, the radio frequency radiation generated would be safe to humans at ground level and is not anticipated to pose harm to the general population. During the DASR system operation, fuel and other hazardous materials may be used at the site, such as engine oil and grease. However, use and disposal of any hazardous materials would occur in compliance with Columbus AFB guidelines as well as applicable state and federal regulations. Consequently, it is anticipated that operational use of hazardous materials would not adversely affect the natural or human environments.

It is anticipated that few mitigation measures would be required during construction and operation of the facility. To minimize noise impacts during construction, mufflers would be used on construction equipment and vehicles. In addition, all equipment and vehicles used during construction would be maintained in good operating condition so that emissions are minimized, thus reducing the potential

for air quality impacts. Dust would be controlled onsite by using water to wet down disturbed areas. Efforts would be made to retain a buffer of trees between the site and Perimeter Road to avoid a visual/aesthetic impact. All areas disturbed for the DASR system construction would be seeded with a grass mixture or covered with a geotextile fabric and crushed stone to stabilize the disturbed soils, in order to minimize the potential for erosion and sedimentation. The wetland nearby Site 2 would be protected through the use of erosion and sedimentation control measures during construction. Should dewatering be necessary during installation of tower footings, proper base procedures for discharge of groundwater would be implemented. The proposed DASR facility would incorporate appropriate best management practices, such as vegetative swales or buffer strips, to reduce the effects of stormwater runoff from the site. All hazardous materials used during construction would be handled and disposed of in accordance with Columbus AFB guidelines and all applicable state and federal regulations. Traffic management measures would be developed to facilitate traffic flow and pedestrian access.

During operation of the DASR system, fuel would be stored at an aboveground storage tank and some hazardous materials, such as equipment oil or grease, may be used at the site. Similar to the construction period, all hazardous materials utilized during operation would be used, and disposed of, in accordance with Columbus AFB guidelines and all applicable state and federal regulations in order to minimize the potential for media contamination.

Based on this summary of effects, along with the detailed description of the effects provided in the Environmental Assessment, I have determined that construction of the ASR-11 at Site 5, which is the site that I have selected, will not have a significant impact on the natural or human environment. For this reason, no environmental impact statement needs to be prepared.

Stephen Dean Schmidt

STEPHEN D. SCHMIDT, Colonel, USAF
Commander, 14th Flying Training Wing

3 Feb 03

Date

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EXECUTIVE SUMMARY

This environmental assessment (EA) has been completed as part of the National Environmental Policy Act (NEPA) process, in compliance with U.S. Air Force (USAF) instruction AFI 32-7061. According to this instruction, the EA provides analysis sufficient to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) and to aid federal agencies in complying with NEPA when no EIS is required.

This EA describes the proposed project to install a Digital Airport Surveillance Radar (DASR) at Columbus Air Force Base (AFB) in Mississippi. This proposed action is part of the National Airspace System (NAS) Program, the aviation system capital investment plan developed by the Federal Aviation Administration (FAA) in cooperation with the Department of Defense (DoD) to modernize approach control systems in the United States and its territories. DASR is a DoD-lead contract to install airport surveillance radar equipment for both the DoD and FAA.

The NAS program will comprehensively upgrade air traffic control systems infrastructure by systematically replacing analog systems with state-of-the-art, digital technology. The purpose of the DASR component of the NAS program is to detect and process aircraft position and weather conditions at airfields. The DASR system will use the ASR-11 radar to accurately locate aircraft, in terms of range, azimuth, and altitude; provide information regarding aircraft identification code; identify emergency conditions; and report six discrete weather precipitation levels. The ASR-11 at Columbus AFB is needed to replace the older existing AN/GPN-20 airport surveillance radar.

The DASR facilities at Columbus AFB would consist of: a 20-foot tall rotating radar antenna mounted on an 77- or 87-foot tower, a concrete radar equipment shelter, an emergency engine generator in a concrete shelter, utility cabling, electronic equipment grounding systems, and a 1,000-gallon aboveground fuel storage tank. Facility construction would include separate concrete foundations for the antenna tower, the equipment shelter and the engine generator shelter, and a 140-foot by 140-foot site fence. Site work should be within a 0.59-acre site (160 feet by 160 feet). Additional site improvements would include minor re-grading, installation of geotextile fabric beneath six inches of crushed stone within the site fence, and up to 1,700 feet of

utility trenching to connect the site to existing duct banks or manholes. The total structure height, including lightning rods on the antenna tower, would be 106 feet or 116 feet, depending on the site chosen. Once the new DASR system is operational, the existing AN/GPN-20 will be dismantled and structures will be razed. The AN/GPN-20 site would be reclaimed by Columbus AFB.

Seven areas were initially identified and evaluated as potential ASR-11 sites. Three of these sites were eliminated after preliminary assessment indicated that they violated obstruction height requirements. A fourth site was eliminated due its location within a wetland. A fifth site (Site 2) was relocated, from atop a closed landfill, across Perimeter Road onto undeveloped land. This site, along with the other two remaining alternative sites (Sites 4 and 5) on Columbus AFB, have been identified as potential locations for the ASR-11, based on operational, construction, and environmental siting criteria contained in the Columbus AFB Integrated Site Survey Report (USAF, 2002a). The three remaining sites (2, 4, and 5) are evaluated in this EA.

Site 2 is located in a forested area approximately 2,000 feet northeast of the Ground to Air Transmit/Receive (GATR) facility. Site 4 is located within a forested area on a lot that has been cleared of trees and is vegetated with grasses and shrubbery. Site 4 is approximately 1,000 feet north of the GATR. Site 5 is located in a forested area approximately 1,000 feet south-southeast of the GATR. All three sites are located on the airfield side of Perimeter Road, which roughly parallels the base boundary line, along the eastern and northern edge of the base.

Issues that must be addressed during construction at any of the sites are elevated noise levels, increased dust, traffic and access disruption, aesthetic effects, site stability, and storm water management issues. Potential impacts in these areas would be reduced using standard mitigation measures as outlined below. Additional measures are discussed in Section 6, Mitigation.

- During the construction period, sheeting or supports of some kind may be used in the areas excavated for the tower footings and utility trenches in order to prevent collapse of these excavated areas.

- To minimize noise impacts during construction, mufflers would be used on construction equipment and vehicles.
- All equipment and vehicles used during construction would be maintained in good operating condition so that emissions are minimized, thus reducing the potential for air quality impacts.
- Dust would be controlled on-site by using water to wet down disturbed areas.
- All areas disturbed for the DASR system construction would be seeded with a native seed mixture or covered with a geotextile fabric and crushed stone to stabilize the disturbed soils, in order to minimize the potential for erosion and sedimentation.
- All hazardous materials used during construction of the ASR-11 would be handled and disposed of in accordance with Columbus AFB policies and protocols and all applicable state and federal regulations.
- Traffic management measures will be developed to facilitate traffic flow and pedestrian access.

Potential future impacts associated with operation of the ASR-11 facility would be minimized through use of mitigation measures including the following:

- All hazardous materials used during operation of the ASR-11 would be handled and disposed of in accordance with Columbus AFB policies and protocols and all applicable state and federal regulations.
- Due to the potential for RFR hazards during operation, warning signs, indicating the safe distance from the operating radar, would be installed at the facility perimeter.

All three sites are acceptable from an environmental perspective. There would be no significant impacts to wetlands or state-protected plant species (no federally- or state-protected species are found on Columbus AFB). The sites meet the restrictive and selective screening criteria as defined in the Integrated Site Survey Report (USAF, 2002a). Table ES-1 provides a summary of the potential environmental impacts associated with each of the alternative sites. The U.S. Air Force in conjunction with Columbus AFB has selected **Site 5** as the preferred ASR-11 location; however, this EA identifies potential impacts associated with placing the ASR-11 at any of the alternative sites.

Table ES-1. Environmental Impact Summary Matrix for the Alternative ASR-11 Sites at Columbus AFB

Category	No Action Alternative	Existing AN/GPN-20 Removal	Site 2	Site 4	Site 5
Land Use	No Impact	Columbus AFB could reclaim land currently occupied by the AN/GPN-20.	Construction and operation of ASR-11 are anticipated to be compatible with adjacent land uses.		
Socioeconomics	No Impact	Dismantling of AN/GPN-20 expected to have short-term minor contributions to the local economy; no long-term impacts are expected.	Installation of ASR-11 expected to have short-term minor contributions to the local economy; no long-term impacts are expected.		
Utilities and Transportation	No Impact	No impacts to utilities anticipated. Minor short-term transportation impacts are possible due to on-base traffic during dismantling.	Connection of fiber optic line to the RAPCON would require installation of up to 1,700 feet of cable to the existing lines that connect to the GATR facility. Connections to both telephone and electricity would be approximately 1,700 feet.	Connection of fiber optic line to the RAPCON would require installation of approximately 1,300 feet of cable. Connections to both telephone and electricity are available within 100 and 1,300 feet of the site, respectively.	Connection of fiber optic line to the RAPCON would require installation of approximately 1,200 feet of cable. Connections to both telephone and electricity are available within 30 and 1,200 feet of the site, respectively.
Noise	No Impact	Dismantling of AN/GPN-20 would occur in an area dominated by aircraft sound levels, thus only slight potential for noise impacts during construction.	Construction of the ASR-11 would generally occur in an area dominated by aircraft sound levels, thus only slight potential for noise impacts during construction. Operation of the ASR-11 system would not generate excessive or persistent levels of noise; therefore, no long-term impacts are anticipated.		
Air Quality	No Impact	Short term impacts from removal of existing AN/GPN-20 are expected to consist of dust generation from construction activities and are anticipated to be minimal.	Short term impacts during installation of ASR-11 expected to consist of dust generation from construction activities and anticipated to be minimal. Long term impacts associated with all alternatives consist of evaporative fuel loss from aboveground storage tank and emissions from on-site emergency generator. Neither source is anticipated to represent a substantial impact to air quality.		
Geology and Soils	No Impact	No Impact	No Impact	No Impact	No Impact
Surface Water and Groundwater	No Impact	No Impact	Site 2 and Site 5 are approximately 150 feet from a mapped and unmapped wetland, respectively. Groundwater is anticipated to be encountered during construction; however, impacts are anticipated to be minimal.		
Biological Resources	No Impact	No Impact	Clearing of just over one-half acre of forested area would be required. Temporary and permanent wildlife displacement.	Minimal tree clearing would be required at this site; however, an area of just over one-half acre of grasses/annuals would be cleared. Temporary and permanent wildlife displacement.	Clearing of just over one-half acre of forested area would be required. Temporary and permanent wildlife displacement.
Aesthetic Resources	No Impact	No Net Impact	Sites are located on undeveloped portion of the base, east of the runways, with low traffic volume, and a natural barrier of a high tree canopy. Not likely to have aesthetic impact during construction or operation.		
Cultural Resources	No Impact	No known cultural resources exist within or near the existing or alternative radar locations, therefore no impacts are anticipated. Base environmental personnel may require procedures to be followed if potential resources are uncovered during construction.			
Pollution Prevention and Hazardous Waste	Hazardous materials used during operation of facility will continue being handled in compliance with all applicable regulations and base policies; therefore, no impacts are expected.	Portions of the radar contain lead paint, which has potential to chip off during the dismantling.	No contaminated soils anticipated to be encountered during construction. Hazardous materials used during facility operation will be handled in compliance with base policies and regulations.		
Electromagnetic Energy	No impact expected - due to the potential for RFR hazards during operation, warning signs, indicating the safe distance from the existing radar, are installed at the facility perimeter.	No Net Impact	No impacts expected – due to the potential for RFR hazards during operation, warning signs, indicating the safe distance from the operating radar, would be installed at the facility perimeter. The proposed facility sites are not proximate to occupied buildings; however, adjacent roadway is used for limited recreational activities.		

1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The National Environmental Policy Act (NEPA; 42 U.S.C. Sections 4321-4347) is the basic national charter for protection of the environment (CEQ, 1978). NEPA establishes policy, sets goals, and provides the process for carrying out the policy and achieving the goals. NEPA procedures were established to ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. To implement NEPA, the U.S. Air Force (USAF) has issued internal instruction AFI 32-7061 (USAF, 2000a) that contains policies, responsibilities, and procedures dictating how NEPA should be implemented for USAF projects.

This environmental assessment (EA) has been prepared in compliance with AFI 32-7061. According to this instruction, the environmental assessment is a written analysis which serves to (1) provide analysis sufficient to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI); and (2) aid federal agencies in complying with NEPA when no EIS is required. If this EA were to determine that the proposed action would significantly degrade the environment, significantly threaten public health or safety, or generate significant public controversy, then an EIS would be completed. An EIS involves a comprehensive assessment of project impacts and alternatives and a high degree of public input. Alternatively, if this EA results in a FONSI, then the action would not be the subject of an EIS. The EA is not intended to be a scientific document. The level and extent of detail and analysis in the EA is commensurate with the importance of the environmental issues involved and with the information needs of both the decision-makers and the general public.

The proposed action addressed in this EA is the construction of a Digital Airport Surveillance Radar (DASR; specifically, an ASR-11) at Columbus Air Force Base (AFB) in Mississippi. This proposed action is part of the Department of Defense (DoD) National Airspace System (NAS) Program, which involves installation of new air traffic control equipment on U.S. Army, U.S. Navy, and USAF bases throughout the country and at overseas DoD installations. These radars are also being installed at commercial airports under the authority of the Federal Aviation Administration (FAA). The implementation of the NAS program at DoD bases was previously evaluated in a programmatic EA and FONSI (USAF, 1995), which fully detailed the need for the program. The programmatic EA and FONSI are available on the internet at

http://eschq.hanscom.af.mil/ESC-BP/pollprev/products.htm#EAs. Environmental review at FAA airfields is being conducted separately by the FAA.

The programmatic EA for the NAS program committed to completing site-specific NEPA documentation tiered from the programmatic EA for individual NAS sites. This EA addresses the site-specific impacts of locating an ASR-11 on Columbus AFB, and evaluates the consequences of constructing and operating an ASR-11 on both the natural and man-made environments.

1.2 PURPOSE OF THE ACTION

The NAS program was developed to modernize military air traffic control systems in the United States and its territories. DoD NAS is a component of the aviation system capital investment plan developed by the FAA. Pursuant to the Program Management Directive (USAF, 1994), the DoD must provide services within its delegated airspace which are comparable to the services which FAA provides to civil aircraft in civilian airspace. These services include flight following, separation, expeditious handling, radar approach control, and landing.

The purpose of the DASR component of the USAF NAS program is to detect and process aircraft position and weather conditions in the vicinity of USAF airfields. The DASR will serve to accurately locate aircraft, in terms of range, azimuth, and altitude; provide information regarding aircraft identification code; identify emergency conditions; and report six discrete weather precipitation levels. The new radar facility will not increase or decrease the current number of flights, change aircraft patterns, or otherwise alter existing base operations.

1.3 NEED FOR THE ACTION

The NAS program is comprehensively upgrading air traffic control systems infrastructure by systematically replacing analog systems with state-of-the-art digital technology. The ASR-11 at Columbus AFB is needed to replace the existing AN/GPN-20 airport surveillance radar, which was installed in 1985 and moved in 1995 to its current location. The ASR-11 will improve system reliability, provide additional weather data, reduce maintenance cost, improve performance, and provide digital data input to proposed new digital automation system air traffic controller displays. The proposed new ASR-11 will take advantage of the significantly increased capabilities of digital technology.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The proposed action is the installation of an ASR-11 at Columbus AFB in Mississippi (Figure 2-1) to replace the existing AN/GPN-20 radar facility. The U.S. Air Force in conjunction with Columbus AFB has selected a preferred site (**Site 5**) for the radar based on operational and base considerations. Alternatives to the proposed action include no action, and installation of the ASR-11 at an alternative site. The no-action alternative consists of not constructing the ASR-11 facility and would involve the continued use of the existing AN/GPN-20 system. Three sites, Sites 2, Site 4, and Site 5 (Figure 2-2), were identified on Columbus AFB in accordance with the *NAS Siting Plan* (USAF, 1995) and the FAA *Primary and Secondary Terminal Radar Siting Handbook* (FAA, 1992), as well as site-specific criteria identified in the *Columbus AFB Integrated Site Survey Report* (USAF, 2002a). This EA discusses and evaluates potential impacts associated with the placement of the ASR-11 at each of the three alternative sites and also summarizes the potential impacts associated with the no action alternative.

2.1 PROPOSED ACTION: DASR AT COLUMBUS AFB

2.1.1 DASR System

The DASR system would detect and process aircraft position and weather conditions at the airfield. The DASR system would consist of two subsystems: the Primary Surveillance Radar and the Monopulse Secondary Surveillance Radar. The purpose of the subsystems would be to accurately locate aircraft, in terms of range, azimuth, and altitude.

The Primary Surveillance Radar would transmit electromagnetic waves in the form of radio frequency pulses, which backscatter from the surface of aircraft. The radar would measure the time required for an echo to return and the direction of the signal in order to determine the aircraft range and azimuth, respectively. By comparing variations in returned signal parameters, such as phase differences between pulses, the radar could separate moving targets from stationary clutter, such as mountains and trees. The primary radar would also report six discrete weather precipitation levels (from mild to hazardous) via a processing channel dedicated to weather detection and reporting. The DASR system would provide highly accurate target data to the Columbus AFB Local Control Facilities and Military Control Towers. The ASR-11 would

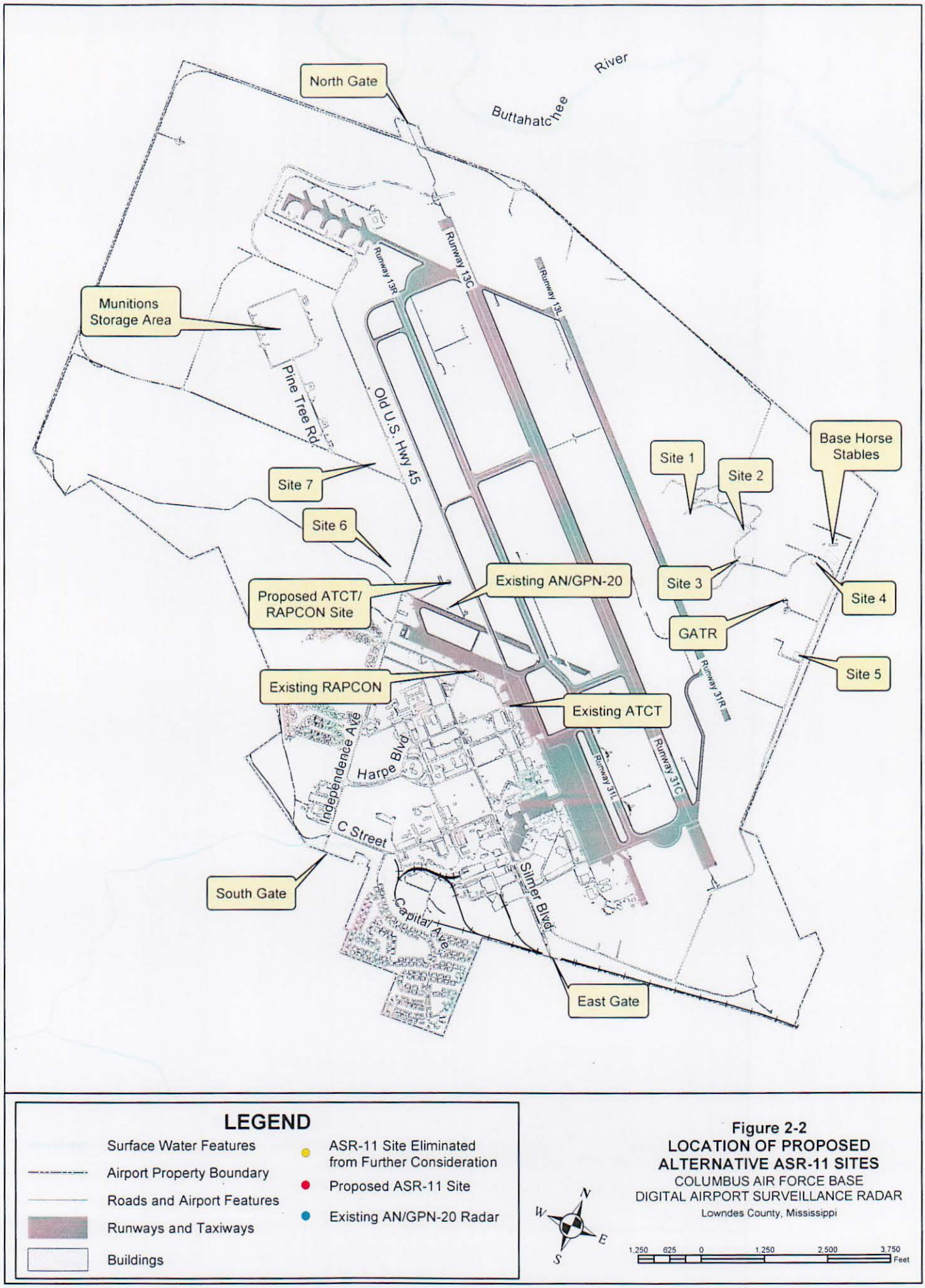


Source: ESRI, 2001

FIGURE 2-1
LOCATION OF COLUMBUS AIR FORCE BASE

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
LOWNDES COUNTY, MISSISSIPPI

ColumbusLocation2.mxd



Source: Columbus AFB, 2001b

Figure 2-2
LOCATION OF PROPOSED ALTERNATIVE ASR-11 SITES
COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

ColumbusSites.mxd

have clutter rejection, target accuracy, and probability of detection that are equal to or better than the existing AN/GPN-20. Operational characteristics of the new ASR-11 as compared to the existing AN/GPN-20 are shown in Table 2-1.

Table 2-1. Comparison of Characteristics of Existing AN/GPN-20 and Proposed ASR-11

	Existing AN/GPN-20	Proposed ASR-11
Frequency	2860 MHz 2790 MHz	2 frequencies separated by at least 30 MHz: 2700-2900 MHz
Power Peak	478 kW	19.5 kW (1 microsec) 18.0 kW (89 microsec)
Average	398 W	1600 Watts (Solid state)
Pulse Repetition Frequency	1040 pulses/second	720-1050 pulses/second

Sources: Columbus AFB, 2001a; MITRE, 1997; Belden, 1999

The Monopulse Secondary Surveillance Radar (also called the beacon radar) would be a cooperative system consisting of ground-based beacon interrogator/receiver systems and existing aircraft based transponders. The secondary radar would obtain additional information, such as identification code, barometric altitude, and emergency conditions, from an aircraft transponder. Various processing techniques would be used to decipher both overlapping responses from multiple aircraft (synchronous garble) and aircraft responses to other beacon systems (asynchronous interference). The beacon radar would also provide rapid identification of aircraft in distress. The Monopulse Secondary Surveillance Radar transmits at a frequency of 1030 MHz and receives at a frequency of 1090 MHz.

The DASR facilities at Columbus AFB would consist of: a 20-foot tall rotating radar antenna mounted on a 77- or 87- foot tower (depending on the selected site), a concrete radar equipment shelter, an emergency engine generator in a concrete shelter, utility cabling, electronic equipment grounding systems, and a 1,000-gallon aboveground fuel storage tank (see Figure 2-3 for a photograph of a typical ASR-11 facility). Facility construction would include separate concrete foundations for the antenna tower, the equipment shelter and the engine generator shelter and a 140-foot by 140-foot site fence. Site work should be within a 0.59-acre site (160 feet by 160

feet). Additional site improvements would include: minor re-grading, installation of geotextile fabric beneath six inches of crushed stone within the site fence and up to 1,700 feet of utility trenching to connect the site to existing duct banks, manholes or utility hook-ups. The total structure height, including lightning rods on the antenna tower, would be 106 to 116 feet depending on the site chosen.



Figure 2-3. Typical ASR-11 Facility

Approximately 30 to 1,700 feet of utility trenching between the edge of the site and existing duct banks/manholes would be required to connect the ASR-11 to existing electric and telephone lines in the vicinity of the alternative sites. Also depending on the site chosen, between 1,200 and 1,700 feet of fiber optic cable would be required to connect the ASR-11 to the Radar Approach Control (RAPCON; USAF, 2002a).

Once the new DASR system is operational, the existing AN/GPN-20 would be dismantled and structures would be removed to existing grade. Any subsequent subsurface activities (removal of

footings, etc.) would be the responsibility of Columbus AFB. Upon completion, the area formerly occupied by the existing AN/GPN-20 would be reclaimed by the base.

2.1.2 Alternative ASR-11 Sites

Three alternative sites on Columbus AFB have been identified as potential locations for the ASR-11, based on the siting criteria contained in the *Columbus AFB Integrated Site Survey Report* (USAF, 2002a) prepared by Raytheon Systems Company (see Appendix B). The three sites evaluated in this EA were identified based on operational, construction, and environmental criteria. The operational criteria included the following (FAA, 1992):

- The site should not be located closer than 0.5 mile from the end of any existing or planned runway.
- The site should not be located closer than 0.5 mile from any point of required detection coverage.
- The site should not be located closer than 2,500 feet from any existing or planned electronic equipment installation or facility.
- The site should not be located closer than 0.5 mile from National Weather Bureau radars and radiosonde equipment.
- The site should not be located closer than 1,500 feet to any aboveground object that would interfere or cause degradation in the ASR-11 operation.

Construction criteria included siting the ASR-11 in an area with a slope of less than 20 percent and away from occupied existing structures, railroads, highways, runways and taxiways, or power lines. The environmental criteria for siting included avoiding a number of sensitive resources, including: ecological/wildlife refuges, preserves, conservation areas and sanctuaries; wild and scenic rivers; prime and unique farmlands; historical, archaeological, and cultural sites; wetlands; threatened and endangered species habitat; designated hazardous waste sites; and floodplains. The details of the siting process are described in the *Integrated Site Survey Report* prepared by Raytheon Systems Company (USAF, 2002a).

Initial site selection screening criteria applied in February 2001 identified seven candidate sites (Sites 1 through 7, Figure 2-2) for consideration at the downselect telephone conference call held

on July 31, 2001. During the conference call, concerns regarding the FAA obstruction height restrictions at **Site 1** and **Site 3** were noted. Site 1 would definitely require a waiver from the FAA obstruction height requirements, while Site 3 would probably require a waiver. To avoid the need for a waiver for DASR installation at these sites, they were eliminated from further consideration. **Site 6** is located near a wetland area and an IRP site and has a less suitable elevation compared to Sites 2, 4, 5, and 7. To avoid impacts to the wetland area and the potential for encroaching upon the contaminated site, Site 6 was eliminated. **Site 7** is less preferable than Sites 2, 4, and 5 from both an elevation and coverage standpoint; therefore, this site was eliminated from further consideration.

Site 2, **Site 4**, and **Site 5** were selected for further investigation as potential locations for the proposed ASR-11. All three sites are located in the northeastern portion of the base. This area is largely undeveloped with a single road, Perimeter Road, winding through the large stands of mature pines that fill the area.

Site 2 abuts Perimeter Road (Figure 2-4) approximately 1,800 feet east of Runway 13L/31R. The site is wooded and lies on the opposite side of Perimeter Road from a former landfill that has been designated as an Installation Restoration Program (IRP) site. Long-term monitoring is in place at the IRP site.

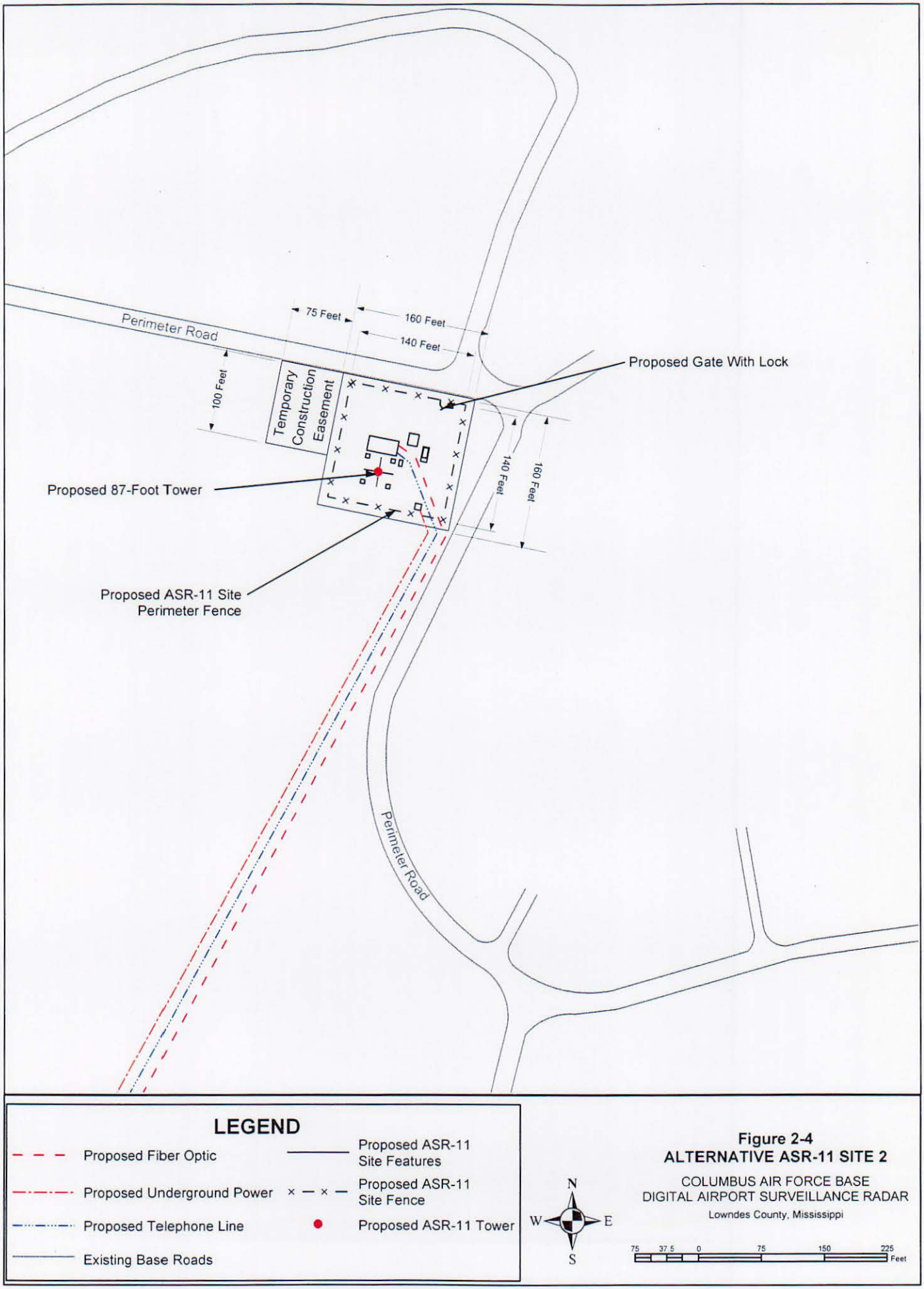
Site 4 (Figure 2-5) is located approximately 300 feet south of the base horse stables. Site 4 is located within a cleared area that is surrounded by tall pines approximately 1,000 feet north of the Ground to Air Transmit/Receive (GATR) facility. According to base personnel, the area was cleared during a previous natural attenuation study performed in conjunction with the Tennessee Valley Authority (TVA). A former landfill included in the IRP program, lies approximately 200 feet to the west of Site 4. Long-term monitoring is in place at the IRP site.

Site 5 (Figure 2-6) is located approximately 250 feet west of the base property line and 1,300 feet south-southeast of the GATR facility. The site is mostly vegetated with trees, shrubs, and some herbaceous growth. An unnamed gravel/dirt road runs along the southern boundary of the site and Perimeter Road is located along its eastern boundary.

2.2 NO ACTION ALTERNATIVE

Implementation of the No Action Alternative would result in the continued use of the AN/GPN-20 radar. Continued use and reliance on the AN/GPN-20 would deny Columbus AFB of the improved technology offered by the new DASR system. Columbus AFB would not benefit from the improved system reliability, additional weather data, reduced maintenance costs, and improved performance provided by the ASR-11 radar.

Conditions reflecting the No Action Alternative are discussed for each of the twelve main environmental parameters evaluated in Section 3.0. For each parameter, the No Action alternative is characterized in the section addressing Future Baseline Without the Project.

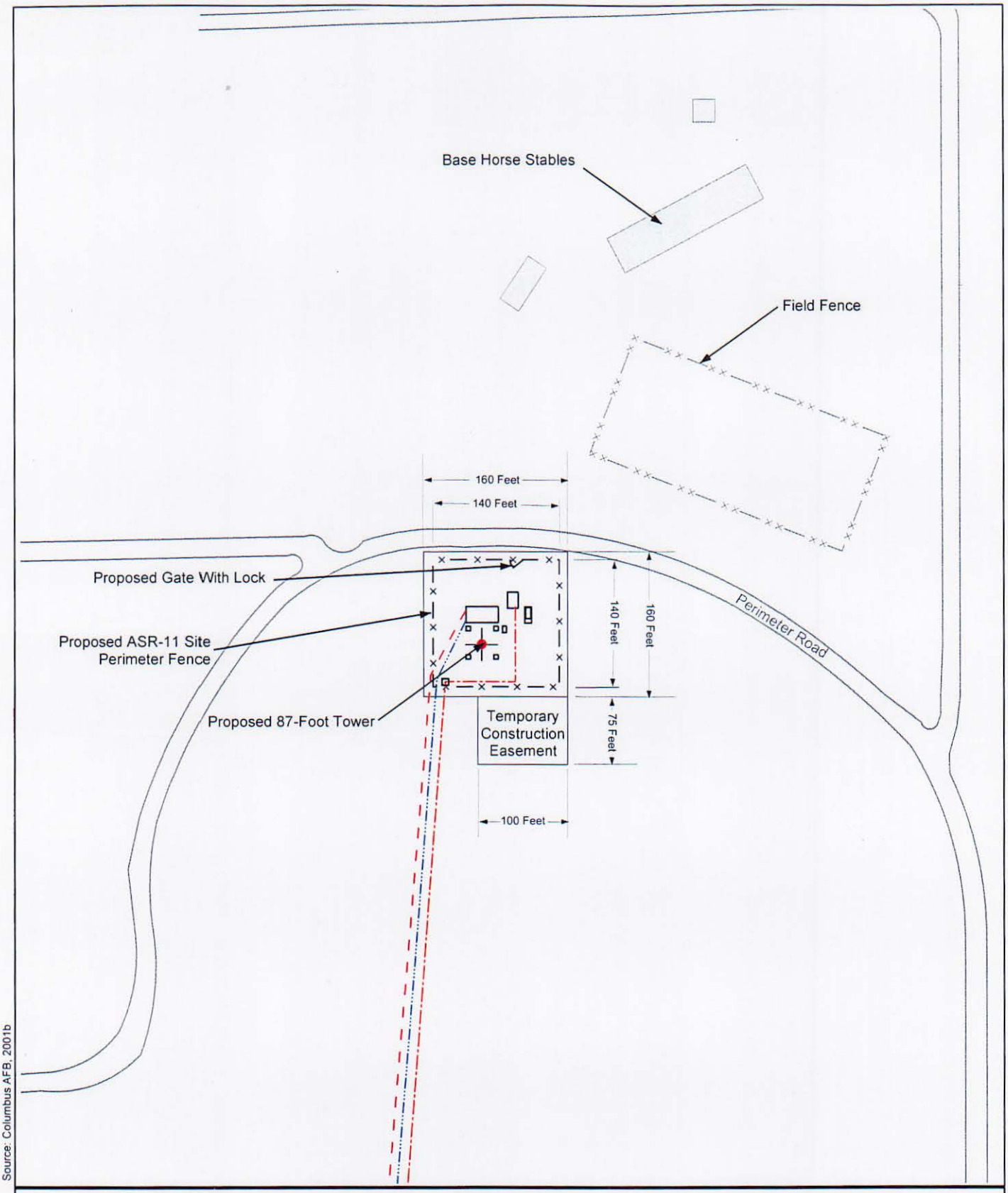


Source: Columbus AFB, 2001b

Figure 2-4
ALTERNATIVE ASR-11 SITE 2

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Site 2 Layout.mxd



Source: Columbus AFB, 2001b

LEGEND

- Proposed Fiber Optic
- Proposed Underground Power
- Proposed Telephone Line
- Existing Base Roads
- Field Fence
- Proposed ASR-11 Site Features
- Proposed ASR-11 Site Fence
- Base Horse Stables
- Proposed ASR-11 Tower

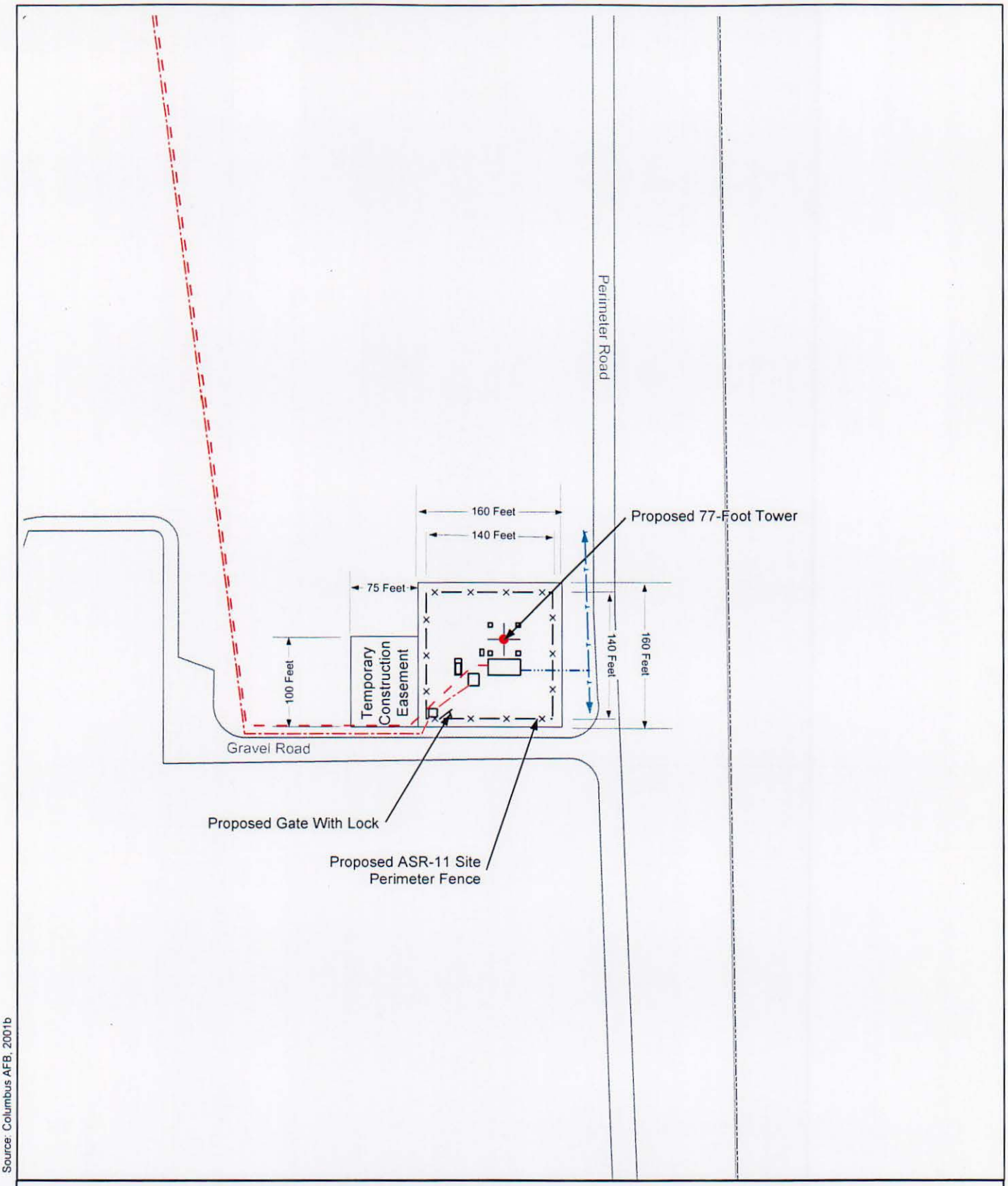
N W E S

75 37.5 0 75 150 225 Feet

Figure 2-5
ALTERNATIVE ASR-11 SITE 4

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Site 4 Layout.mxd



Source: Columbus AFB, 2001b

LEGEND

- Existing Telephone
- Proposed Fiber Optic
- Proposed Underground Power
- Proposed Telephone Line
- Airport Property Boundary
- Existing Base Roads
- Proposed ASR-11 Site Features
- Proposed ASR-11 Site Fence
- Proposed ASR-11 Tower

N
W E
S

75 37.5 0 75 150 225 Feet

Figure 2-6
ALTERNATIVE ASR-11 SITE 5

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Site 5 Layout.mxd

3.0 AFFECTED ENVIRONMENT

The existing environmental conditions and future conditions without the project are described for each candidate site to provide a baseline against which potential impacts related to construction and operation of the ASR-11 can be compared. Existing environmental conditions on Columbus AFB are presented in this section for each of the parameters and site-specific detail is included, as available. Environmental conditions at the existing AN/GPN-20 site are also described to assess any potential issues associated with its removal. The following information was obtained from several documents/reports obtained from Columbus AFB Environmental Flight staff and supplemented with data collected during a site visit conducted in December 2001. Subsequent communications with base personnel contributed additional information that is included in this document.

3.1 LAND USE

The purpose of this section is to characterize land uses throughout Columbus AFB. Specifically, the land use attributes of the existing AN/GPN-20 site and the alternative ASR-11 sites (Site 2, Site 4, and Site 5) are addressed.

3.1.1 Existing Conditions

Columbus AFB, owned and operated by the United States Air Force, is located in the Black Plains of northeast Mississippi, approximately ten miles north of the City of Columbus and approximately ten miles west of the Alabama state line (USAF, 1998a). The AFB is accessible from U.S. Highway 45 and State Highway 373 (Figure 2-1).

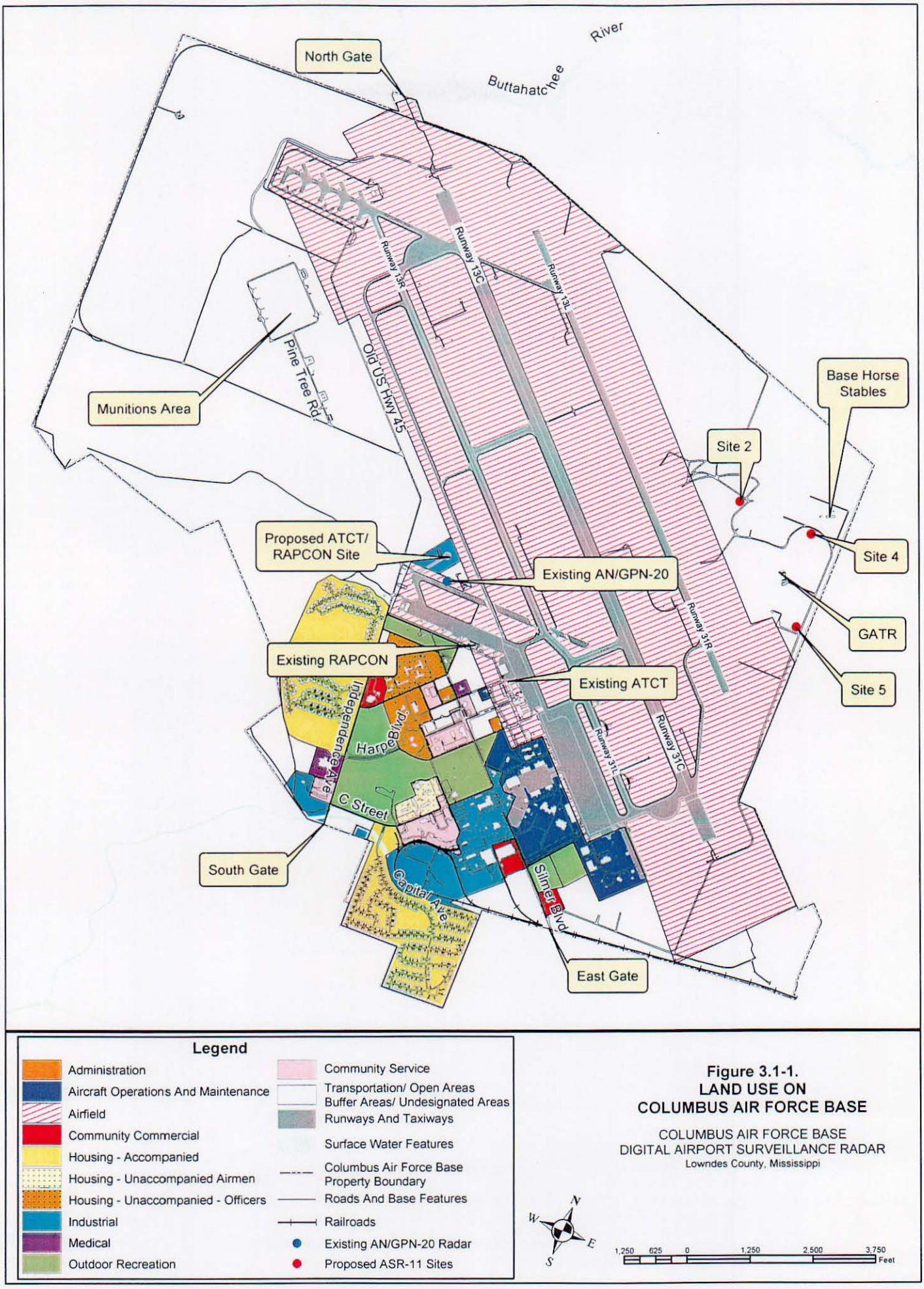
Columbus AFB encompasses over 4,300 acres, approximately three miles southeast of the confluence of the Buttahatchee and Tombigbee Rivers. The area surrounding and including Columbus AFB lies in the Tombigbee River Basin and is characterized by four (out of six) land use classifications of the Mississippi Department of Environmental Quality (MDEQ). These categories consist of Urban, Pasture/Rangeland, Wetland, and Forest; the majority of the base is located within the forest category (USAF, 2001a). Areas surrounding Columbus AFB are mostly

rural, with farming and forestry as the principal activities. MDEQ categorizes these areas as residential with some commercial, public and semi-public parcels.

Columbus AFB is characterized by various individual land use categories, including: airfield, airfield operations and maintenance, industrial, community-commercial, community-service, outdoor recreation, medical/dental/veterinary, housing-unaccompanied (officer), housing-unaccompanied (airmen), housing-accompanied, administrative, transportation, open areas, buffer areas, and undesignated areas (USAF 2001a; Figure 3.1-1 and Table 3.1-1). In addition to the land use categories, there are "grounds categories" identified by Columbus that consist of improved (I), semi-improved (SI), and unimproved (UI) areas. Improved areas are those where regular maintenance is conducted. Semi-improved areas are those areas where less frequent/periodic maintenance occurs and unimproved areas are those areas where no maintenance is conducted, such as the southwest corner of the base. Some land use categories consist of two or more of these "grounds categories". Development on the base is predominantly situated in the south-central portion, where the cantonment area is located. The remainder of the base consists primarily of airfield, transportation, open areas, buffer areas, and undesignated areas.

Site 2 is located within an area defined as transportation/open areas/buffer areas/undesignated areas, approximately 1,800 feet northeast of Runway 13L/31R and 1,500 feet northwest of the Ground to Air Transmit/Receive (GATR) facility. The forested site, which is located inside a sharp bend on the south side of Perimeter Road, is mostly vegetated with trees, shrubs, and some herbaceous growth. A closed landfill (Installation Restoration Program (IRP) landfill LF012) is located north of the site, on the opposite side of Perimeter Road (see Section 3.11). To the east lie wetlands, and the base property line, approximately 200 feet and 2,100 feet, respectively. Clay and gravel pits lie beyond the base property line in this area. In the area of Site 2, as well as Sites 4 and 5, Perimeter Road is occasionally used by recreational runners and walkers.

Site 4 is located within an area defined as transportation/open areas/buffer areas/undesignated areas, approximately 2,200 feet east of Runway 13L/31R and 1,000 feet northeast of the GATR facility. The site, which is located on the south side of Perimeter Road between Site 5 and Site 2, is mostly vegetated with shrubs and herbaceous growth, with trees surrounding the perimeter.



Source: Columbus AFB, 2001b

Legend

- Administration
- Aircraft Operations And Maintenance
- Airfield
- Community Commercial
- Housing - Accompanied
- Housing - Unaccompanied Airmen
- Housing - Unaccompanied - Officers
- Industrial
- Medical
- Outdoor Recreation
- Community Service
- Transportation/ Open Areas
- Buffer Areas/ Undesignated Areas
- Runways And Taxiways
- Surface Water Features
- Columbus Air Force Base Property Boundary
- Roads And Base Features
- Railroads
- Existing AN/GPN-20 Radar
- Proposed ASR-11 Sites

N W E S

1,250 625 0 1,250 2,500 3,750 Feet

Figure 3.1-1.
LAND USE ON COLUMBUS AIR FORCE BASE

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

ColumbusLandUse.mxd

Table 3.1-1 Land Use Definitions

Grounds		Land Use		Typical Facilities and Features
Category	Area (Acres)	Category	Area (Acres)	
I	2,206.3	Airfield	1,857.4	Runways, taxiways, aprons
I		Administrative	23.5	Offices, engineering
I		Community - Commercial	17.5	Mall concessionaires, credit union, barber shop
I		Community - Service	17.1	Chapel, theater, education center, post office
I		Medical	31.5	Composite clinic, dental clinic
I		Housing - Accompanied	222.4	Family housing
I		Housing - Unaccompanied	37.0	Apartments, visitor's housing
SI	201.6	Aircraft Operations & Maintenance	94.5	Maintenance shops, hush house, flight simulators, hangars, fire station
SI		Industrial	107.1	Water treatment plant, transportation, cold storage
I, SI	108.1	Outdoor Recreation	108.1	Playgrounds, golf course, picnic areas, playing courts
I, SI, UI	1,817.9	Water, Transportation, Open Areas Buffer Areas Undesignated Areas	1,817.9	Wetlands, lakes, ponds, roads, fields, forests

Source: U.S. Air Force, 2001a; Columbus AFB 2001b

I = Improved, SI = Semi-Improved, UI = Unimproved

As noted above, Perimeter Road is occasionally used by recreational runners and walkers. On the opposite side of Perimeter Road to the northwest is a closed landfill (IRP landfill LF007, see Section 3.11), and to the northeast are the base horse stables. The base property line lies approximately 650 feet to the east, beyond which are clay and gravel pits.

Site 5 is located within an area defined as transportation/open areas/buffer areas/undesignated areas, approximately 1,200 feet east of Runway 13L/31R and 1,300 feet south-southeast of the GATR facility. The site, which is located on the west side of Perimeter Road, is mostly vegetated with trees, shrubs, and some herbaceous growth. As noted above, Perimeter Road is

occasionally used by recreational runners and walkers. The base property line is located approximately 250 feet to the east.

The existing **AN/GPN-20** is located on the opposite (southwest) side of the runways from the three ASR-11 site alternatives. It is approximately 1,000 feet west of Runway 13R/31L, on the north side of the main base area, in an area designated for "airfield" land uses. The existing AN/GPN-20 is surrounded by maintained grass and pavement/airfield.

3.1.2 Future Baseline Without the Project

The Columbus AFB General Plan, completed in 1998, indicates that future plans for the base include the construction of a new ATCT/RAPCON and the need for additional hanger space, Logistics Complex, and Corrosion Control facilities. Other improvements include road repair, runway aprons, and building upgrades (residential and operation related). Housing in the State Magnolia Village is currently being razed and rebuilt (CAFB, 2002a). Despite the improvements, Columbus AFB does not anticipate any changes in land use at the three alternatives sites or the existing AN/GPN-20 site.

3.2 SOCIOECONOMICS

3.2.1 Existing Conditions

This section addresses the population, employment, general economic condition, and housing of Columbus AFB and the surrounding area. Socioeconomic data specific to the alternative ASR-11 site locations and the existing AN/GPN-20 radar system do not exist. However, there are data for the general area of Columbus AFB, including Lowndes County and parts of Clay and Monroe Counties.

Tract level population data from the 2000 Census are presented here because block group level data are not yet available. Poverty level data are not yet available from the 2000 census, therefore, data reported in this EA are from the 1990 census.

3.2.1.1 Population. According to the U.S. Bureau of the Census, the population of Mississippi in 2000 was 2,844,658 (Table 3.2-1). This represents a population increase of approximately

10.5 percent over one decade (1990-2000). Lowndes County had a population of 61,568 in the year 2000, representing a population increase of 3.8 percent since 1990. Columbus City had a population increase of 9.0 percent over the same 10-year period (USCB, 1990 and 2000).

Table 3.2-1. Population Trends for Mississippi, Lowndes County, and the City of Columbus

Area	1990 Census	2000 Census	% Change (1990-2000)	2010 Predicted	Predicted % Change (2000-2010)
Mississippi	2,573,216	2,844,658	10.5	3,104,296[1]	9.1
Lowndes County	59,308	61,568	3.8	64,081[1]	4.1
City of Columbus	23,799	25,944	9.0	--[2]	--[2]

Sources: U.S. Bureau of the Census, 1990 and 2000; Center for Policy Research and Planning, 2002

[1] Based on 1990 Census

[2] Data Unavailable

The population of Columbus AFB is approximately 4,131 persons (January 2001), of which approximately 2,000 reside on the base (USAF, 2001b; USBC, 2000) while the remaining live in the surrounding community. The base population consists of military personnel, military dependents, and civilian employees (Table 3.2-2). In addition, there are approximately 4,900 retirees that live in the communities surrounding Columbus AFB (USAF, 2001b).

Table 3.2-2. Columbus Air Force Base Approximate Population Breakdown

Category	Number	Percent of Total
Military Personnel	1,410	34.1
Civilian Personnel	1,267	30.7
Military Dependants	1,454	35.2
Total	4,131	100.0

Source: U.S. Air Force, 2001b

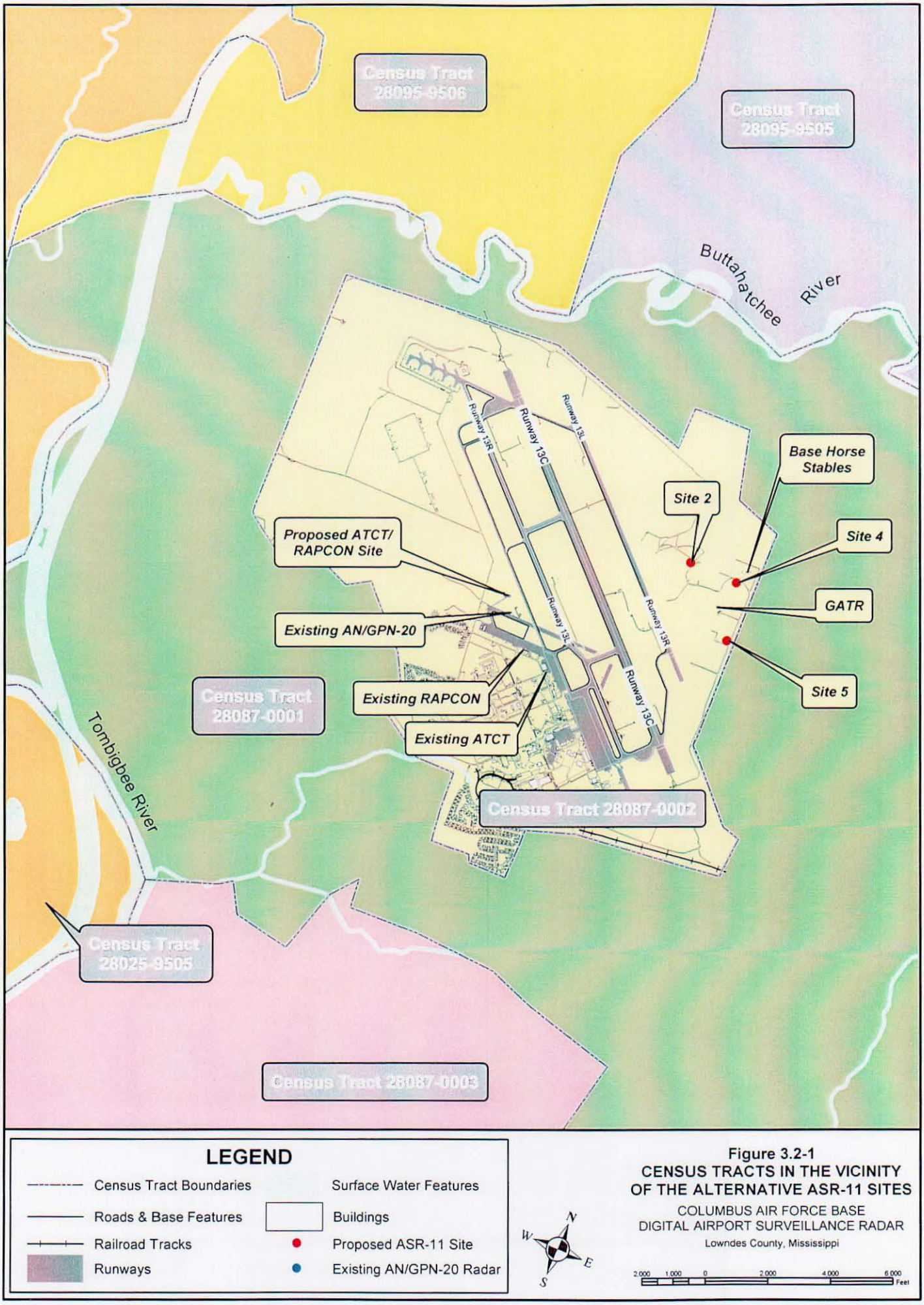
Note: Numbers represent persons associated with Columbus AFB, not persons residing on the base.

As shown on Figure 3.2-1, Columbus AFB is located entirely within Census Tract number 28087-0002 (USBC, 2000). Five other census tracts surround the area of the base, two in Lowndes County (28087-0001 and 28087-0003), one in Clay County (28025-9505) and two in Monroe County (28095-9505 and 28095-9506). The Columbus AFB census tract (28087-0002) is surrounded by Census Tract 28087-0001.

Within these census tracts, population ranges from 2,060 to 7,880 persons (Table 3.2-3). Although the total population of Columbus AFB (Census Tract 28087-0002) is the lowest of the six census tracts, it has the second highest population density. Only Census Tract 28087-0003 has a higher population density, likely because it encompasses a portion of the City of Columbus.

Of the six census tracts, the tract of Columbus AFB (28087-0002) contains the lowest percentage of persons living below the poverty level. This percentage (3.1 percent) is substantially lower than the state (25.2 percent), Lowndes County (22.1 percent), and City of Columbus (28.6 percent). The tracts containing the highest percentage of persons living below the poverty level occur to the north and the west of the base (28095-9506 and 28025-9505). These percentages are substantially higher than the other four census tracts; however, they are generally similar to the state, Lowndes County, and the City of Columbus values. The census tract closest to the ASR-11 alternative sites (28087-0001) contains a percentage of persons living below the poverty level (14.0 percent) that is higher than the tract of Columbus AFB, but lower than the poverty levels of the state, Lowndes County, and the City of Columbus.

The census tract containing Columbus AFB has a higher percentage of white population (73 percent) than the state, Lowndes County or the City of Columbus (Table 3.2-3). The tract immediately adjacent to the alternative sites (Tract 228087-0001) also has a high percentage of white population (75 percent). Census tracts with a greater percentage of black population are located to the southwest and northwest of the base.



Source: U.S. Bureau of the Census, 2000

Figure 3.2-1
CENSUS TRACTS IN THE VICINITY OF THE ALTERNATIVE ASR-11 SITES
COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

ColumbusCensus.mxd

Table 3.2-3. Income and Ethnicity Statistics for Mississippi, Lowndes County, the City of Columbus, and Census Tracts in the Vicinity of Columbus Air Force Base

AREA	Mississippi	Lowndes County	City of Columbus	Census Tracts in the Vicinity of Columbus Air Force Base					
				28087-0001 Lowndes Cty.	28087-0002 Columbus AFB Lowndes Cty	28087-0003 Lowndes Cty.	28025-9505 Clay Cty.	28095-9505 Monroe Cty.	28095-9506 Monroe Cty.
Total Persons	2,844,658	61,586	25,944	7,880	2,060	7,495	4,191	7,488	3,500
Number of Households	1,046,434	22,849	10,062	2,920	570	2,934	1,582	2,841	1,273
Percent Below Poverty Level *	25.2	22.1	28.6	14.8	3.2	6.8	22.2	11.4	25.6
Land Area (sq mi)	46,907	502	11.5	98.8	7.1	24.5	98.1	236	197
Population Density (Persons / mi^2)	60.6	122.7	2256	79.8	290	306	42.7	31.7	17.8
ETHNICITY PERCENTAGES									
White	60.7	56.0	43.3	75.1	73.3	76.7	44.4	86.5	40.9
Black/African American	36.2	41.4	54.3	22.4	16.0	20.0	54.5	11.9	58.0
American Indian or Alaskan	0.4	0.2	0.1	0.2	0.7	0.1	0.0	0.1	0.0
Asian	0.6	0.5	0.5	0.4	2.5	1.0	0.2	0.1	0.1
Hawaiian or Pacific Islander	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hispanic	1.4	1.1	1.1	1.0	4.9	1.2	0.6	1.1	0.5
Other	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1
Two or more races reported	0.6	0.8	0.7	0.8	2.6	0.9	0.4	0.4	0.4

Source: U.S. Bureau of the Census, 1990 and 2000

* Most recent available poverty data consistent for all geographic units is from 1990 Census data.

3.2.1.2 Employment. As of December 2001, the total labor force was estimated to be 27,620 and the unemployment rate within Lowndes County was 9.2 percent (Table 3.2-4). The City of Columbus, located approximately nine miles from Columbus AFB, contains nearly half the labor force (12,060) of Lowndes County, but has an unemployment rate of 14.4 percent. Columbus AFB employs approximately 2,677 people, of which approximately 1,267 are civilians (USAF, 2001b).

Table 3.2-4. Labor Force, Employment, and Unemployment Data for Lowndes County and City of Columbus - December 2001

Area	Labor Force	Employed	Unemployed	Unemployment Rate (percent)
Lowndes County	27,620	25,080	2,540	9.2
City of Columbus	12,060	10,320	1,740	14.4

Source: Mississippi Employment Security Commission, 2002

3.2.1.3. Expenditures of Columbus Air Force Base. Columbus AFB contributes approximately $156 million to the economy of Lowndes County through its direct employment and purchases from local businesses. The military payroll is approximately $50.3 million, the civilian payroll approximately $36.2 million, and the military retirees payroll is approximately $70.8 million. Secondary jobs created by the base are estimated at 845 (USAF, 2001b).

3.2.1.4 Housing. The City of Columbus had a lower owner occupied rate (54 percent) than Lowndes County in 2000, though the vacancy rate was the same (Table 3.2-5). Columbus AFB has 740 family housing units, five unaccompanied quarters for permanent personnel, two guest quarters (dormitory-type buildings), 20 temporary housing units, and six houses for temporary or transient personnel. The accompanied housing, located south and west of the main base area, consists of three developments: Capitol Village, State Village, and Magnolia Village, while unaccompanied housing is within the main base area (USAF, 1998a). Although a substantial amount of housing exists on base, it is inadequate for the military personnel assigned to Columbus AFB (USAF, 1998a). Hence, many military personnel live in the surrounding community.

Table 3.2-5. Housing Units and Vacancy (2000)

AREA	OCCUPIED		VACANT		TOTAL UNITS
	By Owner	By Renter	Empty	Seasonal	
Lowndes County	15,197	7,652	2,024	231	25,104
City of Columbus	5,461	4,601	989	61	11,112

Source: U.S. Bureau of Census, 2000

3.2.2 Future Baseline Without the Project

The socioeconomic characteristics of Columbus AFB are not expected to change substantially in the future without the proposed project. No proposed projects identified in the base's Comprehensive General Plan would result in a substantial alteration of the population, employment or housing of the base and those areas surrounding the base where base personnel reside.

3.3 UTILITIES AND TRANSPORTATION

3.3.1 Existing Conditions

The utility service at Columbus AFB, including availability in the vicinity of the alternative ASR-11 sites, is discussed in this section. The utilities include water, wastewater, solid waste, electricity, telephone, fiber optic and natural gas. Transportation is described in Section 3.3.1.8.

3.3.1.1 Water Supply and Distribution. Columbus AFB receives its water from the City of Columbus municipal water supply system. The total potable water usage at Columbus AFB in 1999 was approximately 177 million gallons, averaging approximately 0.5 million gallons per day (mgd) (USAF, 2001c). The base has one holding tank, which is capable of storing 0.66 million gallons (USAF, 2001c). Columbus AFB has three wells on base that draw water from the Eutaw aquifer. Only one of the three existing wells has (and still is currently) been used to provide potable water at the Munitions Storage Area. The remaining two well provide non-potable water to the horse stable (Building 2030) and the dog kennel (Building 2054).

There are no water distribution lines in the vicinity of **Site 2, Site 4,** or **Site 5** (USAF, 2001c). The existing **AN/GPN-20**, due to its location adjacent to airport operations, is closer to water supply lines than the alternative ASR-11 sites; however, no water distribution lines are located immediately adjacent to the facility.

3.3.1.2 Wastewater Treatment. Wastewater treatment for Columbus AFB is handled by the City of Columbus Wastewater Treatment Plant (WTP), which has a design capacity of ten mgd. The plant treats approximately 6.25 mgd, with an average of 0.436 mgd conveyed from Columbus AFB (USAF, 2001c). Ground water infiltration into the base sewer system accounts for an increase of approximately seven percent of the expected normal wastewater flow, with peak increases of up to 50 percent during rain events (USAF, 2001c). Sewer line repairs have already been completed in the base housing areas to remedy the storm water and groundwater infiltration into the system (CAFB, 2002a). Columbus AFB also has a National Pollutant Discharge Elimination System (NPDES) permit, issued by the MDEQ, that authorizes the base to discharge treated ground water to the WTP in the City of Columbus (USAF, 2001a).

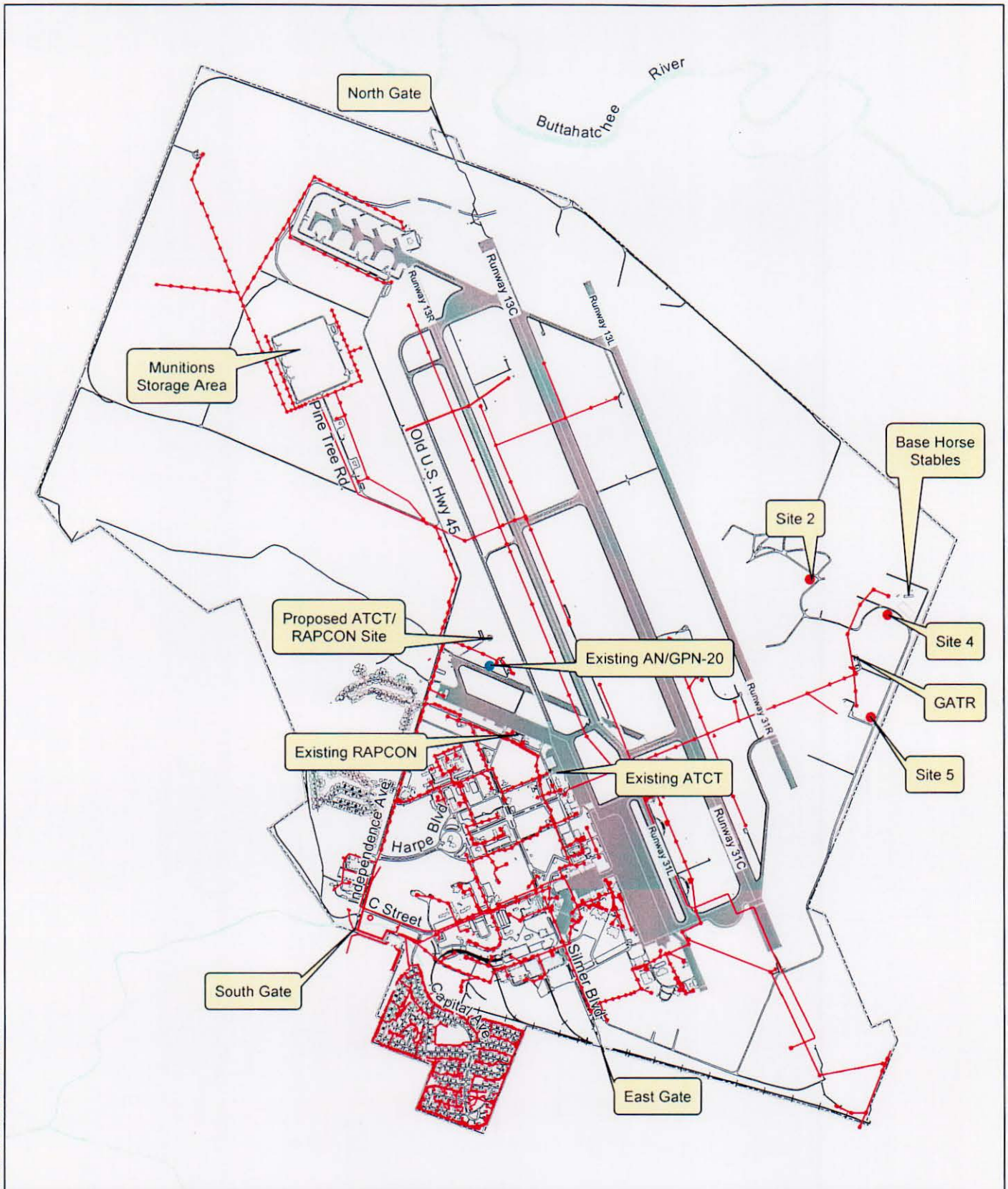
There are no wastewater collection lines in the vicinity of **Site 2, Site 4,** or **Site 5.** (USAF, 2001c). The existing **AN/GPN-20**, located adjacent to airport operations, is closer to the wastewater collection system than the alternative ASR-11 sites; however, no wastewater lines abut the facility.

3.3.1.3 Solid Waste. In accordance with AFI 32-7042, Columbus AFB has developed a solid waste management plan and a pollution prevention plan. According to the base plans, a municipal solid waste management company, Mississippi Industrial Waste, collects solid waste from the base housing, industrial, and aircraft operations and maintenance areas. Mississippi Industrial Waste transports the waste to the Golden Triangle Solid Waste Authority (SWA) landfill for disposal. The Golden Triangle SWA landfill is permitted for 30 acres and has a life expectancy of seven years; however, the SWA is currently in the permitting process to access an additional 260 acres, which would have a life expectancy of 75 years. Recyclables from Columbus AFB are managed on base by the base's recycling center. Columbus AFB produces approximately 1,700 tons of solid waste per year (USAF, 2001b).

3.3.1.4 Electricity. Tennessee Valley Authority (TVA) supplies the base electrical distribution system, which has a 24-megawatt capacity. Annual electricity usage at Columbus AFB is approximately 41 million kilowatt hours (kWh) or 113,000 kWh per day (USAF, 2001c). The TVA is reportedly planning an Uninterruptible Power Supply (UPS) Stored Electricity Facility, which would supply backup power. The facility would be located just outside the South Gate. This project, called *Regenesis*, is the first of its kind in the United States (Columbus AFB, 2001c; USAF, 2001c).

Due to the nature of Columbus AFB operations, the base currently has two electrical feeds, as well as backup and redundant systems, and the ability to isolate sections of the system. Many mission-critical facilities (e.g. radar facilities) have fixed diesel generators as backup power supplies (USAF, 1998a). The primary feed, a radial 46-kilovolt (kV) circuit, passes through the base substation (which is owned by TVA) from TVA's West Point Distribution substation. The alternate feed is from the TVA's Columbus Distribution substation. In addition to these two feeds, a 161 kV line is located just north of the base, connecting the West Point and Lowndes substations (USAF, 1998a). Electrical transmission lines at the base installation are currently a combination of aboveground and below ground lines; however, Columbus AFB has a long-range program named *Poleaway*, which is aimed at removing all overhead power/utility lines and placing them below ground. The electrical distribution lines at Columbus AFB are shown on Figure 3.3-1.

There are no subsurface or overhead electrical power lines in the immediate vicinity of any of the alternative sites. The only source of power east of the runways is a below ground electric line that crosses from the west under the runways and then forks; one fork leads to the GATR facility, the other leads toward the general direction of Site 5. Two aboveground power lines extend from the GATR below ground line; one extends north toward the base horse stables, running between Sites 2 and 4, and the other runs south, in the general direction of Site 5. **Site 2**, farthest from electrical lines, is approximately 1,700 feet from aboveground lines; **Site 4** is located approximately 1,300 feet from aboveground power lines; and **Site 5** is located approximately 800 feet from power, almost equidistant from above and below ground lines. The existing **AN/GPN-20** site is currently supplied by a below ground electrical distribution line.



Source: Columbus AFB, 2001b

LEGEND

- Electrical Distribution Lines
- Electrical Transformers, Power Poles, Light Poles, & Manholes
- Airport Property Boundary
- Roads & Base Features
- Railroads
- Runways and Taxiways
- Surface Water Features
- Buildings
- Proposed ASR-11 Site
- Existing AN/GPN-20 Radar

N W E S

1,250 625 0 1,250 2,500 3,750 Feet

Figure 3.3-1.
ELECTRICAL DISTRIBUTION SYSTEM ON COLUMBUS AIR FORCE BASE

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

ColumbusElec.mxd

3.3.1.5 Telephone. The communications system for Columbus AFB allows the base to provide local telephone service, local area network (LAN) for single or multiple interconnected networks, connect to long-haul communication systems, and operate wireless voice (radio) networks. The transfer of information on base takes place over several types of media, including copper wire, fiber optic, and coaxial-type cable as well as microwave, satellite, and other radio frequency antennas. In addition, the base hosts a number of data communication systems, related mostly to military operations (USAF, 1998a).

The telephone switching system for Columbus AFB resides in the dial central office (DCO), located within Building 900. This office provides telephone service to base subscribers. The 1998 *Columbus AFB Comprehensive General Plan* indicates that the telephone network is at 97 percent capacity (USAF, 1998a).

There are no subsurface or overhead telephone/communication lines in the immediate vicinity of the alternative sites. The only telephone lines east of the runways extend from a below ground line that runs to the GATR. As with the power lines, the telephone lines also fork, remaining below ground on the east fork and coming aboveground on the north fork (at the GATR). The distances from telephone lines are 1,700 feet for **Site 2**, 1,300 feet for **Site 4**, and 800 feet for **Site 5**. A below ground telephone line currently serves the existing **AN/GPN-20**.

3.3.1.6 Fiber Optic. An upgrade of the fiber optic communication system at Columbus AFB has recently been completed (CAFB, 2002b). It consists of a main fiber optic backbone that connects the base area network. This distribution system supports data, digitized voice, and digitized video at very high transmission rates (USAF, 1998a).

No fiber optic lines are currently located in the vicinity of the ASR-11 sites, though some exist at the GATR facility. The distances to existing fiber optic connections are 1,700 feet, 1,300 feet and 1,200 feet to **Site 2**, **Site 4,** and **Site 5,** respectively. A below ground fiber optic line currently services the existing **AN/GPN-20**.

3.3.1.7 Natural Gas. Mississippi Valley Gas Company (MVGC) supplies natural gas to Columbus AFB, while Caledonia Natural Gas serves as the alternate supplier. Columbus AFB

uses an estimated average of 259 million cubic feet (mcf) of natural gas daily (USAF, 2001c). The peak deliverable amount, which MVGC can supply, is approximately 381 mcf daily (USAF, 2001c).

Columbus AFB recently (since 1995) converted to natural gas to replace heating and cooling systems throughout the base. The natural gas lines are located within the more developed portions of the base, with the exception of a single line that runs along the south side of the runways, to the northwest corner of the base (to the hot pad and munitions storage area (MSA)). No natural gas lines are located in the vicinity of **Site 2, Site 4** or **Site 5**. The existing **AN/GPN-20**, located on the south side of the runways is well over 1,000 feet from the nearest gas line.

3.3.1.8 Transportation. Columbus AFB is easily accessible via U.S. Highway 45 from the east, through the East Gate, and from State Highway 373, through the South Gate. An estimated 6,735 vehicles enter and leave the base during a typical work/weekday. During peak traffic times, the highest flow is through the East Gate; however, the South Gate handles a higher overall traffic flow during a 24-hour period. Parking on base is adequate for most areas; however, shortages do occur near the aircraft maintenance areas. The North Gate is not currently in use for daily access and is usually locked.

Columbus AFB roads are classified as primary, secondary or tertiary, depending on their volume of traffic. As might be expected, the primary roads are those connected to the entrance gates (East and South Gates) and the main base thoroughfare. Simler Boulevard, Independence Avenue, and 'C' Street are the base primary roads. Secondary roads are the lesser-used side roads off the main routes. These include 'F', 'D', and 'E' Streets, Seventh Street between 'B' and 'F' Streets, Capitol Avenue, Harpe Boulevard west of wing head quarters, Second Street between 'B' and 'E' Streets, and 'B' Street from Second Avenue to Simler Boulevard. The tertiary roads are predominantly situated outside the main base area and make up the remaining roads on base (USAF, 1998a). Perimeter Road, off which **Site 2, Site 4,** and **Site 5** are located, is a tertiary road with both paved and unpaved portions. The transportation network (and development in general) has not expanded into the area northeast of the runways because it is not economically feasible to extend the base infrastructure to this area (USAF, 2001a). The existing

AN/GPN-20 system is located at the edge of the cantonment area on the north side of Taxiway 33, southeast of the proposed ATCT/RAPCON tower location.

Primary or secondary explosive routes have been designated for Columbus AFB. The primary explosive route enters through the East Gate, traverses Simler Avenue, 1st Street, Independence Avenue, and finally Pine Tree Road to the MSA. The secondary "alternate" explosive route also enters the East Gate onto Simler Avenue, but takes an immediate right and extends along Perimeter Road around the north end of the runways and then to Pine Tree Road and the MSA (CAFB, 2002c). The site alternatives are all located adjacent to the secondary "alternate" explosive route.

3.3.2 Future Baseline Without the Project

No substantial changes in water supply, wastewater treatment, solid waste, natural gas or roads and parking are anticipated at Columbus AFB in the near future. The small incremental and maintenance changes, which are slated to occur, are not anticipated to affect baseline conditions in the future without the project. Substantial changes are planned, however, for electricity, telephone, fiber optic, and facility construction. The *Poleaway* program will affect the electricity and telephone routes as it converts aboveground lines to below ground lines. The base currently expects to install 96 strands of fiber optic and 300 pairs of copper lines to the GATR facility by the fall of 2002 (Columbus AFB, 2001d). Several new facilities are also in planning or under construction, including a new RAPCON/ATCT, COMBS Complex and Fuel Systems Maintenance Facility (Columbus AFB, 2001c).

3.4 NOISE

The existing noise environment of Columbus AFB is discussed in this section, as well as the noise environments of the three alternative ASR-11 sites and the existing AN/GPN-20 location. Many federal agencies use the day-night average sound level (DNL), measured in A-weighted sound levels (dBA), to describe noise and to predict community effects from long-term exposure to noise. In addition, this noise level classification system is used to determine the appropriateness of a given use of specific land (land use compatibility) relative to the average

level of environmental noise experienced at the location. These guidelines are described in the *Air Installation Compatible Use Zone (AICUZ) Program Handbook* (USAF, 1991). Noise levels below 65 decibels are considered to be compatible with residential land use. Residential land use is discouraged in areas with a noise level between 65-70 decibels, strongly discouraged in areas with sound levels between 70 and 75 decibels, and considered generally unacceptable for areas with noise levels exceeding 75 decibels.

3.4.1 Existing Conditions

Columbus AFB is the fourth busiest air traffic control center in the country, with approximately 300 flight operations per day (Columbus AFB, 2001d). The primary sources of noise on and surrounding Columbus AFB include pilot training, aircraft maintenance and transient military operations (USAF, 2001a). Aircraft flight operations represent the most substantial noise source on the base. Noise contours on the base generally follow the shape of the runways and aircraft approach and departure corridors with the area of highest decibels (80 and higher) in the immediate vicinity of the runways (USAF, 2001a).

Site 2, Site 5, and the existing **AN/GPN-20** are within an airfield operation noise contour characterized as having DNL of approximately 75-80 dBA. **Site 4** is located within the 70-75 dBA DNL noise contour (USAF, 2001a).

3.4.2 Future Baseline Without the Project

No substantial change in ambient noise conditions on the base is anticipated. No major changes in land use activities are expected to occur on the base, and specifically in the vicinity of the alternative sites. Thus, future noise levels are not anticipated to be altered on Columbus AFB in the future without the project.

3.5 AIR QUALITY

Existing air quality characteristics of Columbus AFB, including the area in the vicinity of the three alternative ASR-11 sites, are discussed in this section. Information was compiled from regional and local data and is expected to be representative of site-specific characteristics.

The United States Environmental Protection Agency (EPA) defines ambient air in 40 CFR Part 50 as "that portion of the atmosphere, external to buildings, to which the general public has access." In compliance with the 1970 Clean Air Act and the 1977 and 1990 Clean Air Act Amendments, EPA has developed ambient air quality standards and regulations. The National Ambient Air Quality Standards (NAAQS) were enacted for the protection of the public health and welfare, allowing for an adequate margin of safety. To date, EPA has issued NAAQS for six criteria pollutants (Table 3.5-1): carbon monoxide (CO), sulfur dioxide (SO_2), ozone (O_3), nitrogen dioxide (NO_2), lead (Pb), and particulates (i.e. PM_{10} and $PM_{2.5}$, particles with a diameter less than or equal to 10 and 2.5 micrometers (μm), respectively). The regulatory authority, which monitors the pollutant emissions from Columbus AFB, is the air pollution control unit of the MDEQ. Currently, the air quality standards set forth by the state are identical to the NAAQS (USAF, 2001c).

3.5.1 Existing Conditions

Columbus AFB is located ten miles north of Columbus, Mississippi, along the eastern state border with Alabama in north central Mississippi. Cool winters and hot, humid summers characterize the regional climate. The average annual precipitation in the area of Columbus AFB is 56.44 inches. Because of the base's location, north of the Gulf of Mexico in the coastal plain physiographic province, it is prone to frequent heavy thunderstorms that are occasionally accompanied by heavy winds (USAF, 2001c). Columbus AFB and surrounding air quality control region (AQCR), *Intrastate 135,* are currently in attainment for sulfur dioxide (SO_2), but have not been classified for the other criteria pollutants (EPA NAAQS, 1998; USAF, 2001c). There are no non-attainment areas in the vicinity of Columbus AFB.

Table 3.5-1. National and Mississippi DEQ Ambient Air Quality Standards

Air Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)	MDEQ AQS ($\mu g/m^3$)
Particulate matter of diameter less than 2.5 microns ($PM_{2.5}$)	24-hour	65	65
	Annual	15	15
Particulate matter of diameter less than 10 microns (PM_{10})	24-hour	150	150
	Annual	50	50
Sulfur Dioxide	3-hour	1,300[1]	1,300[1]
	24-hour	365	365
	Annual	80	80
Ozone	1-hour	235	235
	8-hour	157	157
Carbon Monoxide	1-hour	40,000	40,000
	8-hour	10,000	10,000
Nitrogen Dioxide	Annual	100	100
Lead	Quarterly	1.5	1.5

Sources: U.S. Environmental Protection Agency, 1998; U.S. Air Force, 2001c

[1] Sulfur Dioxide 3-Hour is a Secondary AQS

MDEQ AQS = Mississippi Department of Environmental Quality Air Quality Standards

NAAQS = National Ambient Air Quality Standards: Primary Standards except Sulfur Dioxide 3-Hour is Secondary.

$\mu g/m^3$ = micrograms per cubic meter

Columbus AFB, which is classified as a large quantity generator under NAAQS, applied for and received a Title V permit from the MDEQ in August 1998 (USAF, 2001d). Air pollutant emissions are generated at Columbus AFB from various sources including military aircraft, paint booths, fuel fill stands, jet engine testing, cogeneration combustion units, boilers, and abrasive blasting. Per Title V reporting requirements, only the stationary sources are reported to the MDEQ. All new stationary sources installed on the base after the issuance date of the existing permit must be reported and added to the Title V permit. Fuel storage tanks with a capacity of greater than 660 gallons must be included in the permit. Table 3.5-2 presents the most recent emissions data available for Columbus AFB along with allowable limits for the base and baseline

emissions for Lowndes County (which include Columbus AFB stationary and grandfathered emissions as well as mobile emissions). Columbus AFB actual emissions are well below the base's annual allowable emissions.

3.5.2 Future Baseline Without The Project

Air quality in the vicinity of the three alternative ASR-11 sites and the existing AN/GPN-20 is expected to remain stable under future baseline conditions. Incremental improvement in automotive emissions and continuing pollution prevention efforts at the base aimed at reducing the use of volatile organic compounds will tend to improve air quality, while the increasing population of Lowndes County and the City of Columbus will contribute to emissions due to increased traffic and use of small engines. The base will need to continue to comply with its Title V permit and the base pollution prevention program.

Table 3.5-2. Emissions Inventory for Columbus Air Force Base, 2001

Emission Inventory	EMISSIONS (TONS/YEAR)				
	Carbon Monoxide (CO)	Volatile Organic Emissions	Nitrogen Oxides (NO_X)	Sulfur Dioxide (SO_2)	Particulate Matter (PM_{10})
Columbus AFB Annual Allowable Emissions	2,282.99	143.55	213.47	60.58	44.74
Columbus AFB Actual Emissions 2001	26.24	7.48[2]	9.14	0.59	1.57
Lowndes County Baseline Emissions 1998[1]	12,927.8	15,179.6	15,354.6	19,391.2	12,391.3

Source: U.S. Air Force, 2000c and 2001c, 2002b

[1] Includes Columbus AFB permitted stationary and grandfathered emissions as well as mobile emissions.
[2] Reflects Total VOC from the facility including VOCs that are HAPs.

3.6 GEOLOGY AND SOILS

3.6.1 Existing Conditions

General characteristics of soils and geology on the base are discussed in this section. Site-specific data relevant to the three alternative ASR-11 sites are provided as available.

3.6.1.1 Geology. Columbus AFB is located in the Tombigbee and Tennessee River Hills physiographic districts in the Upper Coastal Plains Resource Area of the Mississippi. Wide ridges and narrow valleys define the area in which the terraces have poor internally drained upland and terrace soils. Columbus AFB overlies an area that has been extensively modified by multiple erosion events related to the Tombigbee River and its tributaries. Relief across the base ranges from 178 feet in the northwest to 223 feet in the southeast. The cantonment area of the base, located in the south-central portion, is situated on a low terrace. Small rounded hills (50 feet and under) and larger hills and ridges (with up to 200 feet of relief) characterize the region (USAF, 2001a and 2001c). The Eutaw Formation underlies the entire base, and seismic considerations are negligible in this region. None of the alternative ASR-11 sites (**Site 2, Site 4,** or **Site 5**) or the existing **AN/GPN-20** appears to be located in a geologically hazardous location.

3.6.1.2 Soil Resources. Columbus AFB is generally characterized as having either floodplain soils or terrace soils. Soils in the northwest and western portions of the base are typically silt and clay loams, whereas to the southeast and east the soils are sandier (sand, silt, and clay loams). The former belong to the Cahaba-Prentiss-Guyton Association (typical of floodplains) and the latter the Prentiss-Rosella-Steens Association (typical of terraces). The soil types are both characterized by slow permeability. The floodplain soils to the west and northwest are related to the Tombigbee and Buttahatchee Rivers. The confluence of the two rivers is approximately three miles northwest of the base (USAF, 2001a).

Site 2 and the existing **AN/GPN-20** are located in the Cahaba fine sandy loam complex, which is slightly sloped (two to five percent slopes). **Site 4** and **Site 5** are both located within the Prentiss-Urban land complex, which is generally level (0-2 percent slopes).

3.6.2 Future Baseline Without the Project

The geology and soil conditions at the base may potentially change in the future without the project due to the continued potential for erosion of ridges and flooding from the Tombigbee and Buttahatchee Rivers; however, the rate of change is very slow. In the area of the three alternative sites, the soils are not anticipated to change greatly without outside influence.

Therefore, it is expected that the existing soil types will continue to represent the area of the alternative ASR-11 sites and the existing AN/GPN-20.

3.7 SURFACE WATER AND GROUND WATER

3.7.1 Existing Conditions

The characteristics for surface water and ground water on the base are discussed in this section and are expected to generally describe the area around the three alternative ASR-11 sites and the existing AN/GPN-20.

3.7.1.1 Surface Water. Columbus AFB lies within the Tombigbee River Basin, which covers approximately 6,100 square miles in northeast Mississippi and approximately 7,600 square miles in northwest Alabama. The Tennessee-Tombigbee waterway is the most significant hydrologic feature in the basin and through a series of dams, human-made canals, and natural stretches of river, it flows south to the Mobile River. The waterway is used for both commercial and recreational purposes (USAF, 2001a). The Tombigbee River runs along the west side of Columbus AFB and the west-flowing Buttahatchee River is located to the north of the base. The confluence of these two rivers is a few miles northwest of the base.

Columbus AFB receives an average of 56 inches of precipitation annually, most of which comes during the winter and spring. The 100-year floodplain encompasses approximately three-fifths of the base, or any part of the base that is below 195 feet in elevation. The highest high water level recorded in the Tombigbee and Buttahatchee Rivers was 196 feet above mean sea level and occurred in 1973 (USAF, 2001a).

Storm water drains collect runoff throughout the developed portions of the base and convey the flow toward the Tombigbee River. To manage the storm water runoff, the base prepared a Storm Water Pollution Prevention Plan, which was approved in March of 1997 by the MDEQ (USAF, 2001c). This plan includes approximately 200,000 linear feet of storm drain lines and nearly 500 inlets throughout the base (USAF, 2001c).

Natural perennial and vernal surface waters are located predominantly to the northeast and southwest areas of Columbus AFB and consist of wetland areas and small creeks. Human-made surface water features include drainage swales, which, on the southern part of the base, drain to the south-southwest to Stinson Creek and eventually to the Tombigbee River. On the northern side of the base, particularly the northeast corner, surface water drainage is to the north, eventually reaching the Buttahatchee River. **Site 2, Site 4,** and the existing **AN/GPN-20** are not located near any type of surface water, whether perennial or ephemeral. **Site 5**, however, is located approximately 150 feet from a storm water swale that runs parallel to Perimeter Road on the opposite side from the site.

3.7.1.2 Groundwater. Columbus AFB is underlain by four aquifers (USAF, 2001c). The first is a shallow unconfined aquifer that is typically less than 40 feet thick and composed of alluvial sands and gravels derived from the erosion of a portion of the upper Eutaw Formation. Recharge to the shallow aquifer comes from precipitation infiltration. Water table depths tend to be between six and 15 feet (Columbus AFB, 2001c). The second aquifer is the semi-confined Eutaw aquifer, which is approximately 150-200 feet thick and lies approximately 40 feet below the ground surface (encompassing the upper and lower Eutaw Formation). The Eutaw, which is used by the City of Columbus water system (supplier of potable water to Columbus AFB), receives most of its recharge from an area north of Columbus AFB. The base also has three wells, one potable and two non-potable, in the Eutaw, which serve more remote areas of the base. The issue of aquifer interconnectivity (between the shallow and Eutaw aquifers) has been a topic of discussion between Columbus AFB and the MDEQ, the latter expressing concern about the thickness and lateral continuity of the confining/restrictive layer between the two aquifers. To allay these concerns, the base has installed multiple groundwater monitoring wells. The ground water monitoring and vertical and lateral hydraulic conductivity tests have revealed that the vertical flux through the restrictive zone between the two aquifers is several orders of magnitude lower than the lateral flow component (USAF, 2001d); therefore, contamination in the shallow aquifer is more likely to flow laterally rather than downward. The Tuscaloosa Group aquifer, at 200-500 feet deep, is the third and most used aquifer for residential and commercial purposes in the community surrounding the base. Recharge to this aquifer comes from areas north of Columbus AFB. The bottom-most confined aquifer is the Pennsylvanian Aquifer, which is typically greater than 500 feet deep (USAF, 2001d).

3.7.2 Future Baseline Without the Project

No changes in surface water or ground water are expected to occur in the future without the project. Implementation of Best Management Practices during normal activities on the base and the Installation Restoration Program (IRP; see Section 3.11) will continue to reduce both point and non-point source pollution from storm water and ground water.

3.8 BIOLOGICAL RESOURCES

This section contains descriptions of biological resources, including vegetation, wetlands, and wildlife, for Columbus AFB and its vicinity, including the alternative ASR-11 sites and the existing AN/GPN-20 site.

3.8.1 Existing Conditions

3.8.1.1 Vegetation. Columbus AFB lies in the Black Plains region of Mississippi, in an area categorized by the MDEQ as being predominantly forested land use (USAF, 2001a). Approximately two-dozen native tree types and other representative vegetation on Columbus AFB have been identified and described within the *Integrated Natural Resources Management Plan (NRMP) for Columbus Air Force Base, Mississippi* (USAF, 2001a). In addition, there are two non-native shrub and vine species that also occur on the base. Table 3.8-1 provides a list of the common plant species found on Columbus AFB.

Timber management at Columbus AFB includes prescribed burns and tree thinning. Incorporated in these management activities are pest management and disease control. By managing forest growth, the base provides an environment that promotes native vegetative understory while deterring wildfires during dry weather. Additionally, reduced competition for space increases the survival of remaining trees. Commercial forestry management of pine and hardwood species produces a 50 to 60-year pine turnover and 80-year hardwood turnover at Columbus AFB (USAF, 2001a).

Site 2, Site 4, and Site 5 are all located in a predominantly wooded area of Columbus AFB. The following vegetation was noted at the candidate sites during a site visit in December 2001. The vegetation at **Site 2** consists of a thick loblolly pine (*Pinus taeda*) tree canopy. Privet (*Ligustrum sp.*) and black cherry (*Prunus serotina*) were the most obvious shrub species, while thorny vines (*Smilax sp.*) were scattered throughout. The herbaceous layer, sprouting from beneath a layer of pine needles, included goldenrod (*Solidago* sp.) and spleenworts (*Asplenium* sp.). Vegetation found on **Site 4** consisted mainly of an herbaceous layer of grasses and goldenrod species with mature loblolly pine trees lining the perimeter of the site. Vegetation on **Site 5** was similar to Site 2 with a loblolly pine tree canopy and a shrub layer dominated by privet (*Ligustrum* sp.) with some small scrub oak (*Quercus illicifolia*) and highbush blueberry (*Vaccinium corymbosum*) individuals. The herbaceous layer contained panic grass (*Panicum sp.*), clubmoss (*Lycopodium* sp.) and goldenrod. A thick layer of pine needles covered the forest floor.

Unlike the ASR-11 sites, which are located in woodland and grassy/shrub areas, the **AN/GPN-20** is situated on a paved and lawn (maintained) airfield area.

3.8.1.2 Wetlands. Approximately 181 acres of wetlands were identified within Columbus AFB during a June 2002 wetland delineation (USAF, 2002b). The majority of the wetlands mapped are located in the northeast and southwest areas of the base. Although the wetland delineation by the USFWS is generally accepted by base personnel, the United States Army Corp of Engineers (USACE), the only agency with the regulatory authority to classify jurisdictional wetlands, has not accepted the wetlands delineation.

Therefore, the resulting maps delineating these areas are only used as guidance (USAF, 2001a). Site 2, Site 4 and Site 5 are all located in upland areas, outside of the wetland areas that cover the northeastern section of the base. **Site 2**, and **Site 4** are approximately 150 and 1,000 feet, respectively, from any USFWS designated wetlands. **Site 5** is located over 2,000 feet from the nearest wetland area defined in the USFWS service maps of the base. However, Site 5 is approximately 150 feet from a drainage swale on the east side of Perimeter Road. This area is not identified as wetland on existing base maps. The elevation of each of the alternative sites

Table 3.8-1 Plant Species on Columbus Air Force Base

Taxonomic Group	Scientific Name	Common Name
Trees and Shrubs	*Carya* sp.	Hickory
	Fagus grandifolia	American beech
	Juglans nigra	Black walnut
	Juniperus virginiana	Eastern red cedar
	Liquidambar styraciflua	American sweetgum
	Liriodendron tulipifera	Tulip tree/yellow poplar
	Pinus echinata	Shortleaf pine
	Pinus taeda	Loblolly pine
	Platanus occidentalis	Sycamore
	Quercus alba	White oak
	Quercus falcata	Southern red oak
	Quercus nigra	Water oak
	Quercus phellos	Willow oak
	Ulmus americana	American elm
	Acer rubrum	Red maple
	*Carya leiodermis**	Swamp hickory
	Ligustrum sp.	Swamp privet
	Quercus stellata	Post oak
	Salix nigra	Black willow
Herbs and Vines	*Bidens* sp.	Beggartick
	Desmodium sp.	Tickclover
	*Coreopsis auriculata**	Lobed tickseed
	Hydrocotyle sp.	Pennywort
	Pontederia cordata L.	Pickerelweed
	Pueraria lobata	Kudzu
	Typha sp.	Cattail
Grasses and Sedges	*Andropogon* sp.	Broomsedge
	Eleusine indica	Goosegrass
	Erianthus sp.	Plumegrass
	Panacium virgatum	Switchgrass
	Andropogon sp.	Bluestem
	Aristida stricta	Wiregrass
	Axonopus fissifolius	Carpet grass
	*Carex oklahomensis**	Oklahoma sedge
	Juncus sp.	Needlerush
	Spartina alterniflora	Cordgrass
	Sorghastrum sp.	Indian grass

Source: U.S. Air Force, 2001a

*Species are special status in Mississippi and thought to occur at one time on Columbus AFB.

places them above the 100-year floodplain (USAF, 2001a). The existing **AN/GPN-20** is well outside wetland areas and also above the 100-year floodplain.

3.8.1.3 Wildlife. The forest, wetlands and grasslands on Columbus AFB provide habitat for a variety of birds, mammals, reptiles, amphibians, and fish species. According to the Columbus AFB *NRMP*, 40 species of birds, 20 species of mammals, 18 species of reptiles, seven amphibian species and six fish species are thought to occur on the base (USAF, 2001a). Although the base is working to protect and enhance wildlife habitat, management of wildlife on the base is essential to minimize accidents involving aircraft. Regulated hunting and fishing seasons are implemented on the base in an effort to control wildlife populations. **Site 2** contains a primarily wooded habitat that likely supports many bird, mammal and reptile species. **Site 4** has less of a tree canopy and contains more open grasses than Site 2, however, similar species likely inhabit the two areas. **Site 5** contains similar wildlife habitat as Site 2; however, the flowing water within the drainage swale across Perimeter Road from Site 5 provides an additional limited aquatic habitat, which may attract a wider variety of wildlife.

3.8.1.4 Rare, Threatened, or Endangered Species. A 1994 Nature Conservancy report concluded that there were no rare, endangered or threatened federally listed species on Columbus AFB (USAF, 2001a). A recent letter from the USFWS, dated November 6, 2001, has indicated that the federally listed threatened bald eagle (*Haliaeetus leucocephalus*) could be found in the general vicinity of the proposed project. Columbus AFB personnel completed a survey for nests and activity within 1,500 feet of the candidate sites and concluded that none exist (Columbus AFB, 2002f).

Although the *General Plan* indicates that Columbus AFB has records indicating that three state special-status species (Oklahoma sedge, swamp hickory, and lobed tickseed) were found to exist on the base (USAF, 2001a), a letter from the Mississippi Museum of Natural Science, dated December 7, 2001, states that the most recent data regarding state or federally listed or proposed endangered, threatened, rare or otherwise significant animals and plants indicate that no special concern species are currently known to exist at the candidate sites (USAF, 2002a). In addition, base personnel have confirmed that although there may be species of special status in areas surrounding the base, none are known to occur on the base or on the alternative ASR-11 sites (CAFB, 2002e).

3.8.2 Future Baseline Without the Project

Without the project, the status of the vegetation, wetlands, and wildlife is expected to remain similar to existing conditions in the areas of the alternative ASR-11 sites and the existing AN/GPN-20 site. Efforts by the base are anticipated to continue to enhance and protect the numerous biological resources of the base, as indicated in the *NRMP* (USAF, 2001a). There are no anticipated land use changes that would alter the characteristics of the biological resources at **Sites 2, 4**, and **5** or the existing **AN/GPN-20** site.

3.9 AESTHETIC RESOURCES

The purpose of this section is to characterize the aesthetic resources of the project area to provide a framework for determining the potential changes that could occur as a result of the construction and operation of the ASR-11 at the alternative sites. Figures 3.9-1, 3.9-3, and 3.9-5 show the locations from which photographs of the alternative sites (Figures 3.9-2, 3.9-4, and 3.9-6) were taken during the site survey in December 2001. Figures 3.9-7 and 3.9-8 show the viewpoints and pictures, respectively, taken of the existing AN/GPN-20.

3.9.1 Existing Conditions

Columbus AFB is generally flat, however, the overall topography slopes gently toward the northwest. There is what may be described as a functional aesthetic quality on the main portion of the base, with features like runways, aircraft hangars, lights, antennae, and towers considered to be an integral part of the Columbus AFB landscape. These basic features and the typical base activities give the impression of an organized and functional military installation. The following are site descriptions of the alternative ASR-11 locations, all three of which are located on the lesser-developed portion of the base, east of the runways.

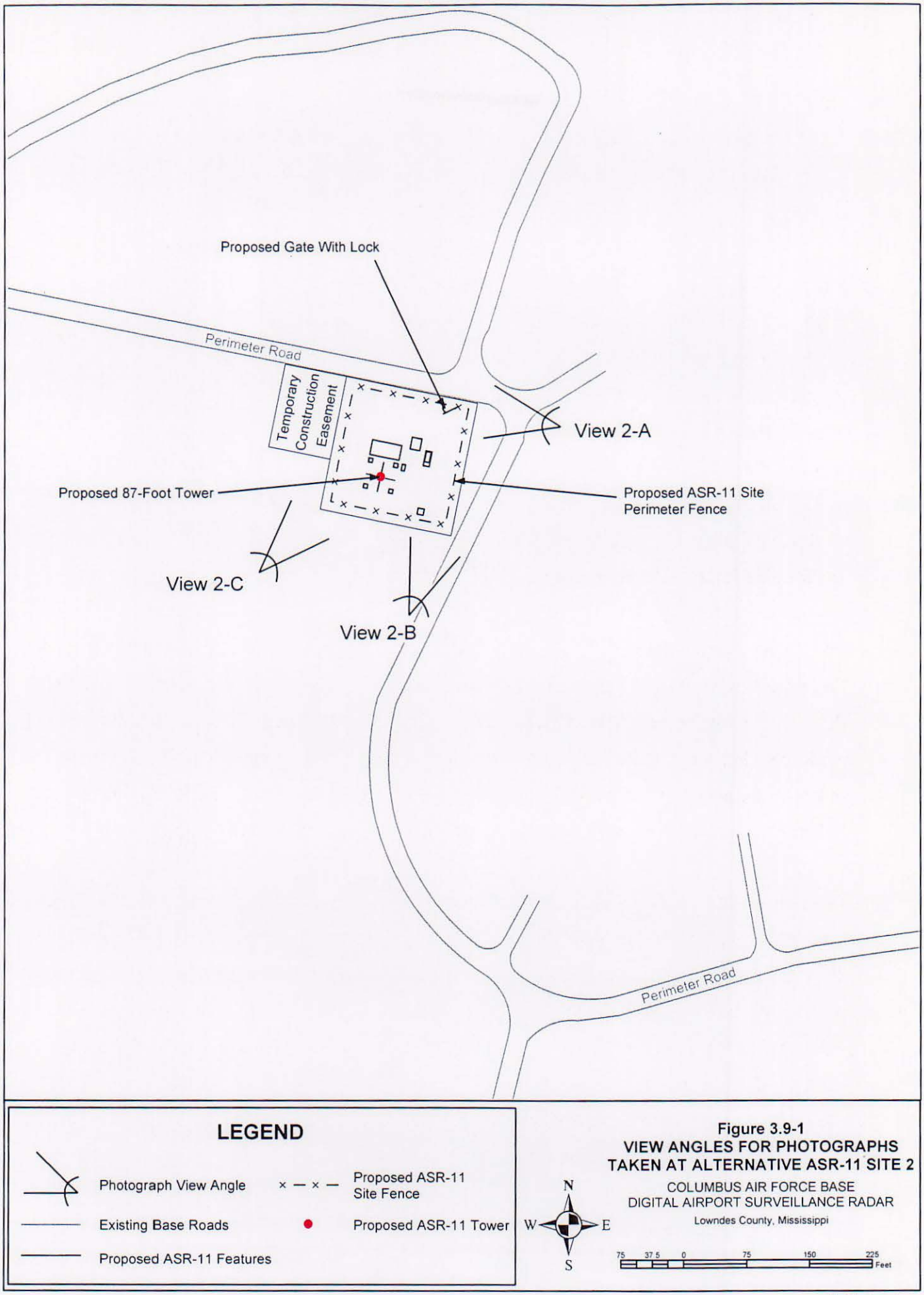
Site 2 is located approximately 1,800 feet northeast of Runway 13L/31R and is situated to the southwest of Perimeter Road inside a sharp turn where the northbound road turns toward the west. Site 2 is surrounded by forest on all sides. Numerous white PVC monitoring wells are

located in the vicinity of Site 2, although none are located directly within the site. Figure 3.9-1 shows the location from which photographs (Figure 3.9-2) were taken of Site 2. Views 2A, 2B and 2C depict the nature of Site 2, which is generally level and is covered mostly by trees and shrubbery.

Site 4 is located approximately 2,200 feet east of Runway 13L/31R and is situated on the south side of Perimeter Road, roughly half way between Site 5 and Site 2. This location, which had previously been cleared of trees for use as a staging area in a natural attenuation study, is now covered by herbaceous species and shrubbery. To the south side of Site 4 there is a clearing in the surrounding trees that appears to have once been a road. The base horse stables are located to the north of Site 4, on the opposite side of Perimeter Road. Figure 3.9-3 shows the location from which photographs (Figure 3.9-4) were taken of Site 4. Views 4A, 4B, and 4C face northwest, south, and north, respectively, across Site 4. The views depict the upland vegetation and the pine forest that surround the site.

Site 5 is approximately 1,300 feet south-southeast of the existing Ground to Air Transmit/Receive (GATR) site, and is situated on the west side of Perimeter Road. The site is flat and densely vegetated with trees and shrubs and is bordered on two sides by unpaved roadways. Perimeter Road forms the eastern site boundary and an unnamed dirt road forms the southern site boundary. Both roadways are bordered on either side by forested land. Figure 3.9-5 shows the location from which photographs (Figure 3.9-6) were taken of Site 5.

The existing **AN/GPN-20** radar is located approximately 1,000 feet west of Runway 13R/31L. It is at an elevation of 205 feet above mean sea level with a tower height of 77 feet. The AN/GPN-20 is located within the base airfield and the aesthetics are directly associated with the military function of the base. The site is flat and within clear view from the surrounding areas. Figure 3.9-7 shows the location from which photographs (Figure 3.9-8) were taken of the existing AN/GPN-20. View E1, facing east from Independence Avenue, depicts the maintained lawns and airfield that surround the existing AN/GPN-20. View E2 faces northwest from 1st Street, showing some of the surrounding structures.



Source: Columbus AFB, 2001b

Figure 3.9-1
VIEW ANGLES FOR PHOTOGRAPHS TAKEN AT ALTERNATIVE ASR-11 SITE 2
COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Site 2 Angles.mxd



View 2-A. Photograph of Site 2 (left side) facing northwest from Perimeter Road.

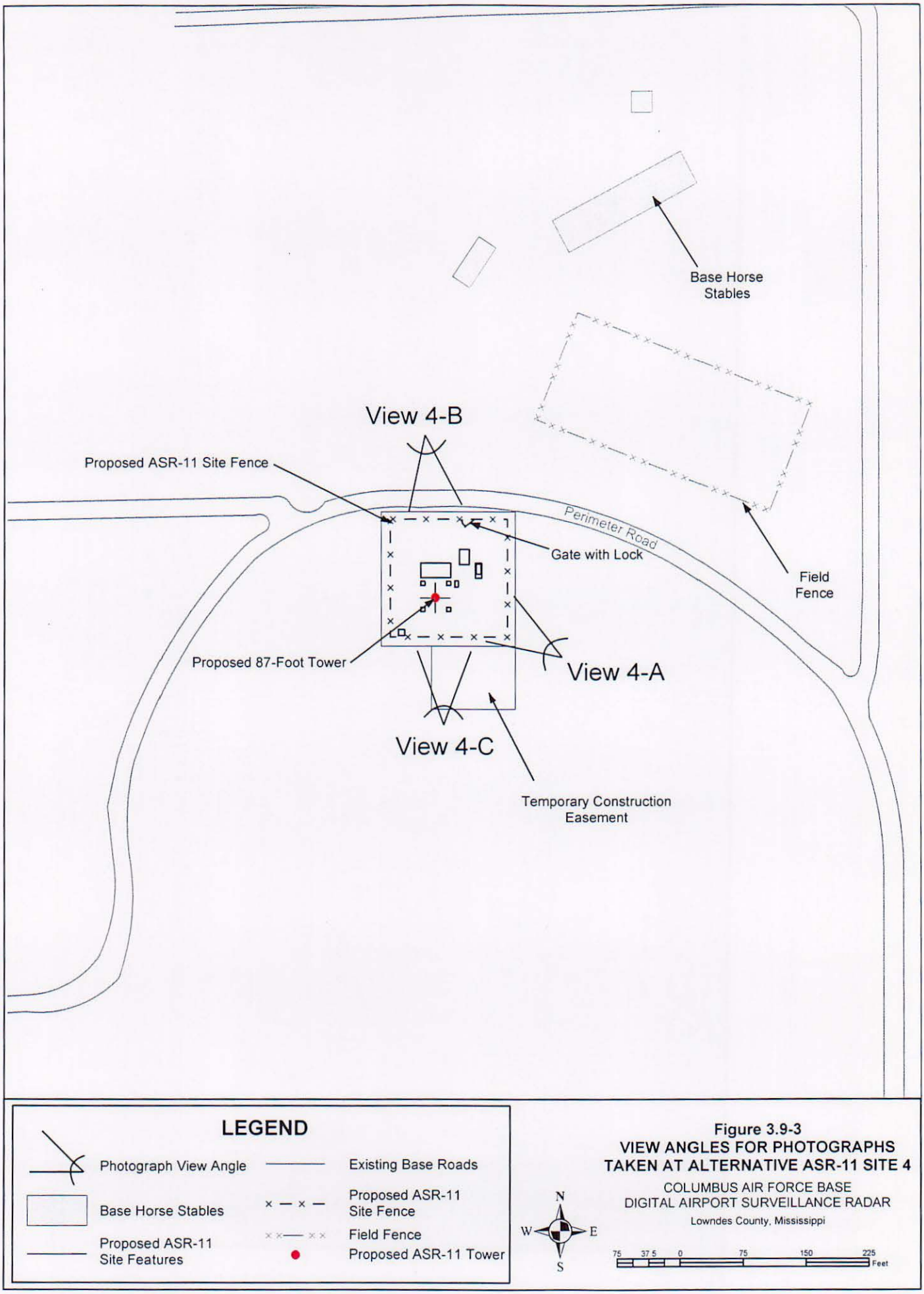


View 2-B. Photograph of Site 2 facing north with Site 2 on the left. Monitor well in forground is for IRP site LF012 located across Perimeter Road to the top right of the photo.



View 2-C. Photograph of Site 2 facing northeast across the site. Typical upland vegetation.

Figure 3.9-2. Photographs Taken of Site 2 During the December 2001 Columbus AFB DASR EA Site Visit



Source: Columbus AFB, 2001b

Figure 3.9-3
VIEW ANGLES FOR PHOTOGRAPHS TAKEN AT ALTERNATIVE ASR-11 SITE 4

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Site 4 Angles.mxd



View 4-A. Photograph of Site 4 facing northwest across the site. Note surrounding pine forest.

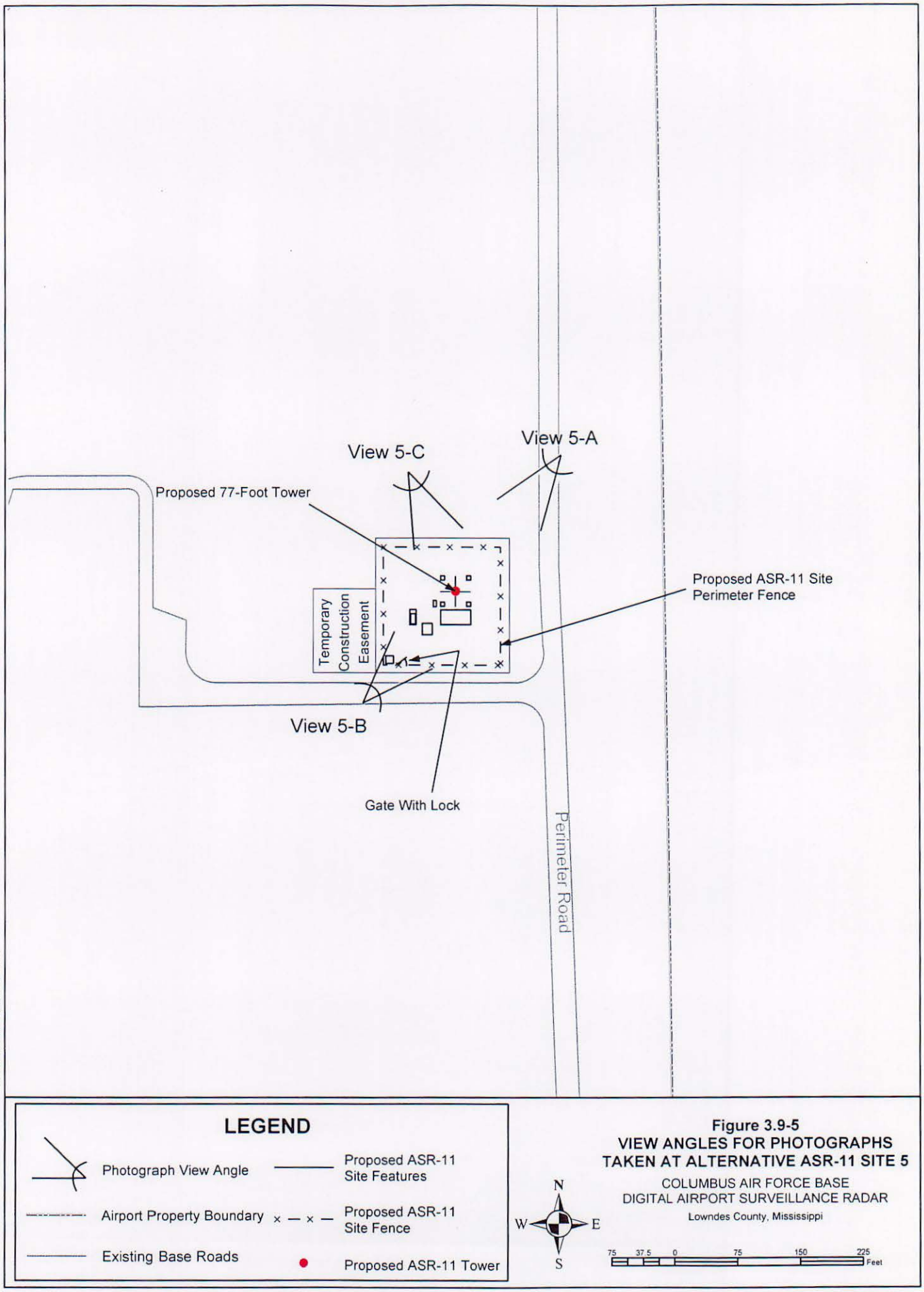


View 4-B. Photograph of Site 4 facing south across site. Typical grass and shrubbery.



View 4-C. Photograph of Site 4 facing north. Perimeter Road is behind first tree line.

Figure 3.9-4. Photographs Taken of Site 4 During the December 2001 Columbus AFB DASR EA Site Visit



Source: Columbus AFB, 2001

Figure 3.9-5
VIEW ANGLES FOR PHOTOGRAPHS TAKEN AT ALTERNATIVE ASR-11 SITE 5

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Site 5 Angles.mxd



View 5-A. Photograph of Site 5 facing southwest across Perimeter Road.

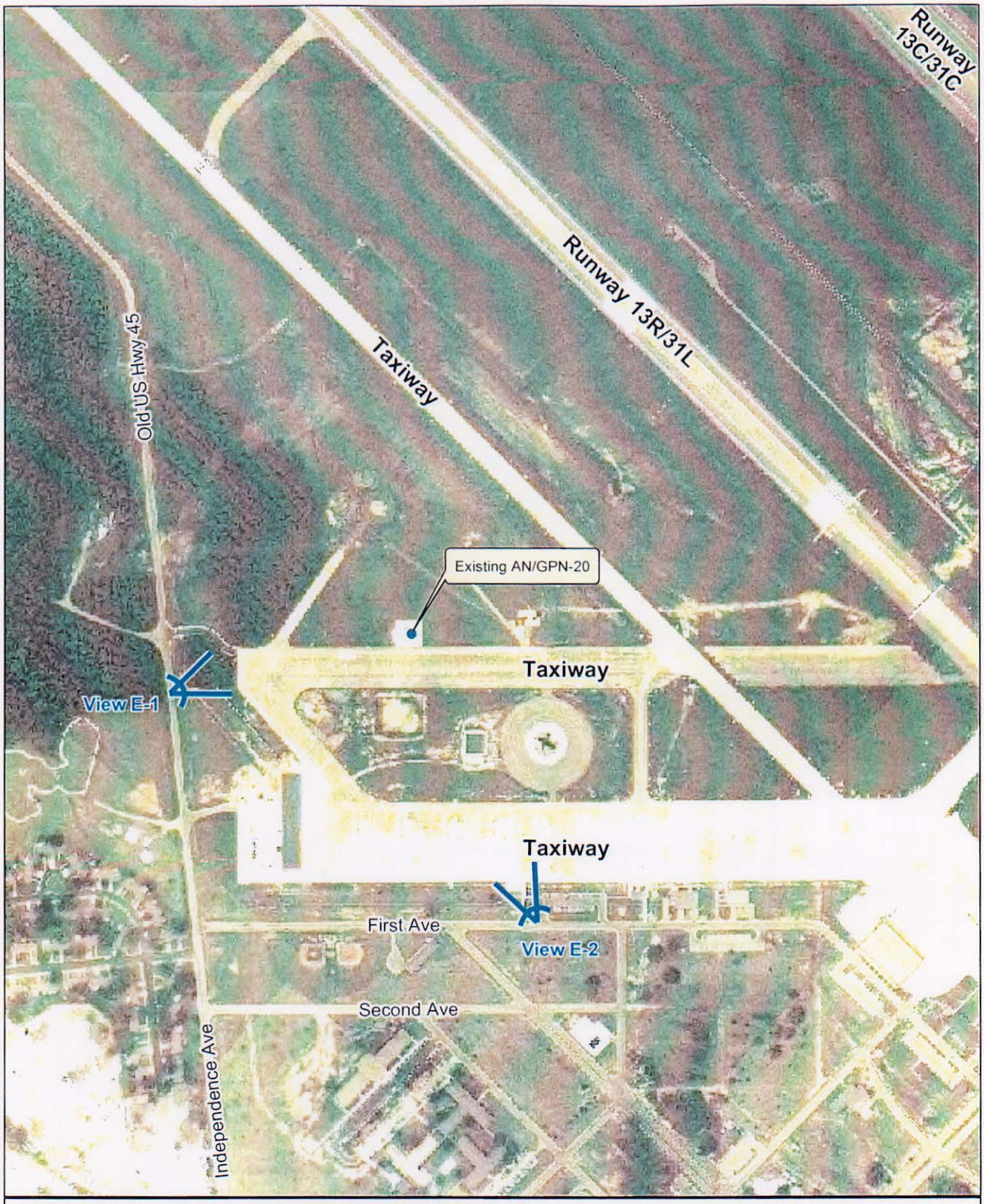


View 5-B. Photograph of Site 5 facing northeast across an unnamed dirt road that runs along the south side of the site. Perimeter Road is to the right.



View 5-C. Photograph of Site 5 facing southeast. Note typical upland vegetation.

Figure 3.9-6. Photographs Taken of Site 5 During the December 2001 Columbus AFB DASR EA Site Visit



Source: Columbus AFB, 2001b

LEGEND

Photograph View Angle

Existing AN/GPN-20 Radar

N
W E
S

Figure 3.9-7
VIEW ANGLES FOR PHOTOGRAPHS TAKEN OF EXISTING AN/GPN-20 RADAR

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

250 125 0 250 500 750 Feet

ExistRadar Angles.mxd



View E-1. Photograph taken from Perimeter Road facing east toward the existing AN/GPN-20 Radar.



View E-2. Photograph taken from Independence Avenue facing northwest toward the existing AN/GPN-20 Radar.

Figure 3.9-8. Photographs Taken of the Existing AN/GPN-20 Radar during the December 2001 Columbus AFB DASR EA Site Visit

3.9.2 Future Baseline Without the Project

In the future without the project, there are no proposed activities on Columbus AFB in the vicinity of the alternative ASR-11 sites or the existing AN/GPN-20 that would have the potential to substantially alter aesthetic conditions.

3.10 CULTURAL RESOURCES

This section discusses cultural resources that have been identified at Columbus AFB and indicates if any known resource areas are located in the vicinity of the existing AN/GPN-20 or the alternative ASR-11 sites.

3.10.1 Existing Conditions

In 1986, the Mississippi Department of Archives and History (MDAH) conducted an exhaustive cultural resource survey of Columbus AFB and determined that there were no significant archeological or historic resources (USAF, 2001a). The MDAH also concluded that it was very unlikely that any resource of significance would be discovered that could be eligible for the National Register of Historic Places (NRHP). In 1998, a Phase I Archeological Survey was conducted at the Shuqualak Auxiliary Airfield (AA), located approximately 25 miles south of Columbus AFB. The survey found some historic artifact scatter deposits that had been exposed due to erosion in the northwest area of the Shuqualak AA. Due to the insignificant nature of the find, the MDAH determined that there was no likelihood of any significant find eligible for the NRHP (USAF, 2001a). Therefore, no archaeological or historic resources are known to be located proximate to or within the alternative ASR-11 sites or existing AN/GPN-20.

3.10.2 Future Baseline Without the Project

It is not anticipated that there would be any substantial change in cultural resource conditions at the alternative sites or the existing AN/GPN-20 location in the future without the project due to the absence of known cultural resources in the respective areas.

3.11 POLLUTION PREVENTION AND HAZARDOUS WASTE

3.11.1 Existing Conditions

The following sections describe current conditions and practices on the base regarding pollution prevention and hazardous waste.

3.11.1.1 Pollution Prevention. A number of policies and procedures have been implemented to prevent pollution on Columbus AFB, including: development and implementation of a hazardous waste management plan; a base pollution prevention program; plan for spill prevention, control, and countermeasures. The overall implementation of these policies and procedures on the base has and is expected to reduce existing and potential pollution. By 2001, the base had reduced hazardous waste by 78 percent from 1992 baseline conditions (USAF, 2002b). This represents an additional 28 percent beyond the regulatory requirement.

The base Pollution Prevention Program has four principles to reduce solid waste. The first is source reduction: the reduction or elimination of solid materials at the generation point. The second is reuse: materials that cannot be eliminated at the source should be reused, if possible, within the base activities. The third is recycle: pollution that cannot be eliminated at the source should be recycled in an environmentally sound manner. The fourth is disposal: as a last resort, hazardous waste that cannot be prevented by the first two principles would then be disposed of in an environmentally safe manner and in accordance with applicable regulations. The Pollution Prevention Management Action Plan is one of the methods by which the Pollution Prevention Program is implemented (USAF, 2001c). One example of the action promoted on base is the encouraged use of environmentally friendly substances in place of hazardous chemicals whenever possible. For instance, the use of alternative cleaners containing grease-eating enzymes has lessened the need for petrochemical based cleaning substances in the aircraft and ground vehicle maintenance shops.

3.11.1.2 Hazardous Waste. Hazardous waste generated at Columbus AFB includes paint contaminated with methyl ethyl ketone, paint residue, paint booth filters, aluminum oxide, sealants, and fuel filters. Small amounts of hazardous wastes are collected and stored at one of

11 satellite buildings on the base (Figure 3.11-1). Larger volumes of waste may be stored up to 90 days at a facility at Building 265. Columbus AFB also has one universal waste storage site (USAF, 2001d). The universal storage site is used for lower-level hazardous waste, such as fluorescent lights and batteries, which may be stored for greater than 90 days (CAFB, 2002a). Disposal of waste is handled by the 14th Civil Engineering Squadron Environmental Flight (14 CES/CEVP) and the Defense Logistics Agency through the Defense Reutilization and Marketing Office (DRMO). Under the Hazardous Materials Management Plan (HMMP) the base operates a hazardous materials pharmacy that is responsible for ordering, tracking, storing, and distributing the use and disposal of hazardous materials. The single-point control of hazardous waste has proven to be effective in tracking and managing hazardous materials at the installation and is aided by the use of the Environmental Management Information System (USAF, 1998a; 2001b; 2001c).

Columbus AFB had 90 unregulated underground storage tanks (USTs) on base prior to fiscal year (FY) 1997, when a contract was issued to remove or abandon in place USTs that were no longer viable or needed. During FY 1997, 41 USTs were removed and an additional ten were closed in place (USAF, 2001d). Columbus AFB is already in compliance with USEPA requirements for USTs (USAF, 2002b). Fifteen additional USTs are regulated by the MDEQ, of which five meet the 1998 specifications for spill/overfill controls and seven have been removed and replaced with aboveground storage tanks (ASTs). No ASTs or USTs are found in the vicinity of the existing **AN/GPN-20** radar or ASR-11 alternative sites **(Site 2, Site 4,** or **Site 5)**.

Due to past releases of hazardous waste materials at DoD installations and the resulting environmental contamination, the Department of Defense (DoD), using the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendments and Reauthorization Act (SARA) as the basis, developed the Installation Restoration Program (IRP). The IRP program identifies, investigates, and remediates sites contaminated prior to 1984 and is funded by the Environmental Restoration Account (USAF, 2001d). Funding cleanup of contamination occurring after 1984 is the responsibility of the base to fund.

The DoD began comprehensive environmental investigations at Columbus AFB in 1984 as part of the IRP. The program has identified 32 IRP sites and seven Areas of Concern (AOC), which are shown in Figure 3.11-1 (USAF, 2002b). The IRP sites are composed of eight landfills, four firefighter-training areas, 14 fuel storage facilities, two aircraft maintenance areas, a pest control shop, an ammunition demolition area, a small arms firing range, and a former weapons maintenance area. The AOC consist of a bank of abandoned WWII aircraft refueling stations, an old munitions demolition area, four construction debris disposal areas, and a suspect construction disposal area/firing range (USAF, 2001d). Currently 17 IRP sites and four AOC have been formally closed with concurrence from the MDEQ, the overseeing regulatory agency, and require no further action (USAF, 2001d; USAF, 2002b). Of the remaining IRP sites, two are in the process of being closed, six are in the study phase, and seven are under long-term monitoring. The remaining three AOC are all in the preliminary assessment or site investigation phase. None of the contaminated sites or sites suspected of contamination are under MDEQ enforcement action or Resource Conservation and Recovery Act (RCRA) part B permit compliance schedule, and none of the sites are on the National Priorities List (NPL) (USAF, 2001d). In addition to the on-going work, quarterly partnering meetings are held between the Headquarters Air Education and Training Command, Columbus AFB, the Air Force Center for Environmental Excellence, MDEQ, and IRP contractors.

Site 2 is located approximately 50 feet south of IRP landfill LF012. LF012, which is suspect to contain sanitary trash, aircraft parts, 300-500 gallons of waste aircraft oil, and potentially waste solvents, is currently under long-term monitoring with annual sampling (USAF, 2002b). No release of contamination to the ground water has been detected down gradient of LF012. Landfill LF008 lies approximately 700 feet west of Site 2 and contains filters from B-52 aircraft suspected of low-level radioactivity. Although LF008 requires no further action, the base monitors the site for radioactivity. The June 2001 Basewide PA/SI report recommended no further action for AOC006 based on the results of soil and groundwater sampling. MDEQ approved the document as final in January 2002 (USAF, 2002b).

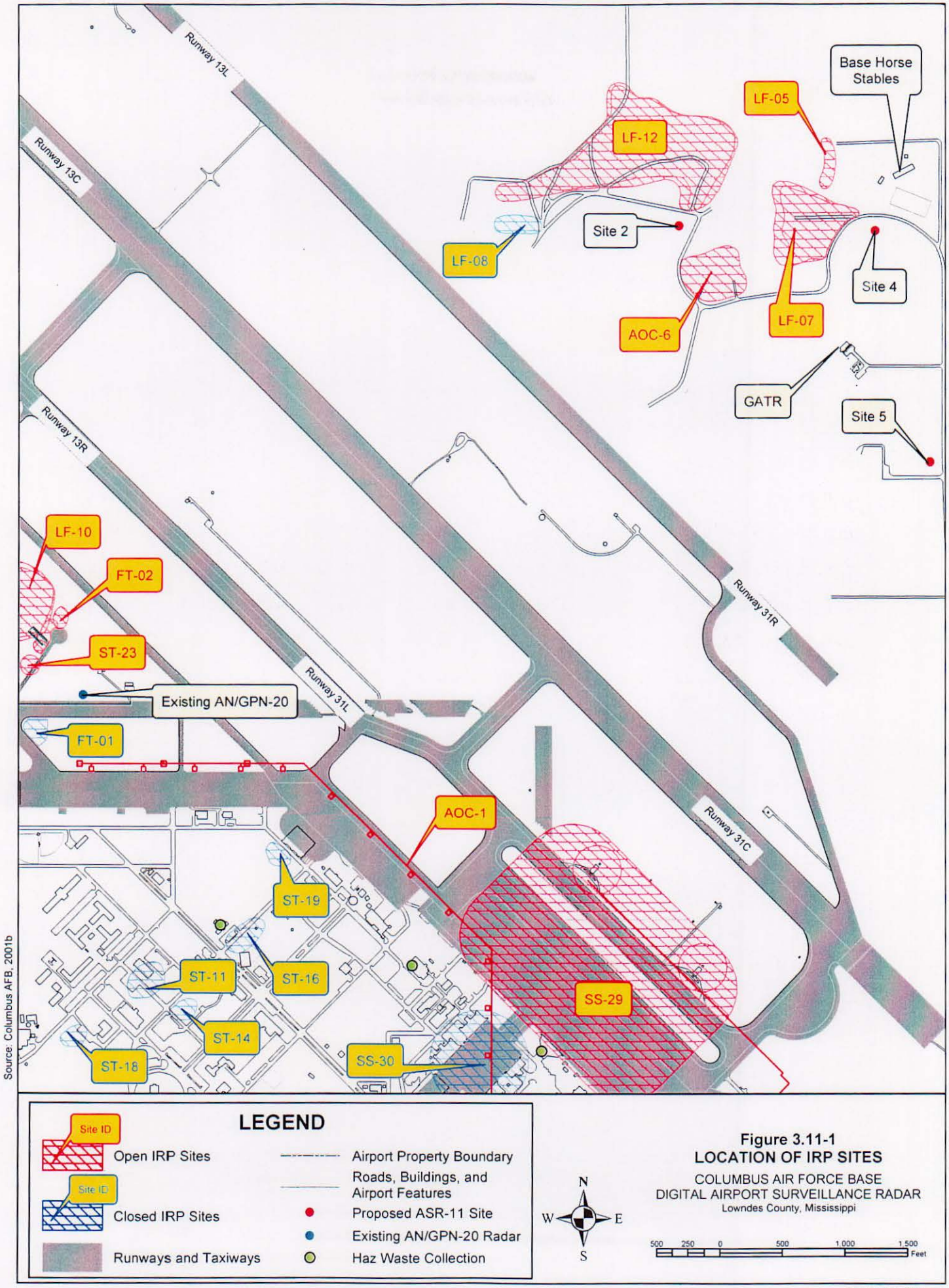


Figure 3.11-1
LOCATION OF IRP SITES
COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

ColumbusIRP.mxd

Site 4 lies approximately 200 feet southeast of LF007, which is a former landfill under annual long-term monitoring. No impact to the ground water has been detected downgradient of LF007. LF005 is approximately 600 feet northwest of alternative Site 4 and is known to contain sanitary trash, construction debris, and waste oil. This landfill may also contain waste solvents, petroleum, oil and lubricants. LF005 is under the same long-term monitoring conditions as LF007 and LF012.

Site 5 is not located near any IRP or AOC sites. The nearest IRP site is landfill LF007 (discussed above), which is located over 2,000 feet to the north.

In addition to the IRP/AOC sites, there were several studies on natural attenuation and movement of jet fuel in ground water located in an area roughly central to the three alternative ASR-11 sites. The area, most commonly known as the Natural Attenuation Test Site, has since been abandoned. MDEQ required no corrective action for the Natural Attenuation Test Site; however, there remains an area of subsurface soil and shallow groundwater contaminated with fuel constituents at the test site source area (about 500 feet south of the GATR site).

The existing **AN/GPN-20** lies approximately 350 feet northeast of FT001 and 350 feet southeast of ST023. FT001 was used as a fire training area from 1971 to 1995 and was subsequently determined to require no further action with MDEQ concurrence (USAF, 2001d). ST023 was a waste fuel UST (#26) that was in poor condition. After confirmatory rounds of groundwater sampling (from 1995 to 1999) indicated that no maximum contaminant levels were exceeded, the site was determined to require no further action with MDEQ concurrence and a decision document issued (USAF, 2001d).

3.11.2 Future Baseline Without the Project.

The Installation Restoration Program Management Action Plan (IRPMAP) clearly states the objectives of Columbus AFB with regard to the environment and human health/quality of life (USAF, 2001d). These objectives are to remediate, reduce, or manage land use in order to protect the environment, community, and human health of the base and surrounding areas. The

IRPMAP also sets a timeline for these actions. It is not anticipated that these baseline objectives and timelines will change in the future without the project. Continuing pollution prevention measures on the base, such as management of hazardous materials and newly generated wastes, may reduce potential for new sources of contamination to arise at any of the alternative ASR-11 sites or the existing AN/GPN-20.

3.12 ELECTROMAGNETIC ENERGY

3.12.1 Existing Conditions

Electrical currents and components generate electrical fields and magnetic fields. These may be stationary or dynamic. Depending on the equipment, electromagnetic radiation that propagates outward may be created. Electromagnetic radiation, electrical fields, and magnetic fields are localized effects. The electromagnetic environment at a particular location and time is the sum of all the localized electric and magnetic fields plus electromagnetic radiation arriving from both natural and manmade sources. Electric fields, magnetic fields, and electromagnetic radiation are of interest here because of the potential for health effects from some frequency ranges and the potential for electromagnetic interference on other electronic equipment. Electromagnetic radiation is discussed first in this introduction.

Electromagnetic radiation travels at a uniform speed (3×10^8 m/sec in a vacuum; the speed of light). It is often useful to consider electromagnetic radiation as a wave, and to describe it in terms of frequency (where 1 Hz means 1 cycle per second and 1 kHz means 1000 cycles per second). Some parts of the electromagnetic spectrum are more commonly described in terms of wavelength, which is inversely related to frequency.

The spectrum of electromagnetic radiation includes visible light, which has frequencies on the order of 5×10^{14} Hz (specifically, wavelengths from 400 nanometers (nm) to 760 nm). Electromagnetic radiation frequencies higher than that of visible light include ultraviolet light, X-rays, and gamma rays. These types of electromagnetic radiation are described as "high energy" and have the potential to "excite" electrons, to thereby ionize molecules, and to thus

affect body chemistry. Especially in high-absorbed doses, high frequency electromagnetic radiation can adversely affect health (NSC, 1979).

Electromagnetic radiation with frequencies lower than that of visible light includes infrared light and radio waves. Frequencies below 10^{12} Hz (10^{6} MHz) are categorized as radio waves. These include frequencies used for AM radio; short wave, television, and FM broadcast bands; pagers; cellular telephones; mobile radios; radar; and microwave technologies. These frequencies are non-ionizing, and have the following known health effects: (1) effects caused by directly heating body tissues and (2) electromagnetic interference with electronic medical devices such as pacemakers.

The heating of tissues caused by exposure to radio frequency radiation (RFR) at relatively low incident power densities can normally be accommodated; however, in some tissues, heat produced at higher radiation intensities may exceed temperature-regulating mechanisms so compensation for heat gain may be inadequate. Thus, exposure at high intensities can cause thermal distress or irreversible thermal damage. Eye tissues are particularly vulnerable (NSC, 1979).

Electromagnetic interference with medical devices has become an issue because medical devices increasingly use sensitive electronics at the same time that RFR and other electromagnetic sources are proliferating (FDA, 1996). Medical equipment that may be susceptible to interference from RFR includes cardiac pacemakers, defibrillators, ventilators, apnea monitors, and electric wheelchairs (VTDPS, 1996; IEEE, 1998). Medical device manufacturers are expected to design and test their products to ensure conformance with standards for protection against radio frequency interference (IEEE, 1998). Nevertheless, users of medical devices are generally advised to keep RFR emitters as far away from their devices as is practical (IEEE, 1998).

The presence of various electrical components in the AN/GPN-20 radar system inevitably means that there are a variety of magnetic and electrical fields in the vicinity of the AN/GPN-20 equipment. There is currently considerable interest on the part of some researchers, the news media, and the public regarding the possibility of health effects from electrical or magnetic

fields. However, no scientific consensus exists that electrical or magnetic fields present health risks other than those associated with medical devices. A 1996 National Academy of Science report, *Possible Health Effects of Exposure to Residential Electric and Magnetic Fields*, concluded that:

> *The current body of evidence does not show exposure to these fields presents a human-health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects.* (National Academy of Science, 1996).

Existing equipment at the AN/GPN-20 radar emits electromagnetic radiation in the radio frequency range. Locations close to the antenna are considered unsafe when the radar is operating, on the basis of the potential for heating of body tissues. The intensity of the radar energy diminishes with distance, so there would be less tissue heating at greater distances.

Within electronic systems for radar, any high-voltage tubes capable of emitting X-rays are typically shielded with lead, and shielding on other equipment is typically adequate to limit transmitted radiation to acceptable levels. While there are unshielded components present at the AN/GPN-20 site such as incandescent light bulbs, there is no indication or expectation that a significant level of electromagnetic radiation other than RFR is emitted into the environment by the AN/GPN-20 system.

Magnetic fields and electrical fields other than electromagnetic radiation are also created by electrical equipment. In everyday situations, high-voltage power lines, televisions, computer monitors, fluorescent lights, light dimmer controls, improperly grounded equipment, and appliances used with non-polarized extension cords create measurable electric fields. Transformers, alternating current (A/C) adapters, motors (e.g., analog clocks and kitchen appliances), low-voltage power lines, vehicles, and old electric blankets also create measurable magnetic fields.

3.12.2 Future Baseline Without the Project

Without the project, the future electromagnetic field conditions in the vicinity of **Site 2, Site 4,** and **Site 5** are expected to remain similar to those currently present. There is no planned change in land use at the site locations that would substantially alter the electromagnetic field characteristics in the area. The location of the new ATCT, proposed as a separate project, is approximately 500 feet from the existing AN/GPN-20. The new facility is expected to be far enough away from the AN/GPN-20 to avoid impacts.

4.0 ENVIRONMENTAL CONSEQUENCES

The No Action alternative would leave the existing AN/GPN-20 and air traffic control equipment in place. In addition, no new construction, renovation, or operations would be required. Since the No Action alternative would involve no alteration to any of the three alternative ASR-11 sites at Columbus AFB, this alternative would result in no impact to environmental resources. Thus, the environmental consequences of the No Action alternative would be identical to those identified in Section 3.0, Future Baseline Without the Project. However, selecting the No Action alternative, and thereby having to maintain the existing AN/GPN-20, would require relying on existing radar equipment that is not capable of meeting future user requirements for transmitting digital signal data to new digital automation system air traffic controller displays. The existing radar also does not meet user requirements for increased target detection, weather reporting, and improved reliability.

The proposed action would involve the construction of a new ASR-11 facility and the removal of the existing AN/GPN-20. Potential impacts associated with the action alternative involve those resulting from construction (short-term) and operation (long-term) of the DASR system. The potential impacts are described in this section for each of the alternative ASR-11 sites (Site 2, Site 4, and Site 5). Impacts are presented by environmental parameter. Mitigation measures that may be required to reduce impacts are described in Section 6.0.

4.1 LAND USE

4.1.1 Short-term Impacts

Short-term impacts associated with the construction of the ASR-11 and removal of the AN/GPN-20 would include the temporary disruption of land uses due to elevated noise levels, increased dust, interference with roadway access, and visual effects. Construction of the ASR-11 facility would also include the utilization of a temporary construction staging area approximately 75 feet by 100 feet adjacent to the ASR-11 site. This staging area would be used by construction personnel to store equipment for use during construction of the ASR-11. Sites 2, 4 and 5 are within the same land use classification of transportation/open areas/buffer areas/undesignated

areas. Construction within these areas, which are relatively remote, is not anticipated to significantly impact the existing land use at any of the sites. The base horse stables located across Perimeter Road from Site 4 are the only active operations that may be disturbed by construction at this site. However, due to the small area and short duration of the activities, the land use surrounding the area to be disturbed would not be affected, and noise and dust impacts are anticipated to be minimal.

The installation of utilities, such as power, telephone, and fiber optic cable to each of the sites is anticipated to result in minimal impact to the transportation/open areas/buffer areas/undesignated areas land use through which the utility corridors would pass. Utility installation for **Site 2**, including a 1,700-foot fiber optic cable trench, would not pass near any occupied buildings and would not cross any different land use areas. Therefore, no impacts to land use are anticipated if this site is chosen. One occupied building, the GATR facility, could be affected by the utility installations at either **Site 4** and **Site 5**, which require fiber optic routes of 1,300 feet and 1,200 feet, respectively, that would terminate at this building.

Upon the successful completion of the construction of the ASR-11, the existing **AN/GPN-20** radar would be dismantled. This activity would likely be considered typical military construction and would not affect the land uses in the immediate vicinity of the existing radar. Surrounding land uses are characterized as airfield, industrial, and transportation/open areas/buffer areas/undesignated areas. Increased noise and dust during the short duration of the dismantling activities are anticipated to be minimal.

4.1.2 Long-term Impacts

The long-term presence and operation of an ASR-11 would be generally consistent with the designated land use at any one of the three alternative ASR-11 sites. Base personnel have confirmed that since all three alternative sites are located in transportation/open areas/buffer areas/undesignated areas adjacent to the base runways, the proposed radar would not interfere with any current or future land use planned for any of the candidate sites (CAFB, 2002e).

4.2 SOCIOECONOMICS

4.2.1 Short-term Impacts

Construction of the ASR-11 at any of the three alternative sites would require similar work efforts, and therefore, would have similar effects on socioeconomic conditions at the base. Construction at **Site 2**, **Site 4**, or **Site 5** would not adversely impact the socioeconomic conditions at Columbus AFB. There would be a slight short-term increase in the revenue generated in the surrounding area due to construction employees utilizing local businesses for supplies and personal use. During the construction period, the work crew would consist of approximately ten persons.

Upon the successful completion of the construction of the ASR-11, the existing **AN/GPN-20** radar would be dismantled and packed for shipment and possible reuse at another location. No effects on socioeconomic conditions are anticipated to result from this activity.

4.2.2 Long-term Impacts

In the absence of other independent activities at Columbus AFB, socioeconomic conditions would return to the existing conditions once the ASR-11 construction was completed. The new radar facility would not be staffed, and therefore, would have no long-term effects on socioeconomic conditions.

4.2.3 Environmental Justice

Under its instructions for the Environmental Impact Analysis Process (32 CFR Part 989), the Air Force must demonstrate compliance with Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, to determine the effects of federal programs, policies, and activities on minority and low income populations.

Sites 2, 4, and 5 are all located on the base, which is in Census Tract 28087-0002. While the census tract that surrounds the base (Census Tract 28087-0001) has a higher percentage of persons below poverty level as compared to the census tract of Columbus AFB, other

demographic characteristics are similar. The areas of the adjacent census tract closest to the alternative sites consist of clay and gravel pits with no proximate residential areas. As described throughout Section 4.0, the proposed DASR installation is not expected to have significant human health or environmental impacts. Therefore, the proposed project is not expected to pose adverse health or environmental impacts to residents of neighborhoods in adjacent census tracts, regardless of income or ethnicity. Thus, the proposed project is consistent with the objectives of Executive Order 12898.

4.3 UTILITIES AND TRANSPORTATION

The following paragraphs describe potential short and long-term effects on utilities at Columbus AFB as a result of the installation of a DASR system at any of the three alternative sites. Connections of the alternative sites to the existing electrical and telephone service can be made within 30 to under 2,000 feet. Fiber optic cable connections, which must be made from each alternative site to the existing RAPCON, are depicted in Figures 4.3-1, 4.3-2, and 4.3-3.

4.3.1 Short-term Impacts

Various lengths of open trench excavation and access roadway would be required to provide utility connections (such as electrical, telephone, and fiber optic) and access for the ASR-11 installation (Table 4.3-1).

4.3.1.1 Water Supply and Distribution. A temporary increase in water demand would occur during construction. A water source would be supplied on site by mobile water tanks. Due to the limited number of construction workers, short construction period, and the adequate water supply from the City of Columbus water system, it is not anticipated that the water demand (both for workers' personal needs and dust control) during construction of the ASR-11 would adversely impact the water supply at Columbus AFB.

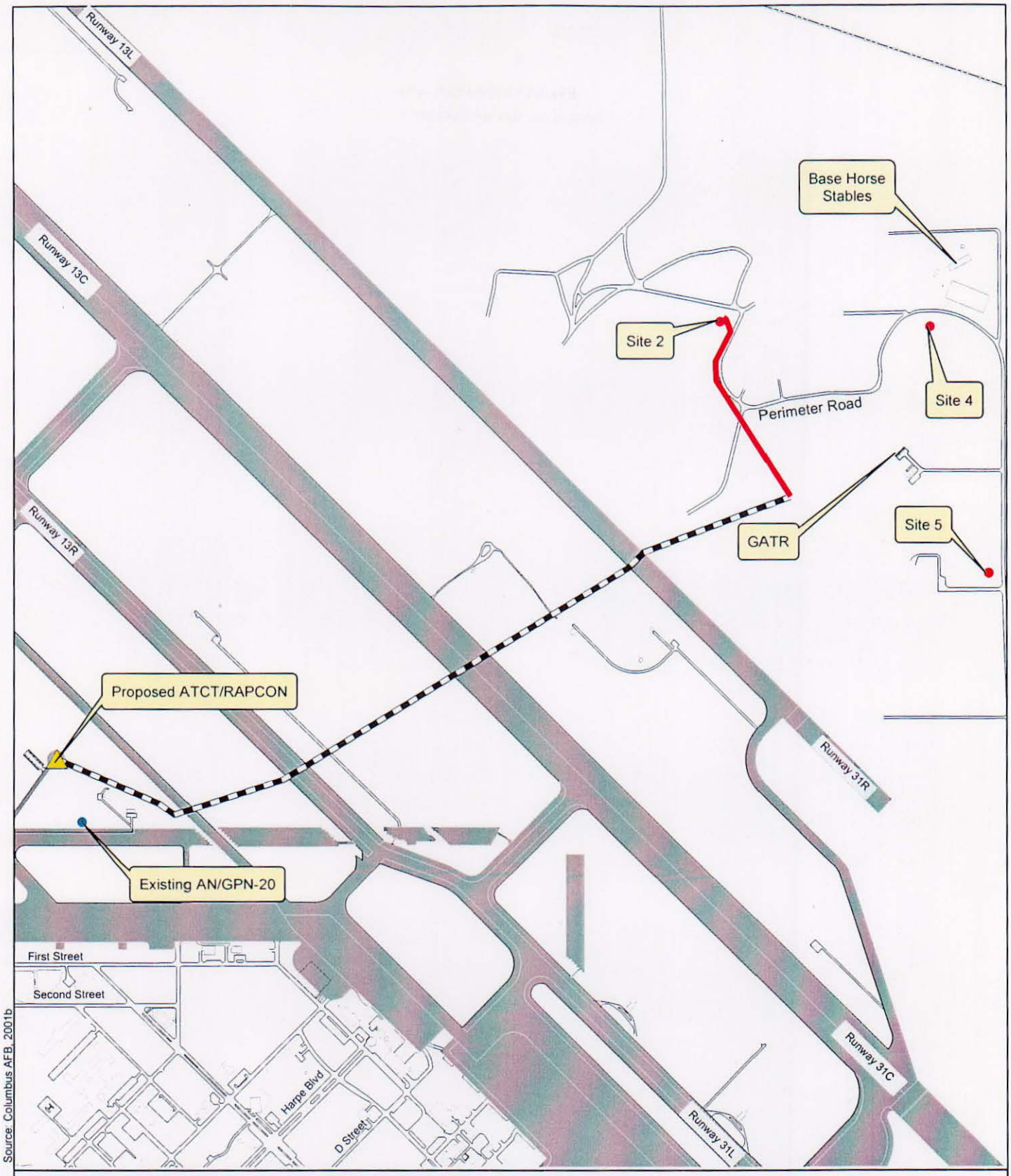
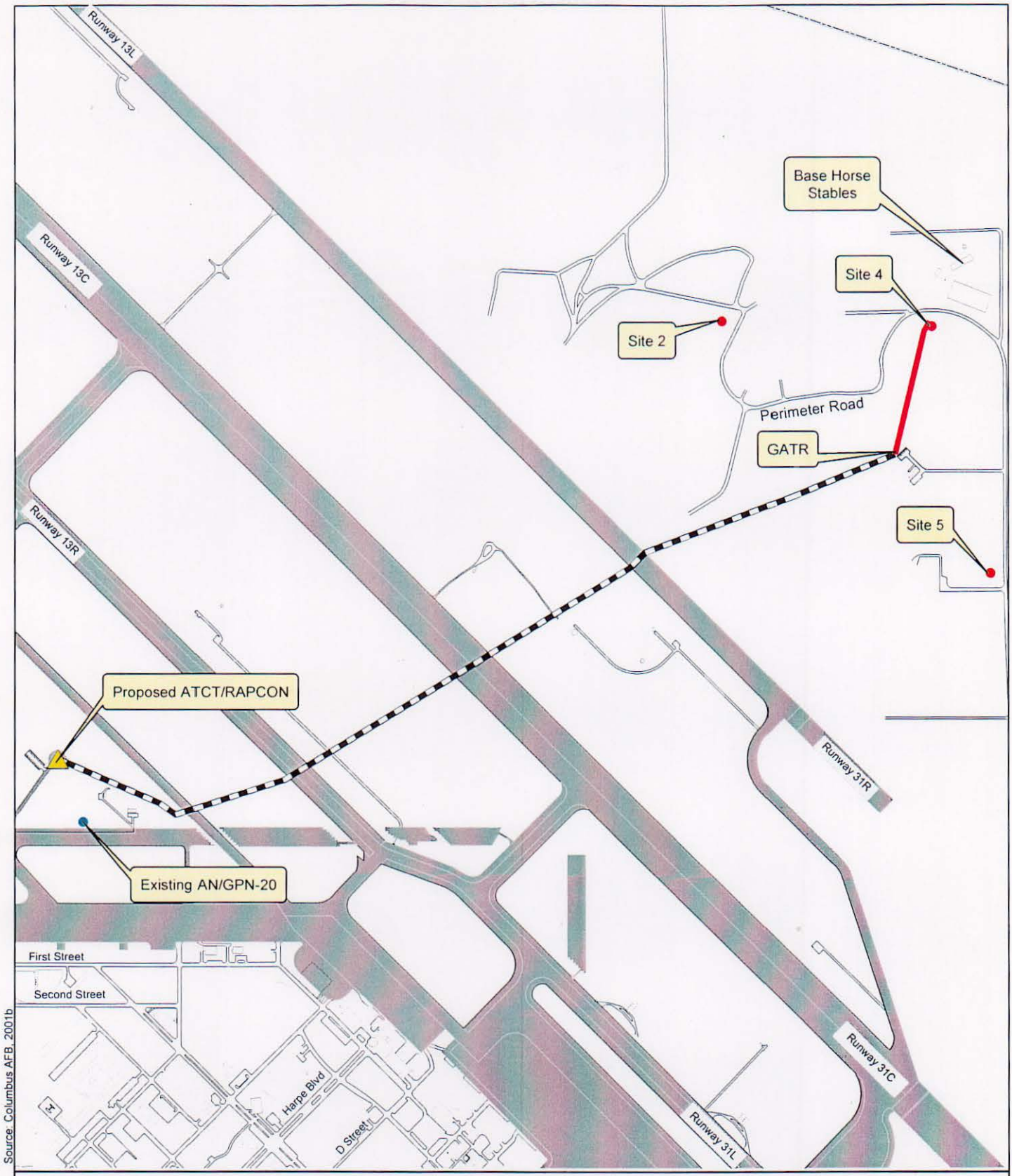


Figure 4.3-1
PROPOSED FIBER OPTIC ROUTE FOR ALTERNATIVE ASR-11 SITE 2
COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Columbus_fiber2.mxd



LEGEND

- Proposed Fiber Optic Cable
- Existing Fiber Optic Cable
- Roads, Buildings, and Airport Features
- Airport Property Boundary
- Runways and Taxiways
- Proposed ASR-11 Site
- Existing AN/GPN-20 Radar
- Proposed ATCT/RAPCON

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W E
S

500 250 0 500 1,000 1,500 Feet

Figure 4.3-2
PROPOSED FIBER OPTIC ROUTE FOR ALTERNATIVE ASR-11 SITE 4
COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Columbus_fiber4.mxd

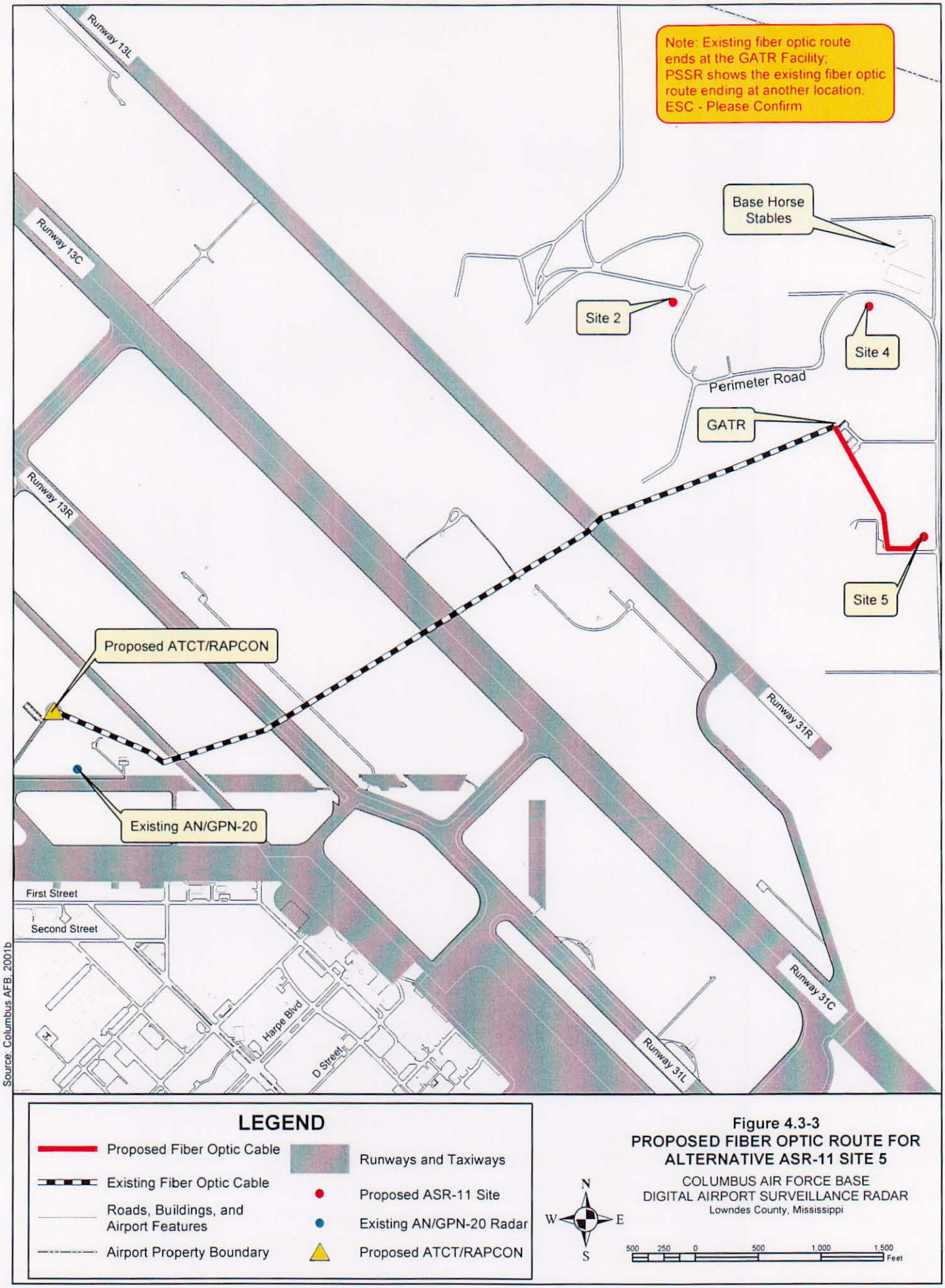


Figure 4.3-3
PROPOSED FIBER OPTIC ROUTE FOR ALTERNATIVE ASR-11 SITE 5

COLUMBUS AIR FORCE BASE
DIGITAL AIRPORT SURVEILLANCE RADAR
Lowndes County, Mississippi

Table 4.3-1. Required Lengths of New Utility Connections

ASR-11 Alternative Site	Length of Electric Power Conduit Required	Length of Telephone Cable Required	Length of Fiber Optic Cable Required
Site 2	1,700 ft	1,700 ft	1,700 ft
Site 4	1,300 ft	100 ft	1,300 ft
Site 5	1,200 ft	30 ft	1,200 ft

Source: U.S. Air Force, 2002

4.3.1.2 Wastewater Treatment. There would be an insignificant short-term increase in demand for sewage treatment during construction. The existing wastewater system would not be impacted since portable wastewater units would be on-site and waste would be transported to a nearby treatment facility.

4.3.1.3 Solid Waste. As the existing AN/GPN-20 is dismantled, material that is not suitable for reuse or recycling would need to be removed. All solid waste would be handled in accordance with standard base procedures. Any hazardous materials would be disposed of following Columbus AFB policies and protocols and relevant state and federal regulations (see Section 4.11).

4.3.1.4 Electricity. Adequate electrical power is available to each of the alternative ASR-11 sites. Power would be provided to **Site 2, Site 4,** and **Site 5** through below ground conduits at a length of 1,700 feet, 1,300 feet, and 1,200 feet, respectively. Short-term impacts causing disruption of power to the immediate area may occur while connections are made.

4.3.1.5 Telephone. Telephone lines would be extended from the existing locations identified in Section 3.3.1.5. While the final route and distance to the new ASR-11 site would be determined

when the final site and design are selected, it is expected that telephone line connections for **Sites 2, 4,** and **5** would coincide with the power line connections mentioned in the preceding section. All power/telephone lines would extend from the existing lines that currently service the GATR facility.

4.3.1.6 Fiber Optic Cable. Fiber optic cable would be supplied via the GATR facility, which is currently connected to the ATCT/RAPCON through a 4,200-foot ductwork system that runs under the runways. A project is planned to install cable with sufficient capacity for the ASR-11 from the existing ATCT to the GATR facility by Fall 2002. The ASR-11 fiber optic cables would connect with these newly installed cables, as shown on Figures 4.3-1, 4.3-2 and 4.3-3. The fiber optic cable connecting **Site 4** and **Site 5** to the fiber optic system that supplies the GATR would span a distance of approximately 1,300 feet and 1,200 feet, respectively. **Site 2** would require 1,700 feet of cabling to connect to the nearest fiber optic network.

4.3.1.7 Natural Gas. Natural gas is not required for the alternative ASR-11 radar. Therefore, no impacts are expected to occur with regard to natural gas at Columbus AFB. Utility trenching for electric, telephone, and fiber optic connections are not anticipated to impact existing natural gas lines.

4.3.1.8 Transportation. Impacts to transportation systems at Columbus AFB during construction would be minimal. Increased activity in the vicinity of the ASR-11 site, including utility trenching, is not likely to disrupt local traffic. Perimeter Road, through the northeast portion of the base, is a tertiary road, meaning that traffic flow is minimal. Personal vehicles and small trucks of the contractor and subcontractors would be on site or at an area designated by the base. There would be a period of approximately ten hours when cement trucks would enter the base for the foundation placement. The foundation concrete must be placed continuously, thus necessitating the ten-hour period. However, since the construction vehicles are common for typical construction projects, they are not expected to have an impact on base roads. Because Perimeter Road is a secondary explosives route, however, coordination with Columbus AFB Explosive Safety personnel would be required to avoid conflicts. Dismantling the existing **AN/GPN-20** would require slightly increased traffic on the roads that lead to it; however, the

limited number of vehicles required to dismantle the radar and the short duration of the project are not anticipated to impact transportation conditions on the base.

4.3.2 Long-term Impacts

It is not anticipated that future utility conditions at Columbus AFB would be affected as a result of operating the proposed ASR-11 radar system. The addition of electrical power, telephone lines, and fiber optic cable at any of the alternative radar sites would not have a significant effect on the utilities in the area. The operation of the ASR-11 radar system would not require water, wastewater treatment, or natural gas; therefore, no impacts to those utilities are anticipated. The operation of the DASR would generate a minimal amount of solid waste.

The long-term operation of the ASR-11 facility is not expected to have an adverse effect on traffic and transportation. As noted above, Perimeter Road is a secondary explosives route. However, Columbus AFB Ground/Explosive Safety personnel have indicated that none of the ordnance that is transported on the explosive route(s) is radio frequency sensitive (CAFB, 2002d). Perimeter Road is not heavily traveled; therefore, the operation and maintenance of the ASR-11 would not affect traffic conditions on this roadway.

Discontinuing the operations at the existing **AN/GPN-20** radar is not expected to affect area utilities or transportation.

4.4 NOISE

4.4.1 Short-term Impacts

Elevated noise levels are anticipated during the minor excavation and grading required to construct the radar tower and supporting infrastructure, including connections to power, telephone, and installation of the fiber optic cable. Noise impacts are expected to be minimal at any of the three alternative sites due to the existing elevated noise levels associated with base aircraft operations. Typical construction equipment noise levels may be reduced by using well-maintained equipment and by installing mufflers and engine jackets. Construction of the tower

and supporting infrastructure is anticipated to take approximately three weeks; therefore, any elevated noise levels would be restricted to this short period.

Dismantling of the existing **AN/GPN-20** would result in a localized, temporary elevation of noise levels. However, the AN/GPN-20 lies adjacent to the airfield where existing noise levels are up to 80 dBA. Due to the expected short duration of the dismantling activity, noise impacts are expected to be minimal.

4.4.2 Long-term Impacts

No long-term noise impacts are anticipated to result from operation of the proposed ASR-11 radar. Noise levels generated by the ASR-11 would be maintained at a level consistent with current Occupational Safety and Health Administration (OSHA) regulations as specified in CFR Title 29, Part 1910. ASR-11 equipment located in operational areas would be designed not to exceed 55 decibels at any time. Noise from the ASR-11 system equipment located in general work areas should not exceed 65 decibels, including periods when the cabinet doors are open. The antenna pedestal with its drives, mounted on the tower, would be designed to produce noise levels at or below 55 decibels outdoors on the ground at a distance of 100 feet from the tower. The contribution to noise in the surrounding areas is expected to be negligible, particularly when compared to levels greater than 70 decibels produced by the surrounding aircraft operations.

4.5 AIR QUALITY

4.5.1 Short-term Impacts

The short-term air quality impacts of constructing an ASR-11 would be similar at each of the three alternative sites. Site clearing and construction vehicle traffic at any of the alternative sites may generate fugitive dust during the construction period. Trenches for below ground utilities (electrical, telephone, and fiber optic cable) would increase the amount of dust in ambient air conditions along the utility corridors. None of the sites are located near sensitive receptors and the application of dust suppressant as needed during construction would minimize adverse air quality impacts. Consequently, no substantial adverse short-term air quality impacts are anticipated at any of the sites.

All construction vehicles and some equipment associated with installation of the new ASR-11 or dismantling of the existing AN/GPN-20 would produce emissions that could temporarily affect air quality. However, because the number of vehicles and duration of construction required to perform the work is limited, emissions are not anticipated to exceed federal or county air quality standards.

4.5.2 Long-term Impacts

Operation of the ASR-11 radar at any of the three alternative sites would produce identical emissions. The new ASR-11 site is not anticipated to have adverse impacts on air quality. Sources of emissions during the operation of the ASR-11 would include the operation of the emergency diesel generator at the ASR-11 site, and evaporative loss of fuel from the AST. As described in the Programmatic EA for the NAS program (USAF, 1995), the emergency generator is anticipated to be operated approximately once a week for testing and during occasional power outages. The emissions anticipated to be produced by the emergency generator would be far below the 100 tons per year threshold, which requires review under the Prevention of Significant Deterioration regulations. Emissions are, therefore, expected to have no substantial adverse impact on air quality (USAF, 1995). The evaporative loss from the associated AST is also expected to be minimal, and to have no adverse impact on air quality. At any of the three alternative sites, minimal fugitive dust is expected to be generated by maintenance vehicles.

Columbus AFB, which operates under Title V permit, would need to apply to have the generator and AST (fuel supply tank for the ASR-11 backup generator) added to the base permit. However, the corresponding removal of the existing AST and generator at the AN/GPN-20 site should result in no net increase in emissions from generator operation.

4.6 GEOLOGY AND SOILS

4.6.1 Short-term Impacts

The construction of the ASR-11 facility would have similar effects on the soil at each of the three alternative ASR-11 sites. Excavation for the footings of the radar tower typically does not

exceed eight feet in depth. The soils found in the area of the alternative sites are not expected to require special foundation construction techniques. Excavation for the utility trench is typically four feet deep and may be up to ten feet wide. None of the utility trenches are anticipated to intercept any geological or soil feature that would create an impact. Final site grading and soil stabilization would further reduce impact.

The dismantling of the **AN/GPN-20** would not require any ground disturbance. No impact to the soil or geology is anticipated from this activity.

4.6.2 Long-term Impacts

No long-term impacts to the existing soils or geology are anticipated if the ASR-11 were constructed at any of the alternative sites. Similarly, dismantling of the existing AN/GPN-20 is not anticipated to result in any long-term impact to the existing soils or geology.

4.7 SURFACE WATER AND GROUNDWATER

4.7.1 Short-term Impacts

According to maps developed by the USFWS, all three sites are well outside delineated wetlands (see Section 3.7.1.1). The drainage swale located on the east side of Perimeter Road across from Site 5 may necessitate the installation and maintenance of erosion and sedimentation controls as described in Section 4.8.1.2 during the construction period. However, no adverse impacts on surface waters are anticipated due to the installation of an ASR-11 facility at any of these alternative sites. Best Management Practices (BMP) guidelines would be used to minimize sedimentation and erosion during storm events.

Excavation for the radar tower footings (approximately seven to eight feet deep) may penetrate the water table, which is estimated at a depth of 6-15 feet (Columbus AFB, 2001c). The IRP sites in the vicinity of Site 2 and Site 4 (LF005, LF007 and LF012) have all shown during long-term monitoring to have no impact on the ground water. In addition, groundwater flow on the northeast section of the base is north (away from the alternative site locations). Therefore, the potential for encountering contaminated ground water is low.

Trenching activities along the proposed utility corridor and fiber optic line for **Site 2, Site 4,** and **Site 5** are not anticipated to encounter any IRP or AOC sites. Therefore no adverse affects to surface or ground water on base is expected to result from these activities.

4.7.2 Long-term Impacts

There would be no long-term impacts to the surface water or ground water if the ASR-11 were to be constructed at any of the three alternative ASR-11 sites (**Site 2, Site 4,** or **Site 5**). Final design of the ASR-11 facility at any location would accommodate surface drainage. There would be minimal change in storm water runoff. The drainage swale across Perimeter Road from Site 5 is not anticipated to be substantially impacted by the minor change in storm water patterns in the area if this site were chosen. Removal of the **AN/GPN-20** is not anticipated to have an impact on storm water runoff, surface water, or ground water.

4.8 BIOLOGICAL RESOURCES

The following describes potential short- and long-term effects of the installation of the DASR system and the removal of the existing AN/GPN-20 facility on biological resources. The biological resources addressed in this section consist of vegetation, wetlands, wildlife and rare, threatened or endangered species.

4.8.1 Short-term Impacts

Operation of the ASR-11 at any of the three alternative sites has limited potential to result in short-term impacts on biological resources, as noted below.

4.8.1.1 Vegetation. The construction of an ASR-11 radar facility requires the clearing of a staging area large enough to support the project, construction activities, and site access. The area required for the construction facility is approximately 160 by 160 feet. If **Site 2** or **Site 5** were chosen for construction of the ASR-11 facility, tree clearing would be necessary. **Site 4**, which is undeveloped but has been previously cleared for an earlier natural attenuation study, would require less tree clearing than the other two sites.

The area surrounding the existing **AN/GPN-20** is currently mowed lawn and airfield pavement. Therefore, dismantling of this facility is not anticipated to adversely impact vegetation in the surrounding vicinity.

4.8.1.2 Wetlands. There are no wetlands known to exist on **Site 2, Site 4,** or **Site 5**; however, the wetland located approximately 150 feet from Site 2 and the drainage swale that runs parallel to Perimeter Road across from Site 5 would be protected with erosion and sedimentation controls during construction to avoid impacts to these areas. Dismantling of the existing **AN/GPN-20** radar is not anticipated to impact any wetlands, due to the absence of wetland resources in the vicinity of the existing radar.

4.8.1.3 Wildlife. Due to the relatively limited area proposed for disturbance (slightly over one-half acre), the construction of the ASR-11 facility and the dismantling of the AN/GPN-20 are not anticipated to substantially impact wildlife in the area. Despite being located in a more remote portion of the base, wildlife populations found on any of the alternative ASR-11 sites, or the existing radar, are likely to be accustomed to periodic noise intrusions because of the persistent nature of nearby airfield operations. Brief displacement of wildlife populations may occur in the area of each site during construction. The wildlife that most commonly utilizes all three of the alternative ASR-11 sites consists primarily of small and large birds, small reptiles, and small mammals. These species are generally mobile and would be capable of temporarily relocating from the vicinity of construction activities.

The dismantling of the **AN/GPN-20,** located in an area of mowed lawn and airfield pavement, is unlikely to have any adverse impacts to wildlife habitat in the vicinity. The anticipated short duration of both the ASR-11 installation and the dismantling of the AN/GPN-20 would also limit impacts on wildlife.

4.8.1.4 Rare, Threatened or Endangered Species. As discussed in Section 3.8, the most recent sources of information indicate that no rare, threatened or endangered species are known to exist

in the area of the candidate sites. Therefore, it is anticipated that no rare, threatened or endangered species would be affected by construction at any of the three sites.

4.8.2 Long-term Impacts

Operation of the ASR-11 at any of the three alternative sites has the potential to result in limited long-term impacts on biological resources, as noted below.

4.8.2.1 Vegetation. Installation of the ASR-11 facility at **Sites 2, Site 4** and **Site 5** would result in clearing of approximately one-half acre of vegetation for the facility site. Sites 2 and 5 would require the removal of more trees than Site 4. None of the sites would require clearing for an access road, as Perimeter Road provides sufficient access. Upon project completion, areas disturbed outside of the permanently cleared areas, including the temporary staging area, would be seeded. Given the limited size of the project area, construction at these sites is not anticipated to substantially impact vegetation on Columbus AFB.

4.8.2.2 Wetlands. Due to the absence of wetlands on any of the alternative ASR-11 sites or the existing radar site, no long-term impacts to wetlands are anticipated. It should be noted that **Site 2** is located much closer (approximately 150 feet) to wetland areas than either **Site 4** or **Site 5**, although Site 5 is approximately 150 feet from a drainage swale on the east side of Perimeter Road. Site-specific storm water design would minimize impacts to any nearby wetland areas. Dismantling of the existing AN/GPN-20 would not impact any wetland areas on the base.

4.8.2.3 Wildlife. Given the relatively small area required for the DASR facility, as well as the extent of wildlife habitat and similar biological features in the vicinity of the alternative sites, the presence and operation of a DASR system should not significantly interfere with wildlife.

The ASR-11 tower could theoretically pose an obstacle to birds flying through the area of the chosen site. However, as discussed in the Programmatic EA for the NAS program (USAF, 1995), the relatively low height of the ASR-11 antenna is not anticipated to pose a substantial threat to birds flying through the area. Removal of the AN/GPN-20 from its existing site is not anticipated to adversely impact wildlife in the area.

4.8.2.4 Rare, Threatened, or Endangered Species. As noted previously, no federal or state rare, threatened or endangered species of plant or animal are known to occur within the area of the alternative ASR-11 sites or the existing AN/GPN-20. Therefore, no impact is anticipated.

4.9 AESTHETIC RESOURCES

4.9.1 Short-term Impacts

In general, the aesthetic values of **Site 2, Site 4,** or **Site 5** are linked to the military function of the base. All three sites are within a wooded area of the base (although Site 4 is within a clearing), outside of the airfield operations area. Traffic through this semi-forested to forested area is very limited, and views of the candidate sites are dominated by the surrounding tall pine trees. Therefore, ASR-11 construction activity is not anticipated to result in an adverse aesthetic impact.

The location of the existing **AN/GPN-20** is within the airfield and direct mission area of military activities; therefore, dismantling of this facility is not anticipated to adversely affect the aesthetic resources of the area.

4.9.2 Long-term Impacts

The long-term presence and operation of the ASR-11 at **Site 2, Site 4,** or **Site 5** would be consistent with the aesthetic military character of the base, including active runways in the vicinity. The radar would be screened from view by the surrounding tall pine trees at any of the three sites. Views from the nearest occupied on-base buildings, the GATR facility, and the base horse stables, are not anticipated to be adversely impacted by the location of an ASR-11 facility at any of the alternative sites. Additionally, there are no off-base residences or businesses expected to be impacted by installation of the ASR-11 at any of the alternative sites. Therefore, no aesthetic impacts are anticipated to result if the ASR-11 were constructed at any of the candidate sites.

Operation of the ASR-11 facility at any of the alternative sites would require the installation of security lighting. The lighting fixtures to be installed at the ASR-11 facility would generally consist of the following: two red, steady burning, 116-watt obstruction lights on top of the antenna; 200-watt area lights on each stair landing of the tower to provide illumination for authorized personnel; two 1,000-watt outdoor area lights to be projected downward to illuminate the area within the fenced footprint; and fluorescent indoor area lighting installed in the two buildings on the site. The tower stairway lights and outdoor area lighting would be illuminated only when needed for nighttime maintenance activities. Impacts associated with lighting at Site 2, Site 4, or Site 5 are expected to be minimal due to their locations within a transportation/open areas/buffer areas/undesignated areas portion of the base that is dominated by a thick forest of tall pine trees. Therefore, no impacts associated with the lighting at any of the sites would be anticipated. The dismantling of the existing **AN/GPN-20** is not anticipated to result in an aesthetic impact.

4.10 CULTURAL RESOURCES

4.10.1 Short-term Impacts

Based on cultural resource surveys for Columbus AFB, cultural resources are not likely to be present within the proposed project areas for the three alternative sites or the existing AN/GPN-20 facility. Therefore, neither the construction activities associated with the installation of the ASR-11 and associated utilities, nor the dismantling of the existing AN/GPN-20 is anticipated to impact any cultural resources since none are known to exist on the base.

4.10.2 Long-term Impacts

Due to the fact that no cultural resources are known to exist on Columbus AFB, no long-term impacts to cultural resources are anticipated to result from either the operation of the ASR-11 at any of the three alternative sites or the removal of the existing AN/GPN-20.

4.11 POLLUTION PREVENTION AND HAZARDOUS WASTE

4.11.1 Short-term Impacts

4.11.1.1 Pollution Prevention. Construction of the ASR-11 radar system would comply with applicable Columbus AFB policies and guidelines for pollution prevention. In addition, a pollution prevention plan has been developed for the NAS program. This plan prohibits the use of all Class I ozone-depleting chemicals and directs the contractor to minimize the use of Class II ozone depleting chemicals, and toxic substances. These requirements are applicable regardless of whether **Site 2, Site 4,** or **Site 5** is chosen. Consequently, hazardous waste generation would be avoided to the maximum extent possible during construction of the ASR-11 facility and the dismantling of the existing **AN/GPN-20** facility.

4.11.1.2 Hazardous Waste. At each of the three alternative ASR-11 sites, some hazardous materials and waste would likely be used and generated during the ASR-11 construction, including: equipment fuel, engine oil, hydraulic oil, grease, and other equipment operation and maintenance material. Refueling of equipment may also take place at the alternative ASR-11 site selected for construction. Any hazardous materials used during ASR-11 construction would be used, stored, transported, and disposed in accordance with base, military, state, and federal regulations.

Although several IRP sites and one AOC (all of which are capped landfills) are located in the vicinity of the alternative sites, no contaminated groundwater or contaminated soils are anticipated to be encountered. The landfills are no longer in use and annual groundwater monitoring results from three of the landfills (LF012, LF005, and LF007) have indicated that there is no ground water contamination. Another landfill (LF008) has not required any remedial action, and the landfill AOC006 is on the AOC list and is currently under preliminary assessment/site investigation.

Portions of the existing AN/GPN-20 radar have been painted with lead paint. The AN/GPN-20 would be dismantled and transported off-site. The contractor would be required to separately

and properly package, mark, and dispose of hazardous materials encountered during the dismantling of the AN/GPN-20 and facilities equipment. Small pieces of lead paint may chip off of the AN/GPN-20 radar during the dismantling process; however, substantial amounts of lead paint would not be left on site as a consequence of the decommissioning of the radar. As part of the dismantling, the area would be surveyed prior to final site decommissioning, and, if present, lead paint chips would be collected and disposed of in accordance with applicable Columbus AFB policies and procedures.

4.11.2 Long-term Impacts

The potential long-term pollution and hazardous waste impacts resulting from operation of the ASR-11 are discussed in the following sections. No pollution or hazardous waste impacts are anticipated to result from the dismantling of the existing AN/GPN-20.

4.11.2.1 Pollution Prevention. As indicated above, the NAS program has a pollution prevention plan, which prohibits the use of all Class I ozone-depleting chemicals, and directs the contractor to minimize the use of Class II ozone-depleting chemicals and toxic substances. In addition, operation of the ASR-11 system would comply with all applicable Columbus AFB policies and guidelines for pollution prevention. Consequently, hazardous waste generation is anticipated to be reduced to the maximum extent possible during the operation of the ASR-11 facility.

4.11.2.2 Hazardous Waste. Operation of the ASR-11 facility at any of the three alternative sites would include the installation of a 1,000-gallon AST for the storage of diesel fuel to be used for emergency power generation. The fuel tank would be affixed with the National Fire Protection Agency Fire Diamond label to indicate the presence of hazardous material/chemicals. The tank would comply with all federal, state, and base spill control requirements, including a leak detection system, overfill alarm, and double-wall and/or secondary containment as specified in 40 CFR 112.

In addition, hazardous materials and waste would likely be used and generated during operation, including: equipment fuel, engine oil, hydraulic oil, grease, and other equipment operation and maintenance material. All hazardous materials and waste would be used and disposed of in

accordance with applicable regulations and base policies. Consequently, it is not anticipated that any soil or groundwater contamination would occur as a result of operating the radar at any of the alternative sites.

4.12 ELECTROMAGNETIC ENERGY

4.12.1 Short-Term Impacts

Construction at any of the ASR-11 alternative sites on Columbus AFB is not expected to generate RFR at levels that would be harmful to human health. Some low levels of RFR could be generated from commonly used devices at construction sites, such as cellular telephones or portable computers. However, any RFR generated, and any other electric or magnetic fields, would be typical of that which exists throughout the developed human environment and is not anticipated to be harmful to human health.

Dismantling of the existing AN/GPN-20 would occur only after its operation has ceased. Consequently, there should be no RFR hazard to workers involved in the AN/GPN-20 dismantling. Similar to the ASR-11 construction, dismantling activities at the AN/GPN-20 site could generate low levels of RFR from commonly used devices; however, these are not anticipated to be harmful to human health.

4.12.2 Long-Term Impacts

Operation of the ASR-11 radar at any of the three alternative sites would generate identical levels of electric and magnetic fields, including RFR. As discussed in Section 3.12, the RFR generated by the existing AN/GPN-20 is only hazardous at close distances to the radar when it is operating. Similarly, the RFR generated by the ASR-11 would only be hazardous at close ranges, while the radar is operating (see below). At any of the three alternative sites, the facility would be sited a sufficient distance from occupied buildings that the radar operation would not pose a RFR hazard to personnel within the general vicinity of any of the ASR-11 sites. To advise personnel in the area of the RFR hazard at close ranges, the perimeter of the ASR-11 facility would be posted with signs warning against approaching the antenna while it is in

operation. When the antenna is not in operation, no RFR would be generated, and therefore no RFR hazard would exist.

The following comparison to various RFR safety standards is adapted from the October 1997 *Radiofrequency Impact Analysis for Airport Surveillance Radar-11* (FAA, 1997), prepared for the FAA.

Terms such as "safety standards" and "exposure standards" generally refer to, and are frequently used interchangeably with, specifications or guidelines on maximum public or occupational exposure levels to electromagnetic fields. Such levels are usually expressed as maximum power densities or field intensities in specific frequency ranges for stated exposure durations. Exposure guidelines have been developed by private organizations such as the American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE), and the National Council on Radiological Protection (NCRP, now called the National Council on Radiation Protection and Measurements) as voluntary guidelines for occupational or general public exposure, or both. Governmental agencies such as the Federal Communications Commission (FCC) and various state and municipal bodies have adopted such guidelines or variations thereof as enforceable stands. The draft version of FAA Order 3910.3B, Radiation Safety Program (1997) adopts the ANSI/IEEE exposure guidelines.

The ANSI/IEEE (1992) guidelines cover the frequency range from 0.003 MHz to 300,000 MHz, and separately specify the maximum permissible exposure (MPE) in "uncontrolled environments" (accessible by the general population) and "controlled environments" (such as occupational exposure). In the ASR-11 frequency band of 2,700-2,900 MHz, the MPE for uncontrolled environments is 1.80-1.93 milliwatts per square centimeter (mW/cm^2) averaged over a 30-minute period. The guideline level for controlled environments is 9-10 mW/cm^2 averaged over a six-minute period.

In 1988, the International Radiation Protection Association (IRPA) published guidelines for occupational and public exposure to RFR in the frequency range 0.001 MHz to 300,000 MHz. At the ASR-11 frequency, the MPE for occupational exposure is five mW/cm^2 averaged over a

six-minute period. The MPE for non-occupational exposure is 1 mW/cm^2 averaged over a six-minute period. The MPE for pulsed RFR is set at 1,000 times the MPE for time-averaged exposure. Thus, at ASR-11 frequency, the MPE for pulsed RFR is 1,000 mW/cm^2 peak pulse power density. The NCRP also published guidelines for human exposure. For RFR at ASR-11 frequency, the MPE for occupational exposure is 5 mW/cm^2, averaged over six minutes. The corresponding MPE for exposure of the general population is 1 mW/cm^2, averaged over 30 minutes.

In August 1996, the FCC adopted a hybrid standard based in part on the ANSI/IEEE (1992) guidelines and in part on the NCRP guidelines. For occupational exposure to RFR in the ASR-11 frequency band, the FCC MPE is the same as the NCRP guideline level.

The power density of the ASR-11 beam varies considerably between the near-field (within 260 feet of the antenna) and the far-field (greater than 260 feet away) (FAA, 1997). Thus, far-field conditions apply to almost all the receptors near the alternative radar sites and are presented herein. Any differences in power densities would be conservative, because near-field calculations lead to lower predicted power densities than do far-field calculations. The power density of the ASR-11 signal can be represented by peak pulse power - the maximum power level of a single pulse - or as the power averaged over a time period, usually several or more minutes. At a distance of 23 meters (75 feet) from the ASR-11 antenna, the peak power density of the ASR-11 signal will be 945 mW/cm^2, less than the 1,000 mW/cm^2 MPE for peak power density established by the IRPA, as discussed above. The peak power density will decrease rapidly with distance from the antenna. At all locations more than 23 meters (75 feet) from the ASR-11 antenna, the ASR-11 signal will comply with the MPE for peak power density established by the IRPA.

The average (mean) power radiated by the ASR-11 is 2.1 kilowatts (kW). At any point near the ASR-11 in normal operation (i.e. antenna is rotating), the average power density is lower than the peak density by the factor 0.00034. For the ASR-11 frequency range (uncontrolled environments), the ANSI/IEEE MPE is 1.8 to 1.93 mW/cm^2, averaged over 30 minutes. The average power density of the ASR-11 signal decreases with distance from the antenna and will

fall below 1.9 mW/cm^2 at a distance of ten meters (33 feet) from the radar antenna. Since the ASR-11 will be mounted on a tower greater than ten meters in height, persons at ground level would not be exposed to RFR levels exceeding the ANSI/IEEE MPE. At distances of more the 13 meters (43 feet) from the ASR-11 antenna, the ASR-11 signal will comply with the MPE levels for the general population, 1.0 mW/cm^2, set forth in IRPA, NCRP, and FCC guidelines, discussed above. Thus, no impacts to nearby receptors are anticipated at any of the three alternative sites. At all locations near the radar, the ASR-11 signal will comply by an even wider margin with the guideline levels for occupational exposure set forth by ANSI/IEEE, IRPA, NCRP, and FCC. As a precautionary measure, signs would be posted at the perimeter of the DASR facility advising personnel and the public against approaching the radar facility during operation.

5.0 COMPARISON OF ENVIRONMENTAL CONSEQUENCES AND SELECTION OF ENVIRONMENTALLY PREFERRED ALTERNATIVE

The three alternative sites are located within the less developed northeastern portion of Columbus AFB. The sites are located in similar environments with respect to land use, socioeconomic, air quality, geologic, and archaeological and cultural resource conditions. All three sites are located adjacent to Perimeter Road with an existing and future land use designation of transportation/open areas/buffer areas/undesignated areas. Sites 2 and 5 are within forested areas consisting of tall pines trees and lower shrubs. Site 4 is within a cleared area dominated by grasses and surrounded by tall pine trees. The area surrounding Site 4 is characterized by a lower dBA DNL noise contour (70-75 dBA) as compared to Sites 2 and 5 (75-80 dBA). Site 2 is located directly across Perimeter Road (approximately 50 feet) from a former landfill, which is being monitored annually as part of the Installation Restoration Program (IRP). Site 4 is located approximately 400 feet southeast from another IRP site, also a former landfill, which is under long-term monitoring. Both landfills are closed out and groundwater sampling has not indicated contamination at either location. None of the sites are located within a FEMA-designated 100-year floodplain or a wetland resource area.

No short-term impacts are expected at any of the three sites for geologic, socioeconomic, archaeological and cultural resources, and hazardous waste. Installation of the DASR facility, regardless of the site chosen, has the potential to result in short-term impacts to land use, air quality, noise, and biological resources, either at the ASR-11 site itself, the nearby staging areas, or along utility connection routes. The proposed utility and fiber optic routes for each of the alternative sites would not cross any land uses other than the buffer area/undesignated areas that surround the sites. The passive recreational use of Perimeter Road as a walking/jogging route, could be temporarily impacted by the increase in construction vehicle traffic, dust and noise levels. The biological resources at Sites 2 and 5, mainly tall pine trees, would be similarly impacted if either site was chosen. Site 4 would have slightly different biological resource impacts since tree removal would be minimal due to the dominance of grasses on this site. All three sites are at relatively similar distances (between 1,200 and 1,700 feet) from existing electric lines and fiber optic cables. Site 2 would require approximately 1,700 feet of telephone connection lines, while Sites 4 and 5 would require 100 and 30 feet of connection lines,

respectively. Construction at any of the three sites would result in the generation of fugitive dust and similar levels of emissions from construction vehicles.

No long-term impacts are anticipated at any of the three alternative sites for land use, socioeconomic, utilities, noise, air quality, geologic, and archaeological and cultural resources and hazardous waste. The three sites have similar aesthetic characteristics given their location within a forested area in the less developed portion of the base. The siting and operation of an ASR-11 at Site 2, Site 4 or Site 5 would be consistent with the military aesthetic value of the base. No rare, threatened, or endangered species are anticipated to be impacted by the construction and operation of an ASR-11 at any of the sites. The area of permanent vegetation loss would be approximately the same at any of the sites; however, selection of Site 2 or Site 5 would result in greater loss of trees as compared to Site 4. Although the radar would generate RFR while operating at any of the sites, persons at ground level would not be exposed to RFR levels exceeding the maximum permissible exposure (MPE) levels for the general population, since the ASR-11 will be mounted on a tower greater than 47 feet in height. As a precautionary measure, signs would be posted at the perimeter of the DASR facility advising personnel and the public against approaching the radar facility during operation. During the DASR operation at any of the alternative sites, fuel and other hazardous materials, such as engine oil and grease, may be used at the site. However, use and disposal of any hazardous materials would occur in compliance with Columbus AFB protocols and guidelines as well as applicable state and federal regulations. Consequently, it is anticipated that operational use of hazardous materials would not adversely affect the natural or human environments.

In summary, construction and operation of the ASR-11 facility would result in minimal short-term and long-term impacts at Sites 2, 4, and 5. Due to operational and other base considerations, the U.S. Air Force in conjunction with Columbus AFB has selected Site 5 as the preferred ASR-11 location.

6.0 MITIGATION

Most of the impacts that may occur at any of the alternative sites during construction and operation of the DASR system are minor in nature and few mitigation measures would be required. If Site 2 were selected, the wetland located approximately 150 feet from the site would be protected with erosion and sedimentation controls during construction to avoid impacts to this area. Similarly, if Site 5 were selected, erosion and sedimentation controls would be installed to protect the drainage swale that runs parallel to Perimeter Road across from the site. To minimize noise impacts during construction, mufflers would be used on construction equipment and vehicles. In addition, all equipment and vehicles used during construction would be maintained in good operating condition so that emissions are minimized, thus reducing the potential for air quality impacts. Dust would be controlled on-site by using water to wet down disturbed areas. Sheeting or supports of some kind may be used in the areas excavated for tower footings and utility trenches in order to prevent collapse of these excavations. The small area (approximately 160 feet by 160 feet) that would be permanently cleared for the DASR facility would be covered with a geotextile fabric and crushed stone to stabilize disturbed soils and lessen the potential for erosion, and minimize the increase of impervious surfaces on the base. In addition, all other areas disturbed outside of the 140 by 140-foot site fence along the perimeter of the ASR-11 facility area, including surrounding area required for grading and the temporary staging area, would be seeded to restore a vegetative covering. Efforts would be made during the design phase to reduce visual impacts to the area by retaining a buffer of trees between Perimeter Road and whichever site is chosen. All hazardous materials used during construction would be handled and disposed of in accordance with Columbus AFB policies and protocols and all applicable state and federal regulations. Traffic management measures will be developed to facilitate traffic flow and pedestrian access.

During operation of the ASR-11, diesel fuel would be stored in an AST and hazardous materials, such as equipment oil or grease, may be used at the site. Similar to the construction period, all hazardous materials used during operation would be used and disposed of in accordance with Columbus AFB policies and protocols and all applicable state and federal regulations in order to minimize the potential for media contamination. Additionally, due to the potential for RFR hazards at close distance during operation of the ASR-11, warning signs indicating the safe distance from the operating radar will be installed at the facility perimeter.

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8.0 LIST OF PREPARERS

Metcalf & Eddy prepared this document to fulfill the requirements of the National Environmental Policy Act (NEPA) for the proposed action of constructing a DASR facility at Columbus AFB in Mississippi. Other entities that provided information on an as-needed basis included Columbus AFB Environmental Management personnel, including hired contractors, and various technical personnel at URS Corporation. The following persons authored and provided direct oversight for the preparation of this environmental assessment:

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Shreve-Gibb, Betsy. M.R.P. Urban and Regional Planner. M&E. As Senior Project Manager responsible for all NEPA compliance on National Airspace System (NAS) projects, with extensive experience preparing environmental assessments and permits, provided technical review and oversight for preparation of all sections of the environmental assessment.

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PRIMARY AUTHORS

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APPENDIX A: LISTING OF AGENCIES AND INDIVIDUALS CONTACTED

LISTING OF AGENCIES AND INDIVIDUALS CONTACTED

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APPENDIX B: PRELIMINARY SITE SCREENING CRITERIA FOR COLUMBUS AFB

PRELIMINARY SITE SCREENING CRITERIA FOR COLUMBUS AFB

EXCLUSIONARY CRITERIA

These criteria consider the essential environmental, constructional, and operational constraints that could eliminate a site from further consideration as a potential site for the ASR-11 System. These criteria relate to environmental parameters that could lead to unmitigable significant impacts and physical parameters regarding a site's suitability for construction.

E	Criteria	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
E1	Impacts occupied existing structures	No	No	No	No	No	No	No
E2	Within railroad ROW	No	No	No	No	No	No	No
E3	Within highway ROW	No	No	No	No	No	No	No
E4	Within runways and/or taxiways	No	No	No	No	No	No	No
E5	Within power line ROW	No	No	No	No	No	No	No
E6	Impacts wilderness areas	No	No	No	No	No	No	No
E7	Impacts national natural landmarks	No	No	No	No	No	No	No
E8	Site less than 160 by 160 feet	No	No	No	No	No	No	No
E9	Lacks coverage of departing aircraft within one nmi of the exiting runway ends	TBD	No	TBD	No	No	TBD	TBD
E10	Lacks coverage of aircraft targets on final approach up to the missed approach point	TBD	No	TBD	No	No	TBD	TBD
E11	Within 1,500 feet of any non-removable above ground screening/reflecting object	No	No	No	No	No	Yes[1]	No
E12	Airport specific exclusions	No	No	No	No	No	No	No

Source: U.S. Air Force, 2002

No = Meets Criteria
Yes = Does Not Meet Criteria
TBD = (To Be Determined) Data is unavailable at present time.

1 Site will be within 1,500 feet of proposed ATCT site.

RESTRICTIVE SCREENING CRITERIA

These criteria could eliminate a site from further consideration due to the extensive mitigation required to offset potentially significant impacts. Many of these criteria originate from Federal law. In these cases, the law has been noted. Additionally, many of the criteria are covered by state and local laws, which were consulted as appropriate.

R	Criteria	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
R1	Ecological or wildlife refuges	5	5	5	5	5	5	5
R2	Wild and scenic rivers	5	5	5	5	5	5	5
R3	Prime and unique farmland	5	5	5	5	5	5	5
R4	Parks and recreation areas	5	5	5	5	5	5	5
R5	Historical, archeological, and cultural sensitive sites	5	5	5	5	5	5	5
R6	Wetlands	5	5	5	5	5	1[1]	1[1]
R7	Endangered and threatened species habitat	5	5	5	5	5	5	5
R8	Non-airfield or non-federal land	5	5	5	5	5	5	5
R9	Designated unremediated hazardous waste site	5	5	5	5	5	3[4]	5
R10	Capped land fill	5	5	3[3]	5	5	3[4]	5
R11	Scenic highways	5	5	5	5	5	5	5
R12	Coastal zones	5	5	5	5	5	5	5
R13	Steep terrain	5	5	5	5	5	5	5
R14	Floodplain	5	5	5	5	5	5	5
R15	Within 2,500 feet of existing electronic facilities or high tension power lines	5	3[5]	3[5]	3[5]	3[5]	3[6]	5
R16	Cone of silence impacts coverage of radar/instrument approaches, navigational fixes, airway/route, and special air traffic coverage requirements	TBD	3[11]	TBD	3[11]	3[11]	TBD	TBD
R17	Within 2,500 feet of industrial operations that could interrupt or contaminate the site	TBD	5	TBD	5	5	TBD	TBD
R18	Within 0.5 nmi of ends of any operational runways and approach and departure paths	5	5	3[7]	5	3[7]	3[8]	3[9]
R19	Violates FAR Part 77 requirements	5	3[10]	5	5	5	5	5

Source: U.S. Air Force, 2002

Shaded columns identify the sites that have been selected as the three alternative sites.
[5] = No Adverse Impacts/Meets Criteria; [3] = Partially Impacted/Marginal; [1] = Significantly Impacted/Does Not Meet Criteria
TBD – (To Be Determined) Data is unavailable at the present time.

1 Site 6 would be partially located on a wetland area adjacent to a landfill, according to base mapping.
2 Site 7 is located on a small wetland area, according to base environmental mapping.
3 Site is located near a closed landfill that is undergoing a preliminary assessment to determine the level of contamination. There is no known contamination at the site.
4 Site is located on closed landfills that have long term monitoring in place.
5 Sites 2, 3, 4 and 5 are within 2,500 feet of existing GATR site.
6 Site 6 is within 2,500 feet of the existing radar (GPN-20).
7 Sites 3 and 5 are within 0.5 nmi of Runway 31R.
8 Site 6 is within 0.5 nmi of Runway 31L.
9 Site 7 is within 0.5 nmi of Runway 13R.
10 Site violates FAR Part 77 by 8 feet.
11 The Cone of Silence (COS) at Site 2 affects fix GAITR (above 22,000 feet) and fix LESSE (above 20,800 feet); the COS at Site 4 affects fix GIATR (above 22,600 feet) and fix LESSE (above 20,200 feet); the COS at Site 5 affects fix GAITR (above 23,600 feet) and fix LESSE (above 19,200 feet).

SELECTIVE SCREENING CRITERIA

These criteria provide positive or negative considerations that will form the basis for comparison of candidate sites. Much of the information required is obtained/confirmed during site visits.

S	Criteria	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
S1	Visual sensitivity	+	+	+	+	+	+	+
S2	Accessibility to roads	+	+	+	+	+	+	+
S3	Soils	+	+	0[1]	-[3]	0[1]	+	-[2]
S4	Geology	+	+	+	+	+	+	+
S5	Proximity to power	+	+	+	+	+	+	+
S6	Proximity to telephone lines	+	+	+	+	+	+	+
S7	Zoning	+	+	+	+	+	+	+
S8	Subsurface rights	+	+	+	+	+	+	+
S9	Unique habitat	+	+	+	+	+	+	+
S10	Utilities	+	+	+	+	+	+	+
S11	Planned use of site	+	+	+	+	+	+	+
S12	Roadways	+	+	+	+	+	+	+
S13	Water resources	+	+	+	+	+	+	+
S14	Recreational use	+	+	+	+	+	+	+
S15	Below ground cable routing	+	+	+	+	+	+	+
S16	LOS visibility to air traffic coverage requirements	+ 60 of 61	+ 48 of 61	+ 60 of 61	+ 50 of 61	+ 47 of 61	+ 60 of 61	+ 60 of 61
S17	Secondary radar coverage, on the surface, over the entire length of runways	TBD	+	TBD	-[4]	+	TBD	TBD

Source: U.S. Air Force, 2002

+ = Positive
– = Negative
O = Neutral
TBD – (To Be Determined) Data is unavailable at the present time.

1 Sites have moderate limitation due to wetness and low soils strength, according to the USDA.
2 Site has severe limitation due to wetness and flooding and is located on a soil type that contains a hydric inclusion, according to the USDA.
3 Site has severe limitations due to wetness and flooding, according to the USDA.
4 Only 86% of Runway 13C/31C is visible. Only 5% of Runway 13L/31R is visible.

APPENDIX C: ACRONYMS AND ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

A/C	Alternating current
AFB	Air Force Base
AICUZ	Air Installation Compatible Use Zone
AM	Amplitude modulation (radio)
AN/GPN-20	airport surveillance radar designation
ANSI	American National Standards Institute
ASR-11	airport surveillance radar designation
AST	aboveground storage tank
ATCT	Air Traffic Control Tower
CFR	Code of Federal Regulations
DASR	Digital Airport Surveillance Radar
dBA	decibel, A-weighted
DNL	Day-night (noise) level
DoD	(US) Department of Defense
DRMO	Defense Reutilization and Marketing Office
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	(US) Environmental Protection Agency
FAA	Federal Aviation Authority (Department of Transportation)
FCC	Federal Communications Commission
FM	Frequency modulation (radio)
FONSI	Finding of No Significant Impact
Hz	hertz
IEEE	Institute of Electrical Electronics Engineers
IRP	Installation Restoration Program
IRPA	International Radiation Protection Association
kHz	kilohertz
kW	kilowatts
L_{eq}	equivalent sound level

m	meters
m/sec	meters per second
MHz	megahertz
MPE	Maximum Permissible Exposure
MSA	Munitions Storage Area
MW	megawatts
mW/cm^2	milliwatts per square centimeter
$\mu g/m^3$	micrograms per cubic meter
µm	micrometers (microns)
NAAQS	National Ambient Air Quality Standards
NAS	National Airspace System
NCRP	National Council on Radiological Protection
NEPA	National Environmental Policy Act
nm	nanometers
nmi	nautical miles
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OSHA (U.S.)	Occupational Safety and Health Administration
PM-2.5	Particulate Matter below 2.5 microns
PM-10	Particulate Matter below 10 microns
POL	petroleum, oil, lubricants
ppm	parts per million (by volume in air)
psi	pounds per square inch
RAPCON	Radar Approach Control
RCRA	Resource Conservation and Recovery Act
RFR	Radio Frequency Radiation
SHPO	State Historic Preservation Officer
TSP	Total Suspended Particulates
USAF	United States (Department of the) Air Force
USFWS	United States Fish & Wildlife Service
UST	Underground Storage Tank

APPENDIX D: AGENCY CORRESPONDENCE

569
78

25 Oct 02

MEMORANDUM FOR MS KATHY LUNCEFORD

FROM: 14 CES/CEVN

SUBJECT: NESTING EAGLE HABITAT SURVEY

1. The United States Forest Service (USFS), Tombigbee Ranger District, has administered a tree survey on Columbus Air Force Base (AFB). The proposed project sites for the ASR-11 construction have been surveyed and the following tree growth exists within 1500 foot from each site:

a. Site 2: Compartment 4, stand 5 surrounds proposed site 2. Stand 5 is 100% pine, approximately 18 years old, ranging from 35 to 40 feet in height. Compartment 4, stand 4 is directly north of proposed site 2. Stand 4 contains approximately 90% hardwood, consisting of gums and smaller oaks ranging from 20 to 30 feet in height. The remaining 10% consists of pine approximately 20 years old, ranging from 35 to 40 feet in height.

b. Site 4: Compartment 4, stand 6 surrounds proposed site 4. Stand 6 consists of 100% pine, approximately 14 to 16 years old, ranging from 30 to 35 feet in height. The southern portion of compartment 4, stand 3 is within 1500 feet of proposed site 4. The southern portion of stand 3 consists of 100% pine, approximately 18 years old, ranging from 35 to 40 feet in height.

b. Site 5: Compartment 4, stands 6, 7, 8, and 9 surround proposed site 5. All four stands consist of 100% pine, approximately 14 to 18 years old, ranging from 30 to 40 feet in height.

2. A complete walk around survey of the three sites has shown **no** signs of nesting eagles or habitat suitable for nesting eagles. The trees are of uniform heights (no isolated, taller trees) and they are **not** in close proximity of running water (approximately 2 miles), which might be attractive to nesting bald eagles. Any questions or comments may be directed to myself at 434-7958.

RYAN E. NELSON, 2Lt, USAF
Natural Resources Manager

Mississippi Department of Archives and History

Historic Preservation Division

PO Box 571 • Jackson, MS 39205-0571 • 601 / 359-6940 • Fax 601 / 359-6955 • mdah.state.ms.us

Established 1902

October 16, 2002

Ms. Christina Hoffman
30 Harvard Mill Square
Post Office Box 4071
Wakefield, Massachusetts 01880

Dear Ms. Hoffman:

RE: Columbus Air Force Base, Installation of Airport Surveillance Radar Model 11, Lowndes County

This is to confirm, based on the additional information you provided, we are rescinding our letter of October 31, 2001, asking for a cultural resources survey of sites 2, 3, 4, and 5. It is our determination, pursuant to our responsibilities under Section 106 of the National Historic Preservation Act and 36 CFR Part 800, that no properties listed in or eligible for listing in the National Register of Historic Places will be affected. Therefore, we have no reservations with the proposal.

In addition, we are not aware of any potential of this undertaking to affect Indian cultural or religious sites. However, if you require confirmation of this, the tribal entities will have to be contacted directly.

Should there be additional work in connection with the project, or any changes in the scope of work, please let us know in order that we may provide you with appropriate comments in compliance with the above referenced regulations. There remains a very remote possibility that unrecorded cultural resources may be encountered during construction. Should this occur, we would appreciate your contacting us immediately so that we may take appropriate steps under 36 CFR 800, part 13, regarding our response within forty-eight hours. If we can be of further assistance, please do not hesitate to contact this office.

Sincerely,

Elbert R. Hilliard
State Historic Preservation Officer

Thomas H. Waggener

By: Thomas H. Waggener
Review and Compliance Officer

cc: Clearinghouse for Federal Programs

Board of Trustees: William F. Winter, president / Van R. Burnham, Jr. / Arch Dalrymple III / Lynn Crosby Gammill / E. Jackson Garner
Gilbert R. Mason, Sr. / Duncan M. Morgan / Martis D. Ramage, Jr. / Rosemary Taylor Williams / *Department Director: Elbert R. Hilliard*

December 7, 2001

Mr. Steve Linhart, Jr.
URS Corporation
4 North Park Drive, Suite 300
Hunt Valley, MD 21030

RE: **Proposed Installation and Operation of Airport Surveillance Radar**
Columbus AFB, Lowndes County, MS

Dear Mr. Linhart:

In response to your request for information dated October 24, 2001, I have searched our database for occurrences of state or federally listed or proposed endangered, threatened, rare or otherwise significant animals and plants on the site referenced above. There are no special concern species, wilderness areas or wildlife preserves currently known to be affected at this site.

Mississippi Natural Heritage Program has compiled a database that is the most complete, single source of information about Mississippi's rare, threatened, endangered or otherwise significant animals, plants, plant communities and natural features. The quantity and quality of data collected by the MNHP are dependent upon the research and observations of many individuals and organizations. In many cases, this information is not the result of comprehensive or site-specific field surveys; most natural areas in Mississippi have not been thoroughly surveyed, and new occurrences of plant and animal species are often discovered. Heritage reports summarize existing information known to the MNHP at the time of the request and cannot always be considered a definitive statement regarding the presence, absence or condition of biological elements at a particular site.

Please feel free to contact us if we can provide any additional information.

Sincerely,

Cynthia Rickis, Environmental Biologist
Mississippi Natural Heritage Program

Preserving Natural Mississippi
2148 RIVERSIDE DRIVE • JACKSON, MS 39202-1353 • PHONE 601 354-7303 FAX 601 354-7227 • www.mdwfp.state.ms.us/museum
DEPARTMENT OF WILDLIFE, FISHERIES, AND PARKS

APPC-CBM-4

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

November 6, 2001

Mr. Washington Bowie
URS Corporation
4 North Park Drive, Suite 300
Hunt Valley, Maryland 21030

Dear Mr. Bowie:

The U.S. Fish and Wildlife Service (Service) has received your October 24, 2001, letter regarding the installation and operation of a new Airport Surveillance Radar Model-11(ASR-11) system at Columbus Air Force Base (CAFB), Lowndes County, Mississippi. The proposed system would enhance the air traffic surveillance capabilities of the base. Our comments are submitted in accordance with the Endangered Species Act (16 U.S.C. 1531 et seq.).

A typical ASR-11 system consists of an antenna sail with a primary and a secondary antenna, an antenna support tower, an electronics equipment building, a power generator, and an aboveground fuel storage tank. The tower could vary from 37 to 107 feet high. Lighting would consist of red obstruction lights on the antenna, outdoor perimeter lighting, and indoor lighting. An access road to the site for construction and maintenance could be necessary on some of the alternative locations.

There are seven proposed alternative sites on CAFB. Four of the sites, 2, 4, 5, and 6, are located in or near wooded habitats. Three sites, 1, 3, and 7, are in developed or cleared areas with minimal vegetation. No wetlands were indicated on any of the proposed sites.

The federally listed threatened bald eagle (*Haliaeetus leucocephalus*) could be found in the general vicinity of the proposed project. The bald eagle is the only species of "sea eagle" regularly occurring on the North American continent. The bald eagle is predominantly a winter migrant in the southeast; however, increasing occurrences of nesting have been observed. The bald eagle nests in the transitional area between forest and water. Their nests are constructed in dominant living pines or bald cypress trees. Eagles often use alternate nests in different years with nesting activity occurring between September and January of each year. Young are usually fledged by mid-summer.

The bald eagle is very sensitive to human disturbance, especially during the courtship, mating, and nesting season. Therefore, the Service recommends a survey for bald eagle nests and activity

within 1500 feet of each of the proposed tower sites. If any evidence of the bald eagle is found, please contact this office.

Based on the submitted information, the Service would recommend that sites 1, 3, and 7 be considered for the project due to the minimal anticipated impacts to fish and wildlife habitats. If you have any questions, please feel free to contact our office, telephone: (601) 321-1132.

Sincerely,

Kathy W. Lunceford
Environmental Coordinator

APPC-CBM-3

Mississippi Department of Archives and History

Historic Preservation Division
PO Box 571 • Jackson, MS 39205-0571 • 601 / 359-6940 • Fax 601 / 359-6955 • mdah.state.ms.us

October 31, 2001

Mr. Steve Linhart
URS Corporation-Maryland
4 North Park Drive, Suite 300
Hunt Valley, Maryland 21030

Dear Mr. Linhart:

RE: Columbus Air Force Base, Installation of Airport Surveillance Radar Model 11, Lowndes County

We have reviewed your October 24, 2001, request for cultural resource assessment of the above mentioned undertaking in accordance with our responsibilities under Section 106 of the National Historic Preservation Act, as amended and codified in 36 CFR 800.

Due to the possibility that unrecorded archaeological sites may exist, a cultural resources survey should be conducted. Upon receipt of the cultural resources survey, we will be able to offer appropriate comments. Sites 1, 6, and 7 have been covered by previous surveys and may be omitted. The survey need only include Sites 2, 3, 4, and 5.

A list of individuals who have represented themselves as being willing and qualified to do archaeological survey work in Mississippi will be furnished upon request. A copy of this letter should be made available to the contracting archaeologist. In addition, when the survey is submitted, any development in the area such as roads, bridges, or buildings should be specifically located on a map of sufficient scale for us to locate the project area and its boundaries, preferably a photocopy or original of a USGS 7.5 quadrangle map. Please let me know if you have any questions.

Sincerely,

Thomas H. Waggener

Thomas H. Waggener
Review and Compliance Officer

cc: Clearinghouse for Federal Programs

Board of Trustees: William F. Winter, president / Van R. Burnham, Jr. / Arch Dalrymple III / Lynn Crosby Gammill / E. Jackson Garner
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APPC-CBM-1