ENVIRONMENTAL ASSESSMENT

FOR

Proposed Phased Array Radar System

Final

PREPARED BY:

National Oceanic and Atmospheric Administration

September 2023

THIS PAGE INTENTIONALLY LEFT BLANK.

COVER SHEET

ENVIRONMENTAL ASSESSMENT

PROPOSED PHASED ARRAY RADAR SYSTEM

a. Lead Agency: National Oceanic and Atmospheric Administration (NOAA)

b. Proposed Action: Construct and operate a phased array radar system in Norman, Oklahoma

c. Written comments and inquiries regarding this document should be directed to:

Anne Delp
1305 East West Highway, SSMC4 Room 5309
Silver Spring, MD 20910
anne.delp@noaa.gov

d. Designation: Final Environmental Assessment (EA)

Abstract: The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) proposes to construct and operate a phased array radar (PAR) system in Norman, Oklahoma. The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL). This EA evaluates the potential environmental impacts associated with two alternatives for this Proposed Action: the Preferred Alternative and the No Action Alternative.

Under the Preferred Alternative, NOAA would construct and operate a rotating planar dual-polarization PAR at the NOAA's NSSL near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, in order to conduct additional research on its meteorological capabilities and determine the feasibility of using PAR technology to replace the Weather Surveillance Radar – 1988 Doppler (WSR-88D) radar. The Preferred Alternative includes four primary components: acquisition of a property lease at the Norman site, acquisition of the radar test article (RTA) and construction of the radar test facility (RTF), operation and maintenance of the PAR system, and relocation of a calibration tower located at the NSSL, if necessary.

Under the No Action Alternative, NSSL would not undertake activities to construct or operate a rotating planar dual-polarization PAR to research its meteorological capabilities.

The following environmental resources were analyzed in the EA: visual resources, air quality, water resources and hydrological processes, cultural resources, flora and fauna, farmland and soils, noise, utilities and solid waste, hazardous materials, human health and safety, environmental justice, and cumulative effects. Resources that would not be meaningfully or measurably affected by the Proposed Action, including land use, geological resources, recreational resources, wetlands, floodplains, transportation, and socioeconomics, were dismissed from detailed analysis. Based on the analysis presented in this EA, NOAA has determined that the Proposed Action would have no significant impacts on the human or natural environment, with incorporation of best management practices and minimization measures.

This Final EA and Finding of No Significant Impact (FONSI) are available on the NOAA website at https://www.noaa.gov/administration/environmental-assessment-public-notices.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
ANSI	American National Standards Institute
AoA	Analysis of Alternatives
APE	Area of Potential Effects
AQCR	Air Quality Control Region
ATD	Advanced Technology Demonstrator
BCC	Birds of Conservation Concern
BMP	Best Management Practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CWA	Clean Water Act
CWP	Construction Work Plan
dB	Decibel
dBA	A-weighted Decibel
DNL	Day-Night Sound Level
DoD	Department of Defense
EA	Environmental Assessment
EISA	Energy Independence and Security Act
EJ	Environmental Justice
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
GHG	Greenhouse Gas
GHz	Gigahertz
HAP	Hazardous Air Pollutant
HTMW	Hazardous and Toxic Materials and Waste
Hz	Hertz
IEEE	Institute of Electrical and Electronics Engineers
IPaC	Information for Planning and Consultation
kHz	Kilohertz
LID	Low Impact Development
LOD	Limits of Disturbance
MHz	Megahertz
MPE	Maximum Permissible Exposure
mW/cm^2	Milliwatts per Square Centimeter
NAAQS	National Ambient Air Quality Standard
NAGPRA	Native American Graves Protection and Repatriation Act
NAS Norman	Naval Air Station Norman
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEXRAD	Next Generation Weather Radar
NHPA	National Historic Preservation Act of 1966
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards

NSSL	National Severe Storms Laboratory
NWS	National Weather Service
O_3	Ozone
OAR	Office of Oceanic and Atmospheric Research
OAS	Oklahoma Archaeological Survey
ODEQ	Oklahoma Department of Environmental Quality
ODOT	Oklahoma Department of Transportation
ODWC	Oklahoma Department of Wildlife Conservation
ONHI	Oklahoma Natural Heritage Inventory
OPDES	Oklahoma Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
OWRB	Oklahoma Water Resources Board
PAR	Phased Array Radar
Pb	Lead
$PM_{2.5}$	Particulate Matter less than 2.5 micrometers in diameter
PM_{10}	Particulate Matter less than 10 micrometers in diameter
ppb	Parts per Billion
ppm	Parts per Million
RCRA	Resource Conservation and Recovery Act
RF	Radiofrequency
ROI	Region of Influence
RTA	Radar Test Article
RTF	Radar Test Facility
SAR	Specific Absorption Rate
SHPO	State Historic Preservation Office
SLEP	Service Life Extension Program
SO_2	Sulfur Dioxide
SPCCP	Spill Prevention, Control and Countermeasure Plan
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
$\mu g/m^3$	Micrograms per Cubic Meter
US	United States
USC	United States Code
US EPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
W/kg	Watts per Kilogram
WSR-57	Weather Surveillance Radar – 1957
WSR-74	Weather Surveillance Radar – 1974
WSR-88D	Weather Surveillance Radar – 1988 Doppler

THIS PAGE INTENTIONALLY LEFT BLANK.

1.0 PURPOSE AND NEED

1.1 INTRODUCTION

This environmental assessment (EA) evaluates the potential environmental impacts associated with the National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research's (OAR) Proposed Action to construct and operate a phased array radar (PAR) system (consisting of a radar test article [RTA] within a radar test facility [RTF]) near existing NOAA facilities in Norman, Oklahoma. These NOAA facilities are located near the University of Oklahoma's Max Westheimer Airport in Norman, Cleveland County, Oklahoma.

NOAA prepared this EA in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States [U.S.] Code [USC] 4321, et seq.); the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508); and NOAA Administrative Order 216-6A and its accompanying Companion Manual.

This Final EA and the associated Finding of No Significant Impact (FONSI) are available on the NOAA website at https://www.noaa.gov/administration/environmental-assessment-public-notices.

1.2 BACKGROUND

The Next Generation Weather Radar (NEXRAD), also known as the Weather Surveillance Radar – 1988 Doppler (WSR-88D), is the premier operational weather radar in the US. It is used by NOAA's National Weather Service (NWS) to detect and observe meteorological conditions and provide warnings for severe weather. Nationwide, the NEXRAD network is comprised of 159 radars used by NWS, the Federal Aviation Administration (FAA), and the Department of Defense (DoD); NWS maintains 122 of these radars (NWS, 2021). The NWS's WSR-88D system has been highly impactful in observing and forecasting various types of weather, including volcanic ash, fire weather, hurricanes and tropical storms, coastal events, routine weather, severe thunderstorms, tornados, flash floods, and winter weather, among others (NOAA, 2020). The first WSR-88D system became operational in 1993, and the last radar was installed in 1998. Since then, NEXRAD has been upgraded numerous times, including the addition of dual-polarization capabilities, which was completed in 2013. The NEXRAD radar network continues to be the primary system used by NWS.

The NEXRAD Service Life Extension Program (SLEP) began in 2015 to replace and refurbish major components of the radars in order to extend their operational capabilities (NWS, 2021; NOAA, 2020). Ongoing updates following completion of the SLEP in 2024, combined with other maintenance and engineering efforts, will sustain the operation of the NEXRAD network into the 2030s. Given these timeframes, NOAA needs to make a key decision by 2028 either to continue maintaining NEXRAD, or to replace it with a new radar network (NOAA, 2020). NOAA has developed a research plan to prepare for a Radar Acquisition Management Program beginning in 2028, and is engaged in planning for the Analysis of Alternatives (AoA) for a WSR-88D successor (NOAA, 2020). One of these alternatives would be the replacement of WSR-88D with PAR technology.

NOAA's OAR has been investigating PAR technology since 2003 to determine the suitability of PAR in replacing the NEXRAD network. PAR has demonstrated potential to improve warnings for various types of severe weather, primarily through the use of faster updates and adaptive scanning capabilities (NOAA, 2022). Previous PAR research has involved multiple radar technologies and array configurations, and has been conducted in conjunction with other federal agencies also concerned with aviation and surveillance applications. Technological challenges still exist that must be addressed before determining if PAR can

replace the current radar network for weather surveillance, particularly the ability to calibrate a dual-polarization PAR.

To address these challenges, NOAA, in partnership with the FAA, developed the Advanced Technology Demonstrator (ATD). This is the first dual-polarization, S-band PAR that has been developed specifically for weather applications. The ATD was installed at NOAA's National Severe Storms Laboratory (NSSL) in Norman, Oklahoma, in 2018, and has been operational and used to conduct experiments since 2021 (NOAA, 2022). This research to-date has moved the PAR technology to NOAA Readiness Level 5 for meteorological applications, indicating that the technology has completed initial testing and prototyping, and is ready to be validated through further operational field testing.

NOAA seeks to continue its research, development, and demonstration activities with PAR technology to determine if meteorological applications have the potential to be advanced to operational readiness (NOAA, 2020). Therefore, to support these activities and assess the capability of PAR to replace WSR-88D, NOAA proposes to procure a proof-of-concept, rotating planar dual-polarization PAR system exclusively for weather surveillance. Similar to the ATD's fixed planar PAR, this rotating PAR would have the potential to be advanced to Readiness Level 5, which is the final stage of development (including integrating the system with realistic supporting elements so the system can be tested in a simulated end-use environment) before demonstration begins (NOAA, 2020). The acquisition and subsequent research of the rotating dual-polarization PAR technology would fill a key knowledge gap in NOAA's AoA to support an informed decision regarding the use of this technology to replace the NEXRAD network.

1.3 PURPOSE AND NEED

The ***purpose*** of the Proposed Action is to enable NOAA's NSSL to conduct research on both fixed planar PAR and rotating PAR, the types of advanced scan strategies that this technology would enable, and investigate whether a rotating planar dual-polarization PAR system would be possible to replace the WSR-88D. The Proposed Action is ***needed*** to determine the functionality of the PAR system exclusively related to weather surveillance. NOAA needs to conduct risk reduction studies to determine the benefits, impacts, and capabilities of the PAR system, as it relates to improved weather observations and severe weather warnings.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Proposed Action is to construct and operate a PAR system at NOAA's NSSL near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma. This will enable NSSL to research the capabilities of dual-polarization PAR technology and determine the potential for PAR technology to replace the existing WSR-88D. The Proposed Action includes acquisition of a property lease at the Norman site, acquisition of the RTA and construction of the RTF, operation and maintenance of the PAR system, and relocation of a calibration tower also located near the University of Oklahoma's Max Westheimer Airport, if necessary (see **Figure 1**).

2.2 SCREENING OF ALTERNATIVES

NOAA has developed selection standards to evaluate specific reasonable alternatives by which to implement the Proposed Action. "Reasonable alternatives" are those that could be utilized to meet the purpose of and need for the Proposed Action. NOAA's selection standards used to evaluate reasonable alternatives include the following:

1. **Standard 1 – Infrastructure Availability:** NOAA currently leases land from the University of Oklahoma, and has leased property in this location for over 50 years. The leased land resides near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, for use by the NSSL. NWS also leases land and buildings from the University at this location. Due to the long-term presence of NOAA at this site, it has been able to develop support facilities (offices and a calibration tower) for radar operation and testing that would also benefit PAR technology. Furthermore, the ATD is another PAR system that is already located at this site, and would enable the NSSL to conduct research simultaneously with the proposed rotating planar dual-polarization PAR system. Location of the proposed PAR system near existing facilities and utilities would reduce overall costs. NOAA evaluated each alternative based on proximity to existing NSSL infrastructure.

2. **Standard 2 – Obstruction Minimization:** In order to adequately test the proposed PAR system, the radar should be free from obstructions that could interfere with or reduce its functionality. The PAR system should be located in an area that is relatively flat and open, and avoids tall trees, tall buildings, and large terrain features. In addition, it should be sited at an appropriate distance from other radars to minimize interference. NOAA evaluated each alternative based on site characteristics and the presence of potential natural and man-made obstructions.

3. **Standard 3 – Proximity to Calibration Tower:** Far-field measurements require a calibration tower to both receive signals from and provide signals to the radar, in order to obtain calibration measurements, ensure proper operation, and act as a known radio frequency (RF) source at a fixed geographical location. The NSSL facilities maintain a calibration tower to enable polarimetric calibration activities with the ATD. The proposed PAR system would also require the use of the calibration tower to perform calibrations and to evaluate the performance of the rotating PAR concept. The PAR system should be located within a range of 450 to 1,000 meters (1,476 to 3,281 feet) (depending on the size of the radar antenna) from the existing calibration tower. NOAA evaluated each alternative based on its ability to provide a location within the appropriate distance from the existing calibration tower.

Figure 1: Proposed Action Location

2.3 EVALUATED ALTERNATIVES

2.3.1 Preferred Alternative

The Preferred Alternative includes the construction and operation of a rotating planar dual-polarization PAR system at the NSSL location in Norman, Oklahoma, in order to conduct additional research on its meteorological capabilities. The Preferred Alternative includes four primary components, described below. The overall Study Area would encompass approximately 110.5 acres (see **Figure 1**).

The Preferred Alternative would enable NOAA to conduct research on the capabilities of PAR technology exclusively related to weather surveillance. Information from testing and validation would be used to support NOAA's AoA to identify a potential replacement for the WSR-88D network and could be used to determine if the dual-polarization PAR would be a feasible option. Placement of the RTF at the NSSL in Norman would enable NOAA to take advantage of existing radar infrastructure and the calibration tower, and the open, flat topography of the area would provide conditions free of obstruction. Therefore, NOAA determined that the Preferred Alternative meets each identified selection standard (see **Section 2.2**) and best achieves the purpose of and need for the Proposed Action.

2.3.1.1 Property Leasing

NOAA would lease a vacant site from the University of Oklahoma near its existing leased NSSL facilities in Norman, Oklahoma on which to construct the RTF for the rotating PAR system. This leased site (i.e., the Proposed Action Area) within the overall Study Area would be anticipated to be approximately 3.73 acres in size, and located to the southwest of the existing ATD (see **Figure 1**). The leased area would be free of obstructions and within the appropriate distance (i.e., 450 to 1,000 meters [1,476 to 3281 feet]) from the calibration tower. The PAR system would require a new access road from existing NOAA facilities, which would be contained within the new lease site.

2.3.1.2 Construction of RTF for PAR

Phase 1 of the Proposed Action would involve acquisition of the RTA from an independent contractor hired to develop and deliver the RTA. The RTA would consist of the PAR antenna along with any associated electronics, computer servers, RF equipment, mechanical equipment, cooling equipment, and other necessary components for a complete, functional radar system. The RTA would meet the design and technical specifications provided by NOAA, including ensuring that the radar architecture is an azimuthally rotating, single-faced planar, dual-polarized, S-band PAR. The contractor responsible for developing the RTA would also be responsible for conducting necessary radiation and RF surveys, to ensure that operation would not result in adverse public or NSSL personnel exposure (see **Section 3.11**).

The RTF would be constructed at the NSSL Norman site concurrently with the development of the RTA, so the RTA can be installed at the RTF once complete. The RTF would consist of the radar tower, enclosures for equipment, and all power, communications, and other support infrastructure for housing and operating the RTA. Electrical, natural gas, network, and non-potable water utilities would be installed at the site, with connections from the existing ATD. A heating, ventilation, and air conditioning (HVAC) system would be installed, as well as a backup generator. The specific type of generator (e.g., natural gas, diesel) would be determined during the final design stages of the RTF. No personnel would be stationed at the RTF, but they would need to be able to access the interior of the RTF as needed to perform maintenance or monitor operations. The total height of the RTF, including the PAR antenna, would not exceed 30 meters (98 feet), but would most likely be 22 to 25 meters (72 to 82 feet) tall.

The RTF would be encompassed by a perimeter 8-foot chain link fence topped with barbed wire arms that would be placed at least 9.1 meters (30 feet) from the RTF and other associated equipment and facilities. One pedestrian entry gate would be installed as well as at least one 12-foot vehicle and equipment access gate. The gates would be manual swing gates with a chain link lock. Ground cover within the fence would be gravel, and no vegetation would be planted. In addition, a paved parking lot and access road would be constructed outside the fence. The parking lot would be at least 6,000 square feet. The new access road would be approximately 274 meters (900 feet) long, and 7 meters (23 feet) wide. Access to the site would be provided via Halley Circle, to the ATD access road, to the proposed RTF access road originating at the southern end of the ATD parking lot.

RTF construction vehicles would likely access the site via the existing ATD access road, and would follow an unpaved access road to transport materials and equipment to the Proposed Action Area. Construction staging areas have not yet been identified, but would occur within the Study Area, and would likely occur on undeveloped, open field near the proposed RTF location within the Proposed Action Area (see **Figure 1**). Construction activities would likely encompass various phases: site preparation, to include site clearing, excavation, and grading; extension and installation of utility systems; installation of foundation piles and concrete foundation slab; erection of structural skeleton; and paving of the parking lot and access road. Construction of the RTF, including installation of the RTA, is anticipated to begin in 2024 and be completed within three years.

Construction activities would be conducted in accordance with the applicable requirements of the U.S. Environmental Protection Agency (US EPA) National Pollutant Discharge Elimination System (NPDES) and associated permits to manage the quantity and quality of stormwater discharged from the Proposed Action Area and minimize the potential for pollution and sedimentation. The project would also comply with applicable requirements of Section 438 of the Energy Independence and Security Act (EISA), which requires federal projects to incorporate, to the maximum extent technically feasible, low impact development (LID) measures to maintain the pre-development hydrology of a site.

2.3.1.3 Operation of PAR

Following construction of the RTF, the RTA would be delivered and installed by the contractor. The complete PAR system is anticipated to be operational in 2027. Once operational, the PAR would be able to be controlled remotely. No personnel would be stationed at the RTF; personnel would access the RTF to perform maintenance, such as corrective repairs, troubleshooting, and facility upkeep. The same personnel that monitor other radars at the NSSL would also monitor the PAR. The PAR would operate during normal daytime business hours, from 7 a.m. to 6 p.m. local time, except in the event of significant after-hours weather events. The PAR is anticipated to be operational for at least 10 to 20 years.

2.3.1.4 Calibration Tower Relocation

The Preferred Alternative may include relocation of the existing calibration tower, which is currently located to the east of Max Westheimer Airport, off Galileo Street. The parcel currently containing the calibration tower is being considered for construction of other facilities unrelated to NOAA or this Proposed Action. The calibration tower is approximately 45.7 meters (150 feet) tall and requires an approximately 7.6-meter by 7.6-meter (25-foot by 25-foot) plot to contain the tower and necessary equipment, and would be fenced in to prevent unauthorized access. In order to maintain the appropriate distances between the tower and the existing ATD, the tower may be moved to the east side of Priestly Avenue. Construction activities associated with relocation would be limited to the concrete pad to support the calibration tower and equipment, and installation of a new perimeter fence.

2.3.2 No Action Alternative

Under the No Action Alternative, NOAA would not undertake activities to construct or operate a new PAR system. NOAA would be unable to research and test the capabilities of the PAR in supporting meteorological applications, and would not be able to consider this technology as part of the AoA to replace the existing WSR-88D. While the No Action Alternative would not meet the Proposed Action's purpose and need, it is analyzed in this EA to provide a comparative baseline with the Preferred Alternative.

2.4 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

NOAA initially considered two additional alternatives to achieve the purpose of and need for the Proposed Action: (1) off-site construction and operation; and (2) placement at a previously developed site at the NSSL. NOAA eliminated these alternatives from further consideration because they did not meet one or more of the selection standards (see **Section 2.2**), as described below.

2.4.1 Off-site Construction and Operation

NOAA considered constructing and operating the PAR system at other sites that do not currently have NSSL presence and infrastructure. Although any site would require some leasing costs, these costs would be higher in a new location where NOAA does not already maintain an existing lease and working relationship with the landowner. NOAA would incur additional costs from building infrastructure needed to support the PAR system, including a new calibration tower and potentially installing new utilities. In addition, the absence of NSSL personnel and other radar equipment and support facilities at the potential site may hinder operation, testing, and maintenance of the PAR system. A new off-site location may also be constrained by the presence of certain environmental and human features that could obstruct and interfere with radar operation, such as trees, tall buildings, or varied topography.

NOAA determined that locating the RTF at a non-NSSL site would pose difficulties to effective and efficient PAR testing and operation. Locations outside of the current NSSL site would not benefit from existing infrastructure, facilities, and knowledge contained within the NSSL, would be more expensive to obtain and develop, and would be limited by potential environmental and human obstructions. Therefore, this alternative did not meet Selection Standards #1, #2, and #3, and thus was eliminated from further consideration.

2.4.2 Placement at Developed Site at NSSL

NOAA considered placing the PAR system at or near a previously developed location at the NSSL site in Norman in order to minimize new leasing costs and ground disturbance. Previously developed sites, however, do not have sufficient space to accommodate the approximately 1 acre needed for the RTF, and proximity to buildings and other radars operated by NWS may pose obstructions and interfere with the PAR system operations. Additionally, many of the developed sites are not within the necessary range from the calibration tower.

NOAA determined that locating the PAR system at a previously developed site would not be feasible, given the lack of space, potential obstructions, and insufficient distance from the calibration tower. Therefore, this alternative did not meet Selection Standards #2 and #3, and thus was eliminated from further consideration.

THIS PAGE INTENTIONALLY LEFT BLANK.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the affected environment and potential environmental consequences for resource areas that could be affected by the Preferred Alternative. Resources dismissed from detailed analysis in the EA, and the justification for their dismissal, are presented in **Table 1**.

Table 1: Resources Dismissed from Detailed Analysis in the EA

Environmental Resource	Justification
Land Use	The Proposed Action Area is located in zoning area A-2, Rural Agricultural District (City of Norman, 2023b). According to the City of Norman's Zoning Ordinance, this district is primarily zoned for agricultural uses, although it includes designated special uses, including for universities or colleges (City of Norman, 1994). As the Proposed Action Area is located within a campus area owned by the University of Oklahoma and multiple similar radar uses exist on-site, the Proposed Action would be compatible with existing land use and zoning requirements.
Geological Resources	The Proposed Action Area is located in an area of moderate seismic hazard (USGS, 2018). The PAR system would be designed and constructed to survive environmental extremes without critical damage and associated seismic hazards would likely be considered as appropriate. No unique geologic features are known to exist. Topography in the Study Area is nearly flat (SRI International, 1994), and construction would not impact the topography of the site.
Recreational Resources	The Proposed Action Area is not located within a recreational area nor has been used for recreational activities. Given its proximity to Max Westheimer Airport, private ownership by the University of Oklahoma, and proximity to secure NSSL radars, the site has not been open for public use. A YMCA facility is located approximately 0.3 miles northeast of the Proposed Action Area, but the Proposed Action would not interfere with access to the facility or activities occurring at the facility. The Proposed Action would not impact recreational opportunities at this site or in the vicinity.
Wetlands	According to the US Fish and Wildlife Service's (USFWS) National Wetlands Inventory, no wetlands are located within the Study Area (USFWS, 2023b). Additionally, the Study Area has been actively used by the University of Oklahoma and NSSL for various purposes, and no wetlands have been identified. The Proposed Action would not result in the fill, destruction, or modification of any wetland areas.
Floodplains	The Study Area is located within an area of minimal flood hazard, and does not contain any 100- or 500-year floodplains (FEMA, 2021). The Proposed Action would have no impact on floodplains.
Transportation	The Proposed Action would not construct any off-site, publicly accessible roadways, nor would result in an increase in personnel traveling to the NSSL. The proposed access road would be used solely to access the RTF and would be used only by designated personnel. It would not result in changes to traffic or traffic patterns around the Study Area.
Socioeconomics	The Proposed Action would not result in changes to the number of personnel employed at the NSSL and no changes to local socioeconomic conditions would be anticipated. Construction of the RTF may result in temporary benefits from increased expenditures for materials and labor, but would have a minimal effect on the regional economy.

3.2 VISUAL RESOURCES

Visual resources refer to the visible features on a landscape, both manmade and natural, moving and stationary. Although visual quality is partly subjective, visual characteristics that often render an area less attractive include clashing or incoherent architectural elements; unorganized mixing of open and built spaces; presence of litter; and dead or dying vegetation. Actions that remedy or mitigate such characteristics generally improve visual quality.

The Region of Influence (ROI) for visual resources includes the viewshed from which the Preferred Alternative would be potentially visible. Given the flat topography of the Study Area and the lack of trees and other tall vegetation, it is possible the PAR system would be observable from the edge of nearby neighborhoods located to the south and east of the Study Area. Thus, the ROI is generally bounded by West Robinson Street to the south and North Flood Avenue to the east. The PAR system would likely not be visible from beyond the Max Westheimer airport, so this feature bounds the ROI to the west and north.

3.2.1 Affected Environment

The overall visual landscape of the ROI is relatively open, with few trees and some scattered buildings throughout the Study Area. Outside of the Study Area, the ROI consists of residential and light commercial areas, with trees and other tall structures, such as power lines. Visibility to the Proposed Action Area within the ROI is relatively high, given the flat topography and amount of open space, in comparison to the surrounding developed areas. The existing WSR-88D radars and the calibration tower within the Study Area are equipped with red lamps at the top of the structures that are illuminated at night to alert aircraft to the potential obstruction. These lamps would be visible offsite but do not contribute to light pollution in the surrounding area. The Proposed Action Area would likely be visible to anyone located within the ROI, including patrons of the businesses north of Westheimer Drive but still west of North Flood Avenue; drivers, pedestrians, and residences along West Robinson Street and North Flood Avenue; and aviators and other users of the Max Westheimer Airport.

3.2.2 Environmental Consequences

3.2.2.1 Preferred Alternative

Construction of the Preferred Alternative would temporarily alter viewsheds in the ROI by the presence of construction equipment and PAR installation activities for about three years. The clearest views would be seen by NSSL personnel who work within the Study Area, as well as airport users and vehicles along West Robinson Street to a lesser extent. Any construction that may be visible from surrounding areas would generally be consistent with views of other commercial/industrial facility construction that the public regularly experiences in suburban areas. Further, construction work would occur within temporary construction fencing (installed to secure the worksite) that would limit views of the site, and ground-level equipment, materials, and structures in particular. Construction activities would only occur during daytime hours, so no overnight lighting of the construction site would be required, except for work that may occur in the dawn or dusk hours, when full daylight is not available. Overall, construction of the RTF would have *short-term, negligible adverse impacts* on visual resources for the public within the ROI.

The Preferred Alternative would permanently alter the viewscape in the ROI by constructing a new, approximately 22- to 25-meter-tall (72 to 82 feet) PAR system (not to exceed 30 meters [98 feet]). The RTF would constitute a new built feature on a primarily flat, open, lightly developed landscape; however, the design of the RTF would be consistent with the ATD and the two WSR-88D radars installed within the Study Area. The height of the PAR system would generally be consistent with the existing radars, but would be shorter than the tallest radar which is approximately 40 meters (131 feet) high, and shorter than the

calibration tower. The proposed new PAR system would therefore be consistent with the existing landscape and developed features. Exterior security lighting may be installed at the RTF which could be visible overnight; these lights, however, would be focused at the Proposed Action Area and would not contribute to light pollution in the surrounding area. The PAR system may also be equipped with a red lamp on its top, similar to the WSR-88D radars and calibration tower, if required by the FAA, which would be a minor additional light in the Study Area with no meaningful effect on visual resources. Overall, the Preferred Alternative would have *long-term, negligible adverse impacts* on visual resources from new construction and placement of the PAR system in a largely undeveloped area.

3.2.2.2 No Action Alternative

Under the No Action Alternative, the proposed PAR system would not be constructed and operated and there would be *no impacts* to visual resources. The viewshed surrounding the Proposed Action Area would remain under current conditions.

3.3 AIR QUALITY

Air quality conditions at a given location are a function of several factors including the quantity and type of pollutants emitted locally and regionally, as well as the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersal include wind speed and direction, atmospheric stability, climate and temperature, and topography.

Air quality is affected by stationary emissions sources (e.g., boilers, emergency generators, and industrial processes), mobile sources (e.g., motor vehicles, construction equipment, and aircraft), and area sources (e.g., vehicle and aircraft fuel transfer, storage, and dispensing). The ROI for air quality is the Central Oklahoma Intrastate Air Quality Control Region (AQCR), which includes Cleveland County.

3.3.1 Affected Environment

3.3.1.1 Criteria Pollutants

Under the Clean Air Act (CAA) and its amendments, the US EPA identifies air pollutants that cause or contribute to the endangerment of human health and or environmental welfare and establishes air quality "criteria" that guide the establishment of air quality standards to regulate these pollutants (42 U.S.C. Sections 7408 - 7409). To date, the US EPA has established such criteria for six air pollutants: Carbon Monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), Ozone (O_3), particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), particulate matter less than ten micrometers in diameter (PM_{10}), and sulfur dioxide (SO_2). As a result, the EPA created National Ambient Air Quality Standards (NAAQS) meant to safeguard public health (i.e., primary NAAQS) and environmental welfare (i.e., secondary NAAQS). Current NAAQS are presented in **Table 2**.

US EPA and state/local air quality control agencies monitor and evaluate outdoor air quality for compliance with the NAAQS. Areas where monitored outdoor air concentrations are within an applicable NAAQS are considered in attainment of that NAAQS. If sufficient ambient air monitoring data are not available to decide NAAQS compliance, the area is instead deemed attainment/unclassifiable. Areas where monitored outdoor air concentrations exceed the NAAQS are designated by the US EPA as nonattainment areas. Nonattainment designations for some pollutants (e.g., O_3) can be further classified based on the severity of the NAAQS exceedances. Lastly, areas that have historically exceeded the NAAQS, but have since instituted controls and programs that have successfully remedied these exceedances, are known as maintenance areas.

The Oklahoma Department of Environmental Quality (ODEQ) Air Quality Division operates various programs, including ambient air monitoring and air quality permitting, to carry out ODEQ's regulatory duties under state and federal law in Oklahoma. The entire state of Oklahoma, including the Central Oklahoma Intrastate AQCR and Cleveland County, is considered in attainment/unclassifiable for all NAAQS.

The General Conformity Rule (40 CFR Part 51, Subpart W) requires federal agencies to prepare written Conformity Determinations for federal actions in or affecting NAAQS in nonattainment areas to demonstrate that their actions will not cause or contribute to violations of the NAAQS, except when the action is covered under the Transportation Conformity Rule or when the action is exempt because the total increase in emissions is insignificant, or *de minimis*. Because the Proposed Action would occur in an area considered in attainment/unclassifiable for all NAAQS, the General Conformity Rule would not apply to the Proposed Action, and no General Conformity analysis is required.

Table 2: National Ambient Air Quality Standards

Pollutant	Averaging Time	Level	Form
CO	8-hour	9 ppm	Not to be exceeded more than once per year
	1-hour	35 ppm	
Pb	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
NO_2	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, 3-year average
	Annual	53 ppb	Annual mean
O_3	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, 3-year average
PM	$PM_{2.5}$ Annual (primary)	12 µg/m^3	Annual mean, 3-year average
	$PM_{2.5}$ Annual (secondary)	15 µg/m^3	Annual mean, 3-year average
	$PM_{2.5}$ 24-hour	35 µg/m^3	98th percentile, 3-year average
	PM_{10} 24-hour	150 µg/m^3	Not to be exceeded more than once per year, 3-year average
SO_2	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, 3-year average
	3-hour	0.5 ppm	Not to be exceeded more than once per year

Notes: ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter of air.
Source: (US EPA, 2023b)

3.3.1.2 Climate Change and Greenhouse Gas Emissions

Greenhouse gases (GHGs) include water vapor, carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHGs are regulated under Section 202 of the CAA. The US EPA regulates GHGs through mobile source emission standards and permitting requirements under the Title V Operating Permits program. These regulations include fuel efficiency and renewable fuel standards on light-duty, medium-duty, and heavy-duty vehicles. The heating effect from these gases is considered the probable cause of the global warming observed over the last 50 years (US EPA, 2009).

For Oklahoma City, Oklahoma, which is the closest city to the Proposed Action location with recent data, the average high temperature is 94 degrees Fahrenheit (°F) in July, which is the hottest month, and the average low temperature is 29°F in January, which is the coldest month. Oklahoma City has average annual precipitation of 36.52 inches per year. The wettest month of the year is June, with an average rainfall of 4.93 inches (U.S. Climate Data, 2023).

In the coming decades, Oklahoma is expected to become warmer overall. Summers are expected to become warmer and drier, while more rain is expected to arrive in heavy downpours, resulting in more severe droughts and floods, respectively. Soils are expected to become drier and the state may experience more frequent water supply shortages (US EPA, 2016).

3.3.1.3 Other Air Quality Considerations

Under the CAA, US EPA established New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAPs) to minimize emissions of criteria pollutants and hazardous air pollutants (HAPs) from man-made emission sources. Although typically present in minimal quantities in the ambient air, HAPs have high toxicity which may pose a threat even at low concentrations. NESHAPs primarily apply to "stationary sources," which are emission sources that have a fixed location (e.g., fuel-burning boilers and generators, entire facilities/plants, etc.), as opposed to "mobile sources," which are emission sources that have the ability to move from one location to another (e.g., motor vehicles, ships, airplanes, etc.).

Major source facilities are required to obtain a Title V operating permit. The US EPA defines a "major source" as stationary sources, or groups of stationary sources, with a potential to emit more than 100 tons per year of any criteria pollutant, 10 tons per year of any HAP, or 25 tons per year of any combination of HAPs.

3.3.2 Environmental Consequences

3.3.2.1 Preferred Alternative

Criteria Pollutants: Since the Proposed Action would be located in an area that is considered in attainment/unclassifiable for all NAAQS, the General Conformity Rule does not apply. The Proposed Action would have *short-term, less-than-significant adverse impacts* to the existing air quality environment in the vicinity of the Proposed Action Area during facility construction. Construction emissions would include exhaust emissions from construction equipment used for site preparation (e.g., land clearing and grading, utility excavation), building construction, and equipment installation. Construction equipment would be certified in accordance with US EPA regulations for non-road engines (40 CFR Parts 89 and 1039). No open burning would occur during land clearing or other proposed construction activities. Site preparation and grading activities would generate particulate matter (e.g., windblown dust). Fugitive volatile organic compounds (VOCs) would be emitted during parking lot and access road paving and architectural coating application. Fuel combustion in construction employee commute vehicles would contribute to the short-term increase of construction-related emissions.

The Proposed Action would have *long-term, less-than-significant adverse impacts* to the existing air quality environment in the vicinity of the Proposed Action Area during facility operation. Operational emissions would be limited to occasional fuel combustion in the single emergency generator that would be installed at the site. The three existing radars at the NSSL are also equipped with emergency generators, but the use and operation of these generators would not change under the Proposed Action. No additional employee commute emissions would be incurred, as the facility would be monitored by personnel already visiting other radar facilities at the site.

Best Management Practices (BMPs) would be implemented during construction to reduce potential impacts on air quality, including having no visible emissions such as dust or wind-blown soil. These control measures could include applying water or using other stabilization measures on unpaved roads, areas of bare soil, or soil piles and covering dump trucks that transport materials that could become airborne. Additionally, contractors would be required to maintain construction equipment in accordance with manufacturers' specifications and US EPA regulations for non-road engines to reduce exhaust emissions. The nature and magnitude of this Proposed Action are expected to create only localized air quality impacts to the immediate area surrounding the site.

Climate Change and Greenhouse Gas Emissions: Similar to criteria pollutants, the Proposed Action would have *short-term, less-than-significant adverse impacts* to GHG emissions from fuel combustion in construction equipment and construction employee commute vehicles. *Long-term, less-than-significant adverse impacts* to GHG emissions would result from occasional fuel combustion in the emergency generator. However, given the global effect of the change in climate conditions caused by GHGs, the localized and limited GHG emissions from the Proposed Action are unlikely to have a measurable effect on climate change.

Overall, the changing climate is not anticipated to impact future operations at the new facility or cause an increase in the impacts associated with the Proposed Action. The Preferred Alternative is not located in a coastal region or along a tidally influenced river reach. Therefore, water level rise or increased flooding from climate change would not impact the Proposed Action Area. Facility design would incorporate the necessary features to withstand potential damage from severe storms.

Other Air Quality Considerations: The Proposed Action would generate minor HAP emissions increases during construction as a result of fuel combustion in construction equipment, construction personnel commute vehicles, and asphalt paving and architectural coating application. Minor ongoing HAP emissions increases would result from occasional operation of the emergency generator. These emissions would be expected to affect only the localized area on and immediately surrounding the site. Prior to installation of the emergency generator, NOAA would be required to coordinate any necessary air quality permitting actions through the ODEQ Air Quality Division. If permitting is required, the installed equipment would be subject to any applicable NSPS and NESHAP requirements.

3.3.2.2 No Action Alternative

Under the No Action Alternative, the proposed PAR system would not be constructed and there would be *no impact* to air quality and climate change. The ambient air quality environment and GHG emissions would remain in their current existing conditions.

3.4 WATER RESOURCES AND HYDROLOGICAL PROCESSES

Water resources and hydrological processes analyzed in this EA include surface water, including stormwater, and groundwater. Surface water resources comprise lakes, rivers, and streams and are important for a variety of ecological, economic, recreational, aesthetic, and human health reasons. Stormwater generally consists of water flowing off-site and into a nearby receiving surface water body. Groundwater can be defined as subsurface water resources that are interlaid in layers of rock and soil and recharged by surface water seepage. Groundwater is important for its use as a potable water source, agricultural irrigation, and industrial applications. As described in **Table 1**, no wetlands or floodplains are present within the Study Area, and these resources have been dismissed from analysis.

The ROI for surface waters and stormwater includes the boundaries of the site, as well as the down-gradient waterbodies receiving stormwater runoff within 0.5 mile of the Proposed Action Area. The ROI for groundwater includes the portion of the groundwater basin that underlies the Study Area.

3.4.1 Affected Environment

Surface Water and Stormwater: The Study Area is located within the Boggy Creek-Canadian River sub-watershed in Oklahoma (US EPA, 2023c). Merkle Creek, an intermittent tributary, is located within the Study Area, and is approximately 32 meters (106 feet) south of the Proposed Action Area (**Figure 2**). Stormwater from the Study Area flows south into Merkle Creek, which discharges into the Canadian River, located approximately 3 miles southwest of the Study Area (USFWS, 2023b). No stormwater outfalls are located within the Study Area, although one water drainage way/ditch flows through the Proposed Action Area and several others are present alongside roadways in the Study Area.

Under Section 303(d) of the Clean Water Act (CWA), states are required to conduct water quality assessments and identify waterbodies that do not meet state water quality standards. Waterbodies not meeting the established thresholds are considered impaired, and a total maximum daily load must be developed to achieve compliance with water quality standards. The ODEQ maintains a list of impaired waters across the state, and has developed various criteria to support the different beneficial uses of waters across the state. The extent of Merkle Creek contained within the Study Area is not listed as impaired for any criteria by ODEQ; however, the remainder of Merkle Creek, from south of West Robinson Street until its intersection with the Canadian River (primarily surrounded by residential and golf course development), is listed as impaired for benthic macroinvertebrate bioassessments (ODEQ, 2022a). This criterion is based on narrative biocriteria implemented by ODEQ for fish, in support of the beneficial use of fish and wildlife propagation, and assesses whether the diversity of fish and macroinvertebrates is considered degraded based on available biological data (ODEQ, 2022b). The segment of the Canadian River where Merkle Creek discharges is not listed as impaired (ODEQ, 2022a).

Groundwater: The City of Norman is underlain by the Garber-Wellington Aquifer, a bedrock aquifer consisting of fine-grained sandstone with siltstone and shale. This aquifer has an estimated annual recharge rate of 1.6 inches per year. Groundwater quality in the Garber-Wellington Aquifer is generally good, but contains concentrations of arsenic and chromium that may exceed regulated levels (Norman Utilities Authority, 2014). The Garber-Wellington Aquifer supplies approximately 6.0 million gallons per day on average annually, and these groundwater supplies are supplemented by other water sources, including the Lake Thunderbird reservoir in Norman, and some supply from Oklahoma City. Norman has historically relied largely on this aquifer for water supplies and currently operates 36 active withdrawal wells; another 12 wells have been rendered inactive due to arsenic contamination (Norman Utilities Authority, 2014).

The Oklahoma Water Resources Board (OWRB) maintains a database of all groundwater wells throughout the state. The OWRB distinguishes between groundwater wells, monitoring wells, other wells, and reported well logs, and also provides information on the groundwater well use class. In addition to municipal wells owned by the City of Norman, according to the OWRB, a total of 4 groundwater wells with a “Domestic” use class are located within 1 mile of the Study Area, and 42 are located within the ROI. The closest domestic use groundwater well is located approximately 0.45 mile northeast from the Proposed Action Area, on the property of the University of Oklahoma’s Max Westheimer Airport (OWRB, 2023).

Figure 2: Water Resources in the Study Area

3.4.2 Environmental Consequences

3.4.2.1 Preferred Alternative

Surface Water and Stormwater: Construction of the Preferred Alternative could potentially impact Merkle Creek due to its close proximity to the Proposed Action Area; however, no in-water work would occur and no direct discharge to or fill of the stream would occur. In a letter dated July 18, 2023, the US Army Corps of Engineers confirmed that no permits under Section 404 of the Clean Water Act would be required (see **Appendix A**). Proposed construction activities would disturb approximately 3.73 acres of land and could result in increased runoff from the Proposed Action Area. Due to ground disturbance of more than one acre, the construction contractors would be required to obtain the appropriate permits for construction site runoff. ODEQ is authorized by the US EPA to implement the NPDES program; NOAA would obtain an Oklahoma Pollution Discharge Elimination System (OPDES) OKR10 Construction General Permit to manage stormwater discharge from the construction site. The OPDES OKR10 permit requires development of a Stormwater Pollution Prevention Plan (SWPPP), that would identify pollution prevention controls, including erosion and sediment control measures, to minimize pollutants and reduce stormwater runoff from the Proposed Action Area (ODEQ, 2023). NOAA would also comply with Section 438 of the EISA to manage stormwater runoff from the site during operation of the PAR system, by incorporating LID features where applicable to allow for stormwater infiltration. In addition, the ground within the fence line of the RTF would be covered with gravel and would remain in a permeable condition, and temporarily disturbed areas outside the fence line would be revegetated to stabilize the soil quickly. Therefore, the Preferred Alternative would have *short-term, less-than-significant adverse impacts* on surface waters and stormwater in the ROI.

With the above-referenced permitting and stormwater control measures in place, construction and operation of the PAR system are not anticipated to impact the impaired portion of Merkle Creek south of the Study Area, nor are expected to result in the degradation and impairment of the stream segment within the Study Area. The segment of Merkle Creek within the Study Area likely does not provide high quality habitat for fish or macroinvertebrates, due to its intermittent nature, and therefore the Proposed Action is not expected to contribute to a loss of aquatic diversity. The Preferred Alternative would have *no impact* on the impairment status of Merkle Creek.

Groundwater: Construction and operation of the RTF would not be expected to intersect groundwater resources, involve groundwater withdrawals, impact existing municipal or domestic use wells, or intentionally release materials into groundwater resources. The Preferred Alternative would require non-potable water, but would not require any potable water utilities (see **Section 2.3.1.2**) and would not reduce the availability of potable water within the City of Norman. Non-potable water would generally be required for periodic maintenance of the PAR system and would not deplete aquifer resources for other purposes. Potential impacts to groundwater may occur during construction from the accidental spill of petroleum products or other liquids during construction, but the implementation of BMPs, such as conducting routine equipment inspections, maintaining spill-containment materials on-site, and adhering to other site-specific hazardous and toxic materials and waste plans, would minimize the potential for impacts to groundwater. The Preferred Alternative would not contribute to existing heavy metal concentrations, and would not result in new exceedances of regulated thresholds. Overall, the Preferred Alternative would have *short-term, negligible adverse impacts* on groundwater resources in the ROI during construction.

3.4.2.2 No Action Alternative

Under the No Action Alternative, the proposed PAR system would not be constructed and there would be *no impacts* to water resources and hydrological processes. No construction activities or associated ground disturbance would occur that could result in degradation of surface water or groundwater, or increased stormwater flows.

3.5 CULTURAL RESOURCES

Cultural resources are historic properties as defined by the National Historic Preservation Act of 1966 (NHPA); cultural items as defined by the Native American Graves Protection and Repatriation Act (NAGPRA); archaeological resources as defined by the Archaeological Resources Protection Act; sacred sites as defined by Executive Order (EO) 13007, *Indian Sacred Sites*, to which access is afforded under the American Indian Religious Freedom Act; and collections and associated records as defined by 36 CFR 79.

Historic properties covered by the NHPA include any prehistoric or historic district, site, building, structure, or object with known or potential significance with regard to pre- or post-American history, architecture, archaeology, engineering, or culture. Section 106 of the NHPA requires federal agencies to consider the effect an undertaking may have on historic properties. The Preferred Alternative is considered an undertaking and is required to comply with Section 106, including consultation with the Oklahoma State Historic Preservation Office (SHPO). All Section 106 correspondence with the SHPO for the Preferred Alternative is provided in **Appendix B**.

Consistent with Section 106 of the NHPA, NOAA is also consulting with five federally recognized tribes that are historically affiliated with the Study Area regarding the potential for the Preferred Alternative to affect properties of cultural, historical, or religious significance to these tribes and tribal nations (hereafter referred to as “tribal nations”). NOAA initiated consultation with each tribe or tribal nation via letter on June 8, 2023; a record of this consultation, including subsequent attempts to contact the tribal nations, is provided in **Appendix C**. To date, these tribal nations have identified no properties of cultural, historical, or religious significance within the Study Area.

The ROI for cultural resources is the area of potential effects (APE) as defined by the NHPA. The APE for the undertaking (36 CFR 800.16(d)) consists of the limits of disturbance (LOD) for construction and a 0.5-mile radius around the boundary of the LOD to account for visual impacts from construction of the RTF and potential relocation of the calibration tower. The LOD includes the Proposed Action Area plus a 100-foot buffer, the current location of the calibration tower plus a 35-foot buffer, and the potential relocation site of the calibration tower across Priestly Avenue.

3.5.1 Affected Environment

NOAA reviewed existing research and investigations to identify historic properties within the APE. According to a cultural resources record review conducted by the Oklahoma Archaeological Survey (i.e., SHPO), two previously recorded archaeological sites (one unnamed site, and site 34CL179) are located within the Project APE.

The unnamed site was recently identified during a small survey immediately adjacent to the airport facilities, outside the potential LOD of the current Proposed Action. Site 34CL179 – Mount Williams, Naval Air Station Norman (NAS Norman) – is located within the LOD. The site boundary encompasses the entire former NAS Norman, including the portion of the APE north of West Robinson Street and west of North Flood Avenue that contains the whole LOD. The site is classified as an historic period archaeological site and includes a WWII-era fort constructed in 1942-1943. The site was first surveyed in 1993 in preparation for the construction of State Highway 77. The large earthen berm known as Mount Williams – located approximately 0.5 miles west of the APE – was recommended eligible for listing in the National Register of Historic Places (NRHP). Archaeological mitigation was conducted by ODOT in 2005-2006, after which Mount Williams was demolished. No structures or features related to the NAS Norman have been identified within the LOD for the PAR system (i.e., proposed lease area). However, one building (Building 601) dating

back to NAS Norman used to exist in the location to which the calibration tower may be moved; this building was demolished sometime between 2010 and 2013.

Beyond the LOD, there are over 700 structures in the 0.5-mile buffer portion of the APE. Most of these structures are single family homes but also include commercial and institutional buildings. They are summarized in greater detail in NOAA's Section 106 consultation package for this Proposed Action (see **Appendix B**). None of these structures are historic properties.

3.5.2 Environmental Consequences

3.5.2.1 Preferred Alternative

The Preferred Alternative would have *less-than-significant adverse impacts* on cultural resources. While portions of site 34CL179 are located within the APE, the individual components of the site recommended eligible for inclusion in the NRHP are displaced by >0.5 miles from the APE. Although the SHPO determined the entire site to be eligible in 1993, numerous structures have been built within the site boundaries since that date, and Mount Williams was demolished following archaeological mitigation in 2005-2006. Additionally, while Building 601, associated with NAS Norman, once stood within the area proposed for the possible relocation of the calibration tower, this building was mechanically demolished ca. 2010-2013, and it is unlikely that any intact archaeological deposits remain.

Additionally, no documented Precontact period archaeological sites have been identified within the APE, and the area has a low potential to contain Precontact period sites due to the distance from a perennial water source.

Finally, the construction of the PAR system and the potential relocation and construction of the calibration tower would have no adverse effect on above-ground historic properties in the APE. The RTF (and potentially the calibration tower) are facilities in-line with the built environment of the APE and would have no impacts on the existing character of the APE. If relocation of the calibration tower is required, the overall impact to the viewshed would be minimal as the calibration tower would only be moving approximately 200-250 feet east of its current location.

NOAA determined that the Preferred Alternative would have no adverse effect to historic properties under the NHPA (see **Appendix B**). The SHPO responded in a letter dated June 22, 2023, which NOAA received in mid-July, concurring that there would be no effects to known historic properties within the APE; however, the SHPO noted that consultation with the Oklahoma Archaeological Survey (OAS) is also required to obtain a determination on the potential presence of prehistoric resources. NOAA contacted OAS on July 18, 2023, and received a response dated July 19, 2023, confirming that additional field inspection for potential prehistoric archaeological resources is not necessary. Additionally, the Preferred Alternative would have *no effect* on resources significant to tribal nations, as none have been identified through consultation with the federally recognized tribes and tribal nations.

Should any unanticipated cultural resources be encountered during activities associated with the Preferred Alternative, NOAA would immediately cease work and report the discovery to the Oklahoma SHPO, OAS, and federally recognized tribes for consultation on how to proceed.

3.5.2.2 No Action Alternative

Under the No Action Alternative, the proposed PAR system would not be constructed and there would be *no impact* to cultural resources. No ground disturbance would occur that would have the potential to disturb

archaeological sites that may be present. No construction or relocation activities would occur that could modify the surrounding viewshed for above-ground historic properties.

3.6 FLORA AND FAUNA

Biological resources addressed in this EA consist of vegetation, wildlife, and special status species. Special status species relevant to this EA are those protected under the federal Endangered Species Act of 1973 (ESA), Bald and Golden Eagle Protection Act of 1940, Migratory Bird Treaty Act of 1918, or under applicable state laws or regulations.

The ROI for biological resources includes vegetation and water resources present within the Study Area and wildlife present on-site or within 0.2 mile of the Study Area boundary (i.e., within the noise ROI).

3.6.1 Affected Environment

Vegetation: The Study Area is located within the Central Great Plains ecoregion, and more specifically within the Cross Timbers Transition sub-ecoregion. This ecoregion is characterized by mixed grass prairie and wooded riparian corridors. The ecoregion contains extensive cropland, which is used to produce wheat, alfalfa, sorghum, and soybeans (Woods, et al., 2005). Much of the Study Area, including the Proposed Action Area, consists of periodically maintained grassland, and portions also contain scattered trees.

Wildlife: The open grasslands within the Study Area, as well as surrounding developments and the Max Westheimer Airport, may contribute to low biological diversity within the ROI due to periodic disturbance from mowing. Common species found within and around the Study Area are likely limited to small common species within Oklahoma, such as eastern grey squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), eastern cottontail rabbit (*Sylvilagus floridanus*), and fulvous harvest mouse (*Reithrodontomys fulvescens*) (ODWC, 2023b). An occasional coyote (*Canis latrans*) or red fox (*Vulpes vulpes*) has been observed passing through the Study Area. Various species of birds have also been observed overhead and in the vicinity of the Study Area, and may nest in trees located within and surrounding the Study Area.

Merkle Creek, which runs through the Study Area to the south of the Proposed Action Area, may provide riparian or aquatic habitat for various species. Given its intermittent nature, however, it is unlikely to provide high-quality wildlife habitat that is utilized year-round.

Special Status Species: NOAA initially queried the USFWS Information for Planning and Consultation (IPaC) database to identify federally listed threatened and endangered (T&E) species with the potential to occur within the Study Area. IPaC identified six federally listed species (see **Table 3**) (USFWS, 2023a). One candidate species, monarch butterfly (*Danaus plexippus*), was also identified as potentially present; however, there are no legal requirements for candidate species under the ESA. No critical habitat was identified.

No suitable habitat is present within the Study Area for the Arkansas River shiner (*Notropis girardi*) or the peppered chub (*Macrhybopsis tetranema*), although the Canadian River is located approximately 3 miles southwest of the Proposed Action Area. Discharges into Merkle Creek may result in impacts to downstream water quality, although these would not result in direct habitat modification. Piping plover (*Charadrius melodus*) and rufa red knot (*Calidris canutus rufa*) are only observed in Oklahoma during migration and use mudflats as stopover habitat; no suitable habitat for either of these species is present within the Study Area. Further, no suitable habitat is present within the Study Area for the tricolored bat (*Perimyotis subflavus*), due to the absence of forested edge habitat.

Table 3: Federally Listed Species Potentially Present in the Study Area

Common Name	Scientific Name	Federal Status[1]	Habitat Type
Arkansas River Shiner	*Notropis girardi*	T	This species occupies long, wide, flowing rivers with shallow depths and sandy bottoms. It has historically occurred in the Arkansas River Basin, including the Canadian River (ODWC, 2023a).
Peppered Chub	*Macrhybopsis tetranema*	E	This species occupies the main channels of wide, shallow rivers with sandy bottoms and swift-flowing waters. It is found in the Arkansas River Basin, including the Canadian River (USFWS, 2023c).
Piping Plover	*Charadrius melodus*	T	This species uses mudflats and sandbars to forage. Piping plovers are typically documented at stopover sites in Oklahoma between the months of March to May and July to September, and do not nest or breed within the state (ODWC, 2023c).
Red Knot	*Calidris canutus rufa*	T	This species uses mudflats to forage, and this habitat is limited within Oklahoma. Red knots are typically reported during fall migration and do not nest or breed within the state (ODWC, 2023d).
Tricolored Bat	*Perimyotis subflavus*	Proposed endangered[2]	This species is found in forested edge habitats in the summer, roosting among the leaves of living or dead hardwood trees. In the winter, this species occupies caves and abandoned mines, or within road culverts in the southern US. They forage for insects in partly open habitats and over waterbodies (USFWS, 2023d; CBD, n.d.).
Whooping Crane	*Grus americana*	E	This species is only observed in Oklahoma during migration (typically April and October), and uses wetland mosaics, marshes, waterbody edges, and wet prairie and agricultural fields near water as stopover sites for feeding (ODWC, 2023e).

1. T=Threatened, E=Endangered
2. The tricolored bat was proposed for listing as an endangered species by USFWS on September 13, 2022. The proposal is still undergoing review.

Suitable stopover habitat for the whooping crane (*Grus americana*) may be present within and in the vicinity of the Study Area. Merkle Creek and surrounding fields, as well as other wet features located within a 3-mile radius may provide foraging habitat for this species during its migration in October and April. The whooping crane is typically observed in western Oklahoma, although it has occasionally been documented in central Oklahoma, near Oklahoma City (ODWC, 2023e).

IPaC identified 10 Birds of Conservation Concern (BCC) with the potential to occur within the Study Area. BCCs are both migratory and non-migratory bird species that are not listed as T&E species, but still represent conservation priorities for the USFWS (USFWS, 2023a). The bald eagle (*Haliaeetus leucocephalus*) was also identified as potentially present; while it is not considered a BCC in this area, it is

still protected under the Bald and Golden Protection Act. Four species have been recently observed within the ROI: the bald eagle, chestnut-collared longspur (*Calcarius ornatus*), chimney swift (*Chaetura pelagica*), and Sprague's pipit (*Anthus spragueii*). Observations of the remaining BCCs have occurred approximately 3 miles to the west of the Study Area, in open fields and some wooded areas bordering the Canadian River (Cornell Lab of Ornithology, 2023). Additionally, periodic landscaping activities in the Study Area and airport operations occurring at Max Westheimer Airport may limit the occurrence of migratory birds due to land disturbance and noise.

The Oklahoma Department of Wildlife Conservation (ODWC) is responsible for managing state-listed T&E species, and the Oklahoma Natural Heritage Inventory (ONHI) maintains lists of state-listed species potentially present in each county. The ONHI does not identify any state-listed T&E species as occurring within Cleveland County. A data request submitted to ONHI on May 19, 2023, confirmed that no threatened, endangered, or candidate species are known to occur in the vicinity of the Study Area; however, in a separate comment submitted on July 14, 2023, ONHI noted that the federally protected bald eagle has been identified within Cleveland County (see **Appendix A**). Bald eagles nest in forested areas near rivers, lakes, marshes, and other permanent bodies of water, and have increasingly been observed in drier areas, such as farmland (USFWS, 2023). Potentially suitable habitat may be present nearby, given the Study Area's proximity to the Canadian River, but no permanent waterbodies or forested areas are present within the ROI.

3.6.2 Environmental Consequences

3.6.2.1 Preferred Alternative

Vegetation: Proposed construction occurring under the Preferred Alternative would clear the grassland vegetation present within the Proposed Action Area, an area of approximately 3.73 acres.

No impacts to vegetation outside of the Proposed Action Area would be anticipated. Construction vehicles would access the site via the proposed access road and all construction staging areas would be contained within the Proposed Action Area. The majority of ground disturbance would occur when preparing the site for erection of the RTF. Paving activities and utilities placement would also result in ground disturbance, although this disturbance would not extend beyond the boundaries of the Proposed Action Area. Once construction activities are complete, the portion of the Proposed Action Area outside the fence line would be revegetated with native plants or landscape vegetation, in accordance with construction design plans prepared prior to implementation of the Proposed Action, and in accordance with applicable stormwater requirements to minimize runoff and erosion (see **Section 3.4.2**). Native vegetation communities and wildlife habitats could be impacted by the introduction or encroachment of noxious weeds or invasive species during construction. However, contractors would minimize the introduction or spread of invasive species through the use of BMPs such as cleaning all construction equipment prior to bringing it on-site. Given the minimal amount of vegetation removal that would occur, the lack of native vegetative communities within the Proposed Action Area, and anticipated implementation of appropriate BMPs, the Preferred Alternative would result in *short-term, less-than-significant adverse impacts* on vegetation during construction of the RTF.

Operation of the PAR system would not have any impacts on vegetation, as no additional ground-disturbing activities would occur. Access to the site would be provided by a paved access road, and no vehicles would drive over undisturbed areas. The Preferred Alternative would have *no impact* on vegetation during operation.

Wildlife: During construction, common wildlife species potentially present within the Proposed Action Area would be physically displaced, and construction noise and increased human activity may also disturb wildlife

species located within the ROI. Mobile wildlife species, such as birds and small mammals, would likely relocate to areas of similar habitat near the Proposed Action Area; similar grassland habitat is present throughout the Study Area, and other wooded habitat is also available outside the ROI. Although disturbance, displacement, or inadvertent wildlife mortality from construction impacts would constitute an adverse impact, such impacts would occur at the individual level, rather than the population or species level, and would not inhibit the continued presence of common wildlife populations and species near the Proposed Action Area. Wildlife that is present in the ROI may be accustomed to human activity due to current NSSL operations, as well as operations at the Max Westheimer Airport. No in-water work would occur as part of the Proposed Action, so any species that may be present within or around Merkle Creek would likely not be directly affected by construction activities (although noise and nearby construction activities may still disturb portions of the creek habitat nearest the Proposed Action Area). Therefore, construction occurring under the Preferred Alternative would result in *short-term, less-than-significant adverse impacts* to wildlife.

Once construction of the RTF is completed and the PAR enters into the testing phase, RF emissions may be present within the Proposed Action Area (see **Section 3.11.2**). Fauna species may experience internal heating and possible behavioral changes as a result of continuous direct exposure to RF radiation (IEEE, 2019). It is unlikely, however, that such species would experience the high intensity of radiation required to produce adverse effects, given the lack of habitat within the fenced area, their ability to avoid the site generally, and the sufficient amount of other suitable habitat in the surrounding area. Should individuals remain near the Proposed Action Area, these impacts would occur over the long-term and would only occur at the individual level. Operation of the PAR system may therefore result in *long-term, negligible adverse impacts* to wildlife remaining in the Proposed Action Area.

Special Status Species: No potential suitable habitat is present within the ROI for the Arkansas River shiner, the peppered chub, piping plover, rufa red knot, or tricolored bat. Therefore, the Proposed Action is anticipated to have *no effect* on these special status species.

Although potential suitable stopover habitat for the whooping crane is present within the ROI, due to the rarity of this species in central Oklahoma, the Preferred Alternative is not anticipated to result in adverse impacts to the whooping crane or migratory BCCs. Due to the marginal quality of the habitat in the ROI for bald eagles, they are unlikely to be present at the site. Construction occurring within the Proposed Action Area could impact up to 3.73 acres of potential habitat. No tree clearing would occur during construction that could further reduce available habitat. Due to the availability of other suitable habitat within 3 miles of the Study Area, whooping cranes and BCCs migrating through central Oklahoma would likely avoid the Study Area during construction. Therefore, construction of the Preferred Alternative *may affect but is not likely to adversely affect* the whooping crane, and would have *short-term, negligible adverse impacts* on BCCs, including the bald eagle. NOAA consulted with USFWS on May 12, 2023, regarding potential impacts to special status species. The USFWS responded on June 8, 2023, and concurred with NOAA's determinations that the Proposed Action would not affect federally listed threatened or endangered species (see **Appendix A**).

Following construction, operation of the PAR system would not result in any additional habitat destruction. The completed RTF structure may pose a collision hazard to whooping crane and other migratory bird species, due to its tall height, although it would be shorter than other radars contained within the Study Area. Migratory BCCs, as well as the whooping crane, would be able to readily avoid the structure. Nighttime security lighting and red lamps for aviation, if installed, would identify the presence of the structure, but would not contribute to light pollution that may disturb species. Limited human activity and disturbance would occur at the site during operation, with personnel accessing the RTF to conduct maintenance and ensure functionality of the PAR. Operation of the Preferred Alternative would result in

long-term, negligible adverse impacts on special status species from the introduction of a new collision hazard.

Other Resources: NOAA Administrative Order 216-6A and its accompanying Companion Manual identifies additional biological factors that should be considered to determine if the Proposed Action's effects are significant. In accordance with the Companion Manual, NOAA has considered the degree to which the action may adversely affect:

i) stocks of marine mammals as defined in the Marine Mammal Protection Act;
ii) managed fish species;
iii) essential fish habitat as defined under the Magnuson-Stevens Fisheries Act; i
iv) vulnerable marine or coastal ecosystems, including, but not limited to, deep coral ecosystems; or
v) biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.).

Given the nature of the Proposed Action and considering that no in-water work would occur that would have the potential to impact marine or aquatic ecosystems or managed fish species, including essential fish habitat, NOAA has determined that the Proposed Action would have no potential to impact those resources.

3.6.2.2 No Action Alternative

Under the No Action Alternative, the proposed PAR system would not be constructed and there would be *no impact* to vegetation, wildlife, or special status species in the ROI. Natural conditions in the Study Area would remain and vegetation and wildlife at the site would not be disturbed by other activities occurring at the NSSL or within the ROI.

3.7 FARMLAND AND SOILS

The Farmland Protection Policy Act (FPPA) (7 USC 4201 et seq.) of 1981 states that federal agencies must "minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses." The resources protected by the FPPA include prime and unique farmland, which are categorized by the Natural Resources Conservation Service (NRCS) based on underlying soil characteristics.

Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions near the soil surface. Under natural conditions, these soils are able to support growth and reproduction of hydrophytic vegetation. Presence of hydric soils is one of the criteria used to identify and delineate wetlands.

The ROI for soils is equivalent to the Study Area as shown on **Figure 3**.

3.7.1 Affected Environment

Soils within the Study Area have been described to have a thickness of about 12 inches with varying fertility, low permeability, and high erosion hazard (SRI International, 1994). Four soil map units have been identified within the Study Area (see **Figure 3** and **Table 4**). Only one of the soil units has been identified as prime or unique farmland; this soil unit is not present within the Proposed Action Area. No hydric soils have been identified within the Study Area (NRCS, 2023). The full Study Area is zoned as a rural agricultural district (City of Norman, 2023b), and the Proposed Action Area is not used for farming or other agricultural purposes.

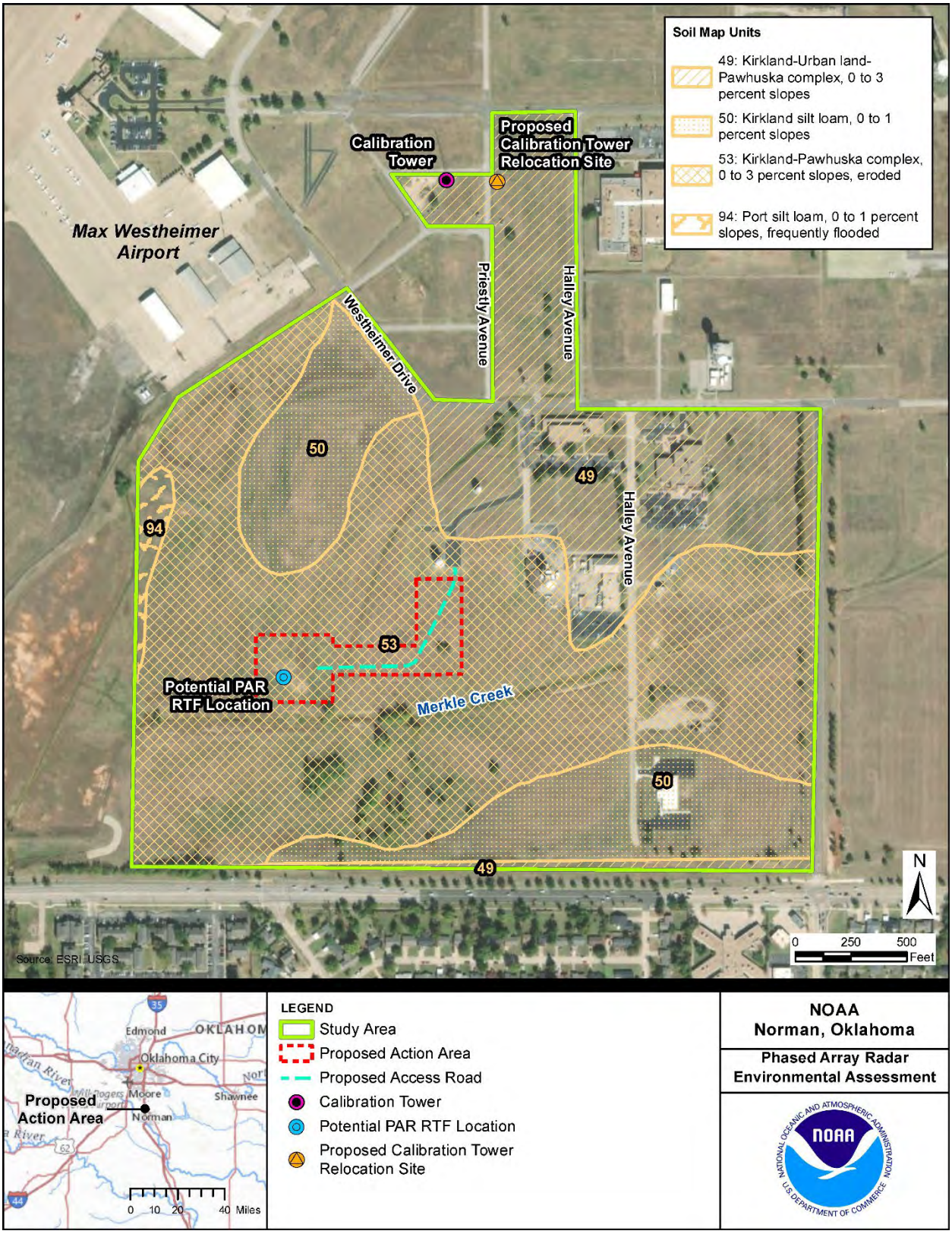


Figure 3: Soil Resources in the Study Area

Table 4: Soil Characteristics for the Study Area

Soil Type	Map Unit	Percent of Study Area	Prime / Unique Farmland	Farmland of Statewide Importance	Hydric
Kirkland-Urban land-Pawhuska complex, 0 to 3 percent slopes	49	29.2%	No	No	No
Kirkland silt loam, 0 to 1 percent slopes	50	16.1%	Yes	No	No
Kirkland-Pawhuska complex, 0 to 3 percent slopes, eroded	53	53.4%	No	No	No
Port silt loam, 0 to 1 percent slopes, frequently flooded	94	1.3%	No	No	No

Source: (NRCS, 2023)

3.7.2 Environmental Consequences

3.7.2.1 Preferred Alternative

During construction of the RTF, soil disturbance and removal would occur in order to lay the foundation, pave the access road and parking lot, and place the security fence. The presence and operation of construction equipment and materials in undeveloped areas within the Proposed Action Area, including staging locations, would also result in soil disturbance or compaction. The proposed location of the PAR system and access road would not intersect any farmland soils, as none are located within the Proposed Action Area. The maximum amount of soils that could be disturbed would be 3.73 acres. Throughout construction, farmland soils in the Study Area would not be affected. Operation of the PAR system is not expected to involve any future disturbance of farmland soils. Therefore, the Preferred Alternative would have *no impact* on farmland.

Generally, soils in the Study Area would be disturbed by construction activities. To minimize the potential for increased runoff and erosion during construction, NOAA would obtain an OPDES OKR10 permit, and would comply with applicable erosion and sediment control measures and BMPs (see **Section 3.4.2**). The Preferred Alternative would result in *short-term, less-than-significant adverse impacts* to soils from runoff and erosion during construction. Operation of the PAR system is not expected to involve any additional ground disturbance, and would have *no impact* on soils.

3.7.2.2 No Action Alternative

Under the No Action Alternative, NOAA would not construct or operate the PAR system at the Norman site and there would be *no impact* to soils. No construction activities or associated ground disturbance would occur that could result in the removal or erosion of soils (including farmland resources).

3.8 NOISE

Sound is vibrations in the air, which are known as compression waves. Just like a pebble dropped into a pond creates ripples, the compression waves, formed of air molecules pressed together, radiate from a source and decrease with distance. If these vibrations reach a human eardrum at a sufficient rate and intensity, we perceive it as sound. When the sound is unwanted, we refer to it as noise. Generally, sound becomes noise to a listener when it interferes with normal activities. Sound within the range of human

hearing is measured on a logarithmic scale, known as the decibel (dB). The human ear does not hear all frequencies equally; the A-weighted decibel scale (dBA) is used to reflect the selective sensitivity of human hearing (USEPA, 1974). Normal speech has a sound level of approximately 60 dBA. Sound levels above 120 dBA begin to be perceived as uncomfortable, while sound levels between 130 and 140 dBA are considered painful (Cowan, 1994; Egan, 1988). The common sound levels encountered in daily life are shown in **Table 5**.

Table 5: Common Sound Levels

Sound Source	Sound Pressure Level (dBA)
Air Raid Siren at 50 feet	120
Maximum Levels at Rock Concerts (Rear Seats)	110
On Sidewalk by Passing Heavy Truck or Bus	90
On Sidewalk by Typical Highway	80
On Sidewalk by Passing Automobiles with Mufflers	70
Typical Urban Area	60-70
Typical Suburban Area	50–60
Quiet Suburban Area at Night	40-50
Typical Rural Area at Night	30-40
Isolated Broadcast Studio	20
Audiometric (Hearing Testing) Booth	10
Threshold of Hearing	0

Sources: (Cowan, 1994; Egan, 1988)

The two most common types of noise are point sources and line sources. Point source noise is usually associated with one or more sound sources that generally remain in one place for extended periods of time, such as with most construction activities, and are described within an area having a largest dimension that is much smaller than the distance from this acoustical point source to a receptor of interest. A few examples of point sources of noise are pile drivers, jackhammers, rock drills, or excavators working in one location. A construction site is typically considered a point source. Line source noise is generated by moving objects along a linear corridor. Highway traffic on a busy road is a good example of line source noise (FTA, 2018).

Natural factors such as topography, vegetation, temperature, and relative humidity can further reduce noise over distance. Acoustically “hard” sites (i.e., sites with a smooth reflective surface along the direct sound path between the source and the receiver, such as paved parking lots or bodies of water) offer little or no ground attenuation due to acoustical absorption. “Soft” sites, on the other hand, are porous ground surface conditions characterized by loose soils, fresh-fallen snow, grass, or scattered bushes and trees that yield an excess ground attenuation value (i.e., over and above what geometric divergence already provides) of 1.5 dBA per doubling of distance (Crocker, 2007).

A large object in the direct path between a noise source and a receiver can significantly attenuate noise levels at that receiver location. The amount of attenuation provided by this “shielding” depends on the size of the object and the frequencies of the noise levels—the lower the frequency, and hence the larger the wavelength, the less noise reduction the barrier provides. Natural terrain features such as hills and dense woods, as well as fabricated features such as buildings and walls, can significantly alter noise levels. Linear occlusion (i.e., a break in the line of sight between a noise source and receiver) due to natural terrain can

generally reduce noise levels at the receiver up to 10 dBA for relatively close-range receivers (WSDOT, 2020).

The ROI for noise includes areas within 0.2 mile of the Proposed Action Area. At this distance (approximately 1,000 feet), most noise emitted from construction equipment attenuates to background levels of around 60 dBA.

3.8.1 Affected Environment

The ambient noise level in the vicinity of the NSSL includes noise associated with existing NOAA and University of Oklahoma facilities, traffic in the surrounding area (such as along West Robinson Street, North Flood Avenue, and Interstate 35), operation of landscaping equipment used to maintain the Study Area (e.g., mowers/balers), and aircraft operation at the University of Oklahoma's Max Westheimer Airport. There is little varied terrain or tall vegetation surrounding the Study Area, so noise may be able to travel greater distances relative to areas with hills and dense woods. However, the Study Area would be considered a "soft" site due to the minimal development present on-site and the presence of loose, undisturbed soils and grasses which may facilitate noise absorption.

Sensitive receptors typically include residential dwellings, schools, and hospitals, or other noise-sensitive land uses. Sensitive receptors nearest to the NSSL include residences south of West Robinson Street (approximately 0.2 mile from the Proposed Action Area), the Cleveland County Family YMCA (approximately 0.25 mile from the Proposed Action Area), Adams Elementary School (approximately 0.6 mile from the Proposed Action Area), and Norman North High School (approximately 0.8 mile from the Proposed Action Area). Each of these sensitive receptors are buffered from the Proposed Action Area by major roadways and/or other structures.

The City of Norman maintains a Noise Control Ordinance in its Municipal Code which identifies allowable noise levels based on the land use district and time of day and establishes noise prohibitions. The Study Area is zoned as a rural agricultural district (City of Norman, 1994). The Noise Control Ordinance only provides limits for residential, commercial, and industrial districts; however, it requires that the limits of the most restrictive land use apply at the boundaries between different districts (City of Norman, 2023a). The closest other land use district to the Proposed Action Area is a residential district; therefore, it is assumed that the maximum permissible noise levels for residential districts would apply to the Proposed Action. The regulated ambient noise level for residential districts between 7:00 a.m. and 9:00 p.m. is 55 dBA, and between 9:00 p.m. to 7:00 a.m. is 50 dBA. Sound levels cannot be generated higher than 15 dBA above the ambient limit (i.e., no higher than 70 dBA between 7:00 a.m. and 9:00 p.m., and no higher than 65 dBA between 9:00 p.m. and 7:00 a.m.) (City of Norman, 2023a).

The Noise Control Ordinance does make some exceptions for construction work. Noise from construction work, including use and operation of equipment, is prohibited in residential and commercial land use districts between 9:00 p.m. and 7:00 a.m. the following day. Further, the maximum permissible sound level must not exceed the limits established for industrial land use districts, regardless of the land use district where the construction work is occurring. The regulated ambient noise level for industrial districts between 7:00 a.m. and 9:00 p.m. is 70 dBA, and between 9:00 p.m. to 7:00 a.m. is 65 dBA. Sound levels cannot be generated higher than 15 dBA above the ambient limit (i.e., no higher than 85 dBA between 7:00 a.m. and 9:00 p.m., and no higher than 80 dBA between 9:00 p.m. and 7:00 a.m.) (City of Norman, 2023a).

3.8.2 Environmental Consequences

3.8.2.1 Preferred Alternative

Construction activities associated with the Preferred Alternative would result in a temporary increase in noise levels within the vicinity of the Proposed Action Area, related to use of equipment during construction of the RTF. Equipment such as backhoes, excavators, graders, loaders, and trucks would be used, and would be the primary source of noise during implementation of the Proposed Action. Noise impacts would be the greatest at the Proposed Action Area and would decrease with distance. Buildings located along Westheimer Drive and Halley Avenue would be the closest receptors to the Proposed Action Area (i.e., within approximately 0.2 mile). **Table 6** provides sound levels typical of construction equipment up to a distance of 2,500 feet (approximately 0.5 mile). These noise levels will continue to attenuate at further distances from the Proposed Action Area.

Proposed construction and installation activities are anticipated to be complete within three years and would be loudest during the site preparation phase and the installation of foundation piles and concrete foundation slab. The nearest sensitive receptors are approximately 0.2 mile (about 1,000 feet) from the Proposed Action Area. Therefore, construction noise levels would mostly dissipate to levels 69 dBA or less (see **Table 6**), with the exception of noise generated by a bulldozer, which would be consistent with typical ambient noise levels in an urban area (see **Table 5**) and with regulated daytime ambient noise levels in industrial areas in accordance with the City of Norman's Noise Control Ordinance (i.e., 70 dBA). No construction work would occur between the hours of 9:00 p.m. and 7:00 a.m., in accordance with the Noise Control Ordinance. Noise reduction BMPs, such as the use of mufflers on construction equipment and vehicles, would also minimize noise impacts during implementation of the Proposed Action. Therefore, the construction activities under the Preferred Alternative would result in *short-term, less-than-significant adverse impacts* to the overall noise environment.

Table 6: Construction Equipment Noise Levels at Certain Distances from Source (dBA)

Source	Distance from Source (feet)							
	0	**50**	**100**	**200**	**400**	**1,000**	**1,700**	**2,500**
Heavy Truck	95	84-89	78-93	72-77	66-71	58-63	54-59	50-55
Dump Truck	108	88	82	76	70	62	58	54
Concrete Mixer	108	85	79	73	67	59	55	51
Jackhammer	108	88	82	76	70	62	58	54
Scraper	93	80-89	74-82	68-77	60-71	54-63	50-59	46-55
Bulldozer	107	87-102	81-96	75-90	69-84	61-76	57-72	53-68
Generator	96	76	70	64	58	50	46	42
Crane	104	75-88	69-82	63-76	55-70	49-62	45-48	41-54
Loader	104	73-86	67-80	61-74	55-68	47-60	43-56	39-52
Grader	108	88-91	82-85	76-79	70-73	62-65	58-61	54-57
Pile driver	105	95	89	83	77	69	65	61
Forklift	100	95	89	83	77	69	65	61

Source: (Tipler, 1976)

Following completion of construction, changes to the noise environment would be negligible and not discernable to nearby sensitive receptors. During operation of the PAR system, noise would be generated

by infrequent visits of maintenance and repair vehicles. The moving assemblies of the radar, the generator, and the HVAC system may all generate some noise, but it would generally be imperceptible off-site. Operation of the PAR system would be consistent with residential permissible sound levels in accordance with the Noise Control Ordinance. Therefore, operations under the Preferred Alternative would have a *long-term, negligible adverse impact* to the overall noise environment.

3.8.2.2 No Action Alternative

Under the No Action Alternative, NOAA would not construct or operate the PAR system at the Norman site and there would be *no impact* to the existing noise environment.

3.9 UTILITIES AND SOLID WASTE

Utilities include water storage facilities, treatment plants, and delivery systems; power generation, transmission, and distribution facilities, including, but not limited to, generators, substations, and power lines; natural gas transmission and distribution facilities; sewage collection systems and treatment plants; and communication systems.

The ROI for utilities includes all areas and end users within the Study Area that may be impacted from temporary utility disruptions or an increased demand on utilities. No changes to utilities outside of the Study Area are anticipated.

3.9.1 Affected Environment

No utilities are currently present at the Proposed Action Area, although electrical, gas, network, and water utilities are available elsewhere within the Study Area to support other NOAA facilities and radars. The closest tie-in points to connect the necessary utilities to the PAR system would be at the ATD adjacent to the Proposed Action Area. The expansion of the existing utilities within the Study Area would not require any new off-site connections.

3.9.2 Environmental Consequences

3.9.2.1 Preferred Alternative

Implementation of the Preferred Alternative would increase overall utility usage at the Norman site, as the new PAR system would require connections to electrical, natural gas, network, and non-potable water utilities to support the operation and testing of the PAR. During construction, these utilities would be connected to the RTF from elsewhere within the Study Area, most likely from the ATD, as it is the closest existing facility to the Proposed Action Area. Minor, temporary service disruptions to utility services within the Study Area could occur while the new utilities are being connected; however, these disruptions would be minimized by ensuring that existing utilities remain operational until the new utilities are ready to be connected. End users would also be given advance notice of any anticipated disruptions. No service disruptions would be anticipated for users located outside of the Study Area. The Preferred Alternative would have *short-term, negligible adverse impacts* to utilities within the Study Area during construction.

Construction activities would generate solid wastes, primarily in the form of excess construction materials such as removed soils, rock, concrete, wood, asphalt, glass, and plastics that may be generated, from site preparation, erection of the RTF, and paving of the access road and parking lot. Materials considered unsuitable for reuse would be removed and disposed of at appropriate landfills in accordance with applicable solid waste regulations. Portable restrooms would be available at the construction site, and the construction contractors would be responsible for removing sanitary waste from the site. Therefore,

construction would be anticipated to have *short-term, negligible adverse impacts* on solid waste generation and disposal.

Once the PAR system is operational, utility demand would increase relative to the existing demand at the Study Area, but is not anticipated to generate substantially higher demand that would burden utility providers or result in disrupted service to other facilities within the Study Area. As no new personnel would be stationed at the RTF, utility demand would be limited to what is required for the PAR to function, rather than to support new staff. Further, operation of the radar would not reduce the availability of potable water supplies, as it would only be equipped to receive non-potable water. In the event of a power outage, the RTF would be equipped with a backup generator that would either operate on diesel or natural gas to ensure that the PAR system would be able to remain operational. Operation of the PAR system would not generate any sanitary waste that would need to be transported from the site, nor would it generate solid waste other than from routine maintenance activities. Minimal quantities of solid wastes, such as replacement parts, would be generated during PAR system maintenance and would be removed and disposed of in accordance with applicable requirements. Therefore, operation of the Preferred Alternative would have *long-term, negligible adverse impacts* on utility demand, and *no impact* on solid waste.

3.9.2.2 No Action Alternative

Under the No Action Alternative, NOAA would not construct or operate the PAR system and there would be *no impact* to utilities. No physical changes would occur at the site, and existing utility use and solid waste generation in the Study Area would not change.

3.10 HAZARDOUS AND TOXIC MATERIALS AND WASTE

This section describes the use and presence of hazardous and toxic materials and waste (HTMW) at the Proposed Action Area. The ROI for HTMW is the Proposed Action Area.

HTMW are generally defined as materials or substances that pose a risk (through either physical or chemical reactions) to human health or the environment. Regulated hazardous substances are identified through a number of federal laws and regulations. The most comprehensive list is contained in 40 CFR Part 302, and identifies quantities of these substances that, when released to the environment, require notification to a federal government agency. Hazardous wastes, defined in 40 CFR 261.3, are considered hazardous substances. Generally, hazardous wastes are discarded materials (solids or liquids) not otherwise excluded by 40 CFR 261.4 that exhibit a hazardous characteristic (i.e., ignitable, corrosive, reactive, or toxic), or are specifically identified within 40 CFR Part 261. Petroleum products are specifically exempted from 40 CFR Part 302, but some are also generally considered hazardous substances due to their physical characteristics (especially fuel products), and their ability to impair natural resources.

Hazardous waste must be transported, treated, or disposed of in accordance with the Resource Conservation and Recovery Act (RCRA) of 1976 regulations which require the hazardous waste to be tracked using a Uniform Hazardous Waste Manifest (EPA Form 8700-22). Sites that generate over 220 pounds of hazardous waste, or that accumulate over 2200 pounds of hazardous waste at any one time, require a RCRA Site ID Number and filing of an application (referred to as Dangerous Waste Site Identification Form) with US EPA.

3.10.1 Affected Environment

There is no record of on-site contamination within the Proposed Action Area. The location of the Proposed Action Area was within the U.S. Navy's NAS Norman until 1959 when land ownership was transferred to the University of Oklahoma. The NSSL was established near the Proposed Action Area in 1964 and a

Weather Surveillance Radar - 1957 (WSR-57), Weather Surveillance Radar - 1974 (WSR-74), and a Doppler radar were installed in the vicinity of the Proposed Action Area thereafter. WSR-88D systems were also installed in 1988 and 1994.

Except for fuel for backup generators to operate these radar systems, there is no known history of HTMW use, storage, generation, or disposal in the Proposed Action Area. A Spill Prevention, Control and Countermeasure Plan (SPCCP) is maintained for the University of Oklahoma's North Base to address incident response and emergency responsibilities resulting from spills or discharges of HTMW and includes NSSL operations.

3.10.2 Environmental Consequences

3.10.2.1 Preferred Alternative

Operation of construction equipment and vehicles under the Preferred Alternative would create the potential for discharge, spills, and contamination from commonly used products, such as diesel fuel, gasoline, oil, antifreeze, and lubricants, at the Proposed Action Area. Even without major release events, multiple minor releases could have potential effects to the environment within the ROI; however, such releases would be addressed via adherence to the SPCCP and by maintaining spill containment and clean-up materials on-site. All hazardous materials or waste discovered, generated, or used during construction would be handled, containerized, and disposed of in accordance with applicable local, state, and federal regulations. Therefore, construction of the Preferred Alternative would have the potential for *short-term, less-than-significant adverse impacts* from releases of HTMW.

Operation of the Preferred Alternative would not result in the generation of hazardous waste. Although routine maintenance could create the potential for discharge, spills, and contamination from commonly used HTMW, any potential releases of HTMW would be handled in accordance with the SPCCP and applicable local, state, and federal regulations. If the backup generator for the PAR requires a fuel tank (as opposed to utility natural gas), all necessary precautions would be taken to prevent an accidental release and any release would be handled per the procedures set out in the SPCCP. Thus, adverse impacts from the operation of the Preferred Alternative would be *negligible*.

3.10.2.2 No Action Alternative

Under the No Action Alternative, NOAA would not construct or operate the PAR system and there would be *no impact* to HTMW. No construction would occur at the site, and existing use of HTMW (i.e., generator fuels) in the vicinity of the Proposed Action Area would not change.

3.11 HUMAN HEALTH AND SAFETY

Human health and safety considers potential impacts to people living in the surrounding environment and the ways in which they may be affected. It addresses the possibilities of adverse health outcomes, including illness and injury, that could result from the Proposed Action. Potential risks to human populations addressed in this EA center around physical risk from proximity to a construction site, as well as other health and safety risks that may result from RF radiation.

The ROI for human health and safety includes all areas where people may be exposed to physical health and safety risks. This is generally limited to the Study Area, as members of the general population would not be able to access radar facilities contained within the NSSL.

3.11.1 Affected Environment

Radars emit signals in the form of electromagnetic radiation, which consists of waves of electric and magnetic energy. Electromagnetic energy from radars is typically referred to as RF radiation, that is further characterized based on the wavelength and the frequency of the transmitted signal. The frequency of RF signals is measured in hertz (Hz), and electromagnetic waves typically have frequencies ranging between 3 kilohertz (kHz) to 300 gigahertz (GHz) (FCC, 2023).

Dual-polarization PARs emit both horizontally and vertically polarized waves that are scattered by atmospheric particles and return back to the PAR. The two types of waves identify two-dimensional characteristics of precipitation, such as both the size and shape of atmospheric particles, and can provide a more specific picture of anticipated weather events (NOAA NSSL, 2023b). PARs used for weather surveillance, including the NSSL's ATD, operate in the S-band, which includes frequencies between 2 and 4 GHz (NOAA NSSL, 2023a; NASA, 2023).

People located in the vicinity of radars may be exposed to RF radiation; however, all humans are generally exposed to low levels of RF radiation on a daily basis. These signals primarily come from the use of communications technology, such as mobile phones, radio, and television broadcasting, as well as non-communications technology, such as traffic speed radar, microwave ovens, and medical imaging (FCC, 2023). The Federal Communications Commission (FCC) regulates the use of these devices and restricts the RF radiation that is emitted to certain levels to ensure that human exposure is maintained at safe levels.

Exposure standards are generally expressed as maximum permissible exposure (MPE) limits that indicate the maximum duration humans can safely be exposed to specified frequencies. These measurements are based on maximum values of the specific absorption rate (SAR), which measures the rate at which RF energy is absorbed by a human body. Human absorption varies based on how much of the body is exposed (e.g., whole body versus just the head like when talking on a cell phone), and the most restrictive MPE limits are for frequencies in the range of 100 to 300 MHz, since the human body most efficiently absorbs RF energy occurring within that range (FCC, 2023). The basis for these MPE limits is a whole-body averaged SAR level of 4 watts per kilogram (W/kg) (Cleveland, Jr., Sylvar, & Ulcek, 1997). FCC guidelines for human exposure limits are based on criteria developed by expert organizations, including the National Council on Radiation Protection and Measurements (NCRP), the American National Standards Institute (ANSI), and the Institute of Electrical and Electronics Engineers (IEEE) (FCC, 2023). FCC's guidelines for MPE are based on known thresholds for adverse effects and incorporate margins of safety (see **Table 7**).

Table 7: Limits for Maximum Permissible Exposure

Frequency Range (MHz)	Occupational Exposure		Uncontrolled Exposure	
	Power Density (mW/cm^2)	Average Time (minutes)	Power Density (mW/cm^2)	Average Time (minutes)
0.3-3.0	*(100)	≤6	*(100)	<30
3.0-30	*($900/f^2$)	<6	*($180/f^2$)	<30
30-300	1.0	<6	0.2	<30
300-1,500	f/300	<6	f/1500	<30
1,500-100,000 (1.5-100 GHz)[1]	5	<6	1.0	<30

Source: 47 CFR 1.1310(e)(1)

Notes: f = frequency in MHz; * = Plane-wave equivalent power density

1. The PAR would operate within this frequency range, between 2-4 GHz.

The MPE limits vary based on the type of exposure, and who is exposed. Occupational exposure limits apply where persons are exposed as part of their employment. FCC regulations require that those who are occupationally exposed be informed of the potential for RF exposure and that they are able to control or reduce their exposure with use of safe work practices or personal protective equipment (FCC, 2023). The Occupational Safety and Health Administration (OSHA) also has published regulations that include occupational and construction exposure limits for nonionizing radiation, which are set at 10 milliwatts per square centimeter (mW/cm^2). These limits, however, are considered unenforceable standards (OSHA, 2023). Uncontrolled exposure limits apply where the general public may be exposed to RF radiation. These guidelines are time-averaged and are only relevant to locations that are accessible to members of the public (Cleveland, Jr., Sylvar, & Ulcek, 1997).

Depending on the frequency, intensity of the RF radiation, and time of exposure, human injury or adverse biological effects may occur. Environmental background levels of RF energy have been determined to be safe for the public and will not result in health or safety concerns (FCC, 2023). The primary effect that can occur to humans from prolonged exposure to frequencies between 2 and 4 GHz is thermal heating, which increases the body temperature overall. Generally, even at higher levels of exposure than the identified MPE limits, thermoregulation performed by the human body is able to offset thermal effects (IEEE, 2019). However, continual exposure to very high levels of RF radiation can be harmful if the body is unable to cope with or dissipate excessive heat. Significant internal temperature increase can result in tissue damage, particularly to the eyes (FCC, 2023). Various other health impacts have been studied, such as changes to digestive function, cognitive function, sleep disturbances, headaches and fatigue, and increased blood pressure, but no consistent evidence has been produced that suggests these impacts are correlated to RF exposure. In addition, the potential link between RF exposure and cancer has been studied, and experimental data have not provided evidence of a causal link (IEEE, 2019).

3.11.2 Environmental Consequences

3.11.2.1 Preferred Alternative

Construction of the RTF would be performed by qualified, trained contractors with applicable licenses and certifications. Construction activities would be performed in accordance with applicable federal and state occupational safety and health regulations and requirements, including specific OSHA regulations on fall protection and confined spaces. Proposed construction would occur during daytime working hours in conditions with ample lighting and would not occur during inclement weather. All construction activities would occur within a fenced or marked perimeter and would only be accessible to authorized personnel. Any solid or hazardous wastes generated during construction would be handled and disposed of in accordance with applicable requirements (see **Section 3.9.2** and **Section 3.10.2**).

Adherence to applicable health and safety regulations and requirements during construction would minimize the potential for accidents and human injury; however, some inherent risk would remain due to the nature of the work and exposure to heavy equipment and machinery. In the event of an accident or injury, trained personnel would administer first-aid immediately, and emergency services would be contacted if necessary. Such risks from construction work would be limited to on-site construction personnel, and would not extend to the general public. Although construction would only be performed by qualified personnel, due to the inherent risks, the Preferred Alternative has the potential to result in *short-term, less-than-significant adverse impacts* to human health and safety during construction of the RTF. These risks would cease following the completion of construction activities.

Operation of the PAR may also result in slight risks to human health and safety, from RF radiation emitted by the PAR. The proposed PAR would operate in a frequency range of 2.7 to 3.1 GHz (2,700 to 3,100 MHz), which is outside of the frequency range where the human body most efficiently absorbs radiation

(FCC, 2023). Given the anticipated frequency range, the applicable MPE for occupational exposure to the PAR would be less than 6 minutes, and the applicable MPE for uncontrolled exposure (i.e., exposure outside the controlled area) would be less than 30 minutes (see **Table 7**). Operation of the PAR would comply with applicable federal regulations on emissions, power densities, and exposure times from the FCC and OSHA, as well as industry standards for exposure limits provided by IEEE. Operation of the PAR would also comply with thresholds identified in NOAA Manual 209-10, Occupational Safety and Health Management System. Prior to beginning operation of the PAR, NOAA's contractor would conduct a radiation hazard survey to ensure public and uncontrolled exposure compliance in publicly accessible areas, and to ensure occupational and controlled exposure compliance in areas accessible only to NSSL personnel and other personnel involved in PAR system operation and maintenance. The radiation hazard survey would also validate the functionality of safety features such as interlocks and sector blanking. Once operational, the PAR system would typically operate during normal daytime hours (i.e., from 7 a.m. to 6 p.m.), except in the event of a significant overnight weather event.

The closest residences to the Proposed Action Area are located approximately 0.2 miles to the south, and no businesses or facilities are located within a closer distance to the site that the general public may frequent. However, various businesses and organizations are located in relative proximity to the Proposed Action Area, including Max Westheimer Airport and other University of Oklahoma-owned buildings, Cleveland County Family YMCA, and the Norman Optimist Club. Given the separation of these facilities from the proposed PAR, it is unlikely that any member of the general public would be in close proximity to the PAR. Secure safety fencing would be installed around the RTF as an additional barrier to access, and RF warning signs would be posted on the fence to alert members of the public to the possibility of exposure, should anyone approach it. The radiation hazard survey would also validate that the amount of public exposure is below the acceptable safety thresholds. Since public access to the RTF would be restricted, operation would result in *no impacts* to the health and safety of the general public.

NSSL personnel working within the Study Area may already experience occupational exposure to other radar systems in the area and would be exposed to additional RF radiation when accessing the PAR system. Exposure to frequencies emitted from the PAR would generally be limited, as personnel would access the PAR system primarily to conduct maintenance and ensure correct operation under normal conditions. When it is necessary to access the RTF, the safety interlock system would be implemented by NSSL personnel to safeguard against any RF exposure potentials. The PAR system would also include other safety features to minimize occupational exposure and protect workers from RF radiation, including lockout safety mechanisms so the radar cannot be accessed while running, sector blanking, and interlocks. Further, personnel who would be accessing the PAR system are currently employed in similar radar operations on-site, and would already be aware of the potential risks of exposure, trained in proper operation and safety protocols, and able to take steps to mitigate and minimize exposure, should they exceed the established MPE limits. Regardless, exposure exceeding the MPE limits may have the potential to result in adverse health effects such as internal heating, although this would not be significant. Occupational exposure within the MPE limits would not have the potential to affect human health. Therefore, operation of the PAR system could result in *long-term, less-than-significant adverse impacts* to the health and safety of personnel within the Study Area.

3.11.2.2 No Action Alternative

Under the No Action Alternative, NOAA would not construct or operate the PAR system at the Norman site. While existing radar systems, including the ATD and WSR-88D radars, would continue to operate within the Study Area and emit RF radiation, there would be no change to existing conditions. Therefore, the continued presence of radars within the Study Area would result in *no impacts* to human health and safety of NSSL personnel working at the site.

3.12 ENVIRONMENTAL JUSTICE

Socioeconomics refer to the attributes of the human environment, and include demographic and economic characteristics such as age, race, income, and employment. Additionally, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, directs federal agencies to consider the potential adverse impacts of their activities on children. Environmental Justice (EJ) is the consideration of low-income and minority populations. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to consider the potential adverse impacts of their activities on EJ communities, and requires that impacts that may disproportionately affect these communities be addressed. This is further supplemented by EO 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All*, which requires analysis of direct, indirect, and cumulative impacts of agency actions on EJ communities in NEPA documents.

The CEQ has established criteria for identifying EJ communities of concern with respect to race and income: minority populations exist where the percentage of minorities exceeds 50 percent or is meaningfully greater than in the general population of the larger surrounding area, and low-income populations exist where there is a substantial discrepancy between a community and surrounding communities with regard to income and poverty status (CEQ, 1997). Information used to aid in the identification of EJ communities can be obtained from the U.S. Census Bureau or via the US EPA's Environmental Justice Screening and Mapping Tool. This tool provides socioeconomic data for Census block groups, based on data from the 2020 American Community Survey (US EPA, 2023a).

The ROI for socioeconomics and EJ includes 11 different block groups (see **Figure 4**); however, two of these block groups are not populated and therefore have no associated demographic data (US EPA, 2023a). In addition, a third block group likely contains data inaccuracies, and thus has been excluded from the combined ROI. All components of the Preferred Alternative are located within tract 2015.09, block group 4; however, the other seven populated block groups are adjacent to the block group containing the NSSL and are included in the ROI in order to evaluate the socioeconomic impact of the Proposed Action on the surrounding area. Adjacent communities would be most likely to experience impacts from the Preferred Alternative, both with regard to changes in socioeconomic characteristics and potential disproportionate impacts.

3.12.1 Affected Environment

Socioeconomic and EJ data for the combined ROI, Cleveland County, and the state of Oklahoma are presented in **Table 8.** Individual data for each of the seven Census block groups comprising the ROI, in addition to the one block group with potential data flaws, are presented in **Table 9**. No tribal nation reservations are present within 10 miles of the Study Area (US EPA, 2023a).

As shown in **Table 8**, median household income is lower in the ROI than in Cleveland County, although the unemployment rate in the ROI is lowest of the three geographies. The ROI also has the largest low-income population, at 38.2 percent, compared to 12.3 percent in Cleveland County and 15.6 percent in the state. The minority population within the ROI (38.8 percent) is comparable to that of both Cleveland County (30.5 percent) and the state (36.2 percent). Additionally, the minority population in the ROI is lower than 50 percent. Therefore, the ROI is not considered an EJ community of concern with respect to race. An EJ community of concern is present, however, with regard to low income, given the large discrepancy between the poverty rates within the ROI and the larger geographic area.

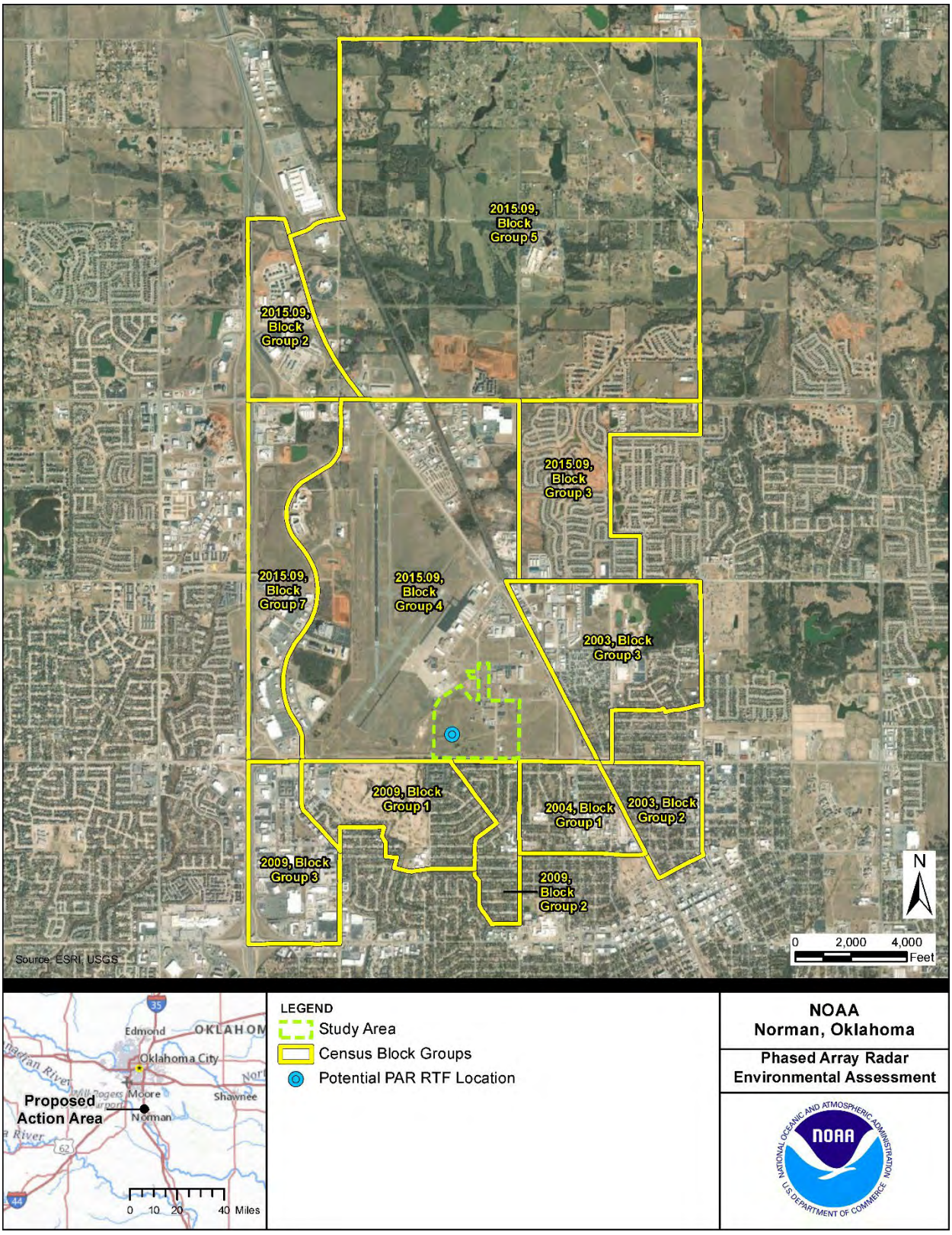


Figure 4: Census Block Groups within EJ ROI

Table 8: Socioeconomic and EJ Data

Demographic Indicators	ROI	Cleveland County	State of Oklahoma
Socioeconomic Indicators			
Total Population	4,745	295,528	3,959,353
Population Change (2010-2020)	--[1]	5.5%	15.6%
Median Household Income	$59,771	$67,068	$56,956
Unemployment Rate	3.5%	4.6%	5.1%
Population Under 18 Years	20.5%	20.9%	24.1%
EJ Indicators			
Population Below Poverty Level	38.2%	12.3%	15.6%
Minority Population	38.8%	30.5%	36.2%

1. The block group mapping for this area changed between 2010 and 2020, so a fair population comparison cannot be made.

Sources: (U.S. Census Bureau, 2020; U.S. Census Bureau, 2022; US EPA, 2023a)

In addition to the ROI being considered an EJ community of concern with regard to low income, various individual block groups are also considered communities of concern. With the exception of tract 2015.09, block group 3, and tract 2015.09, block group 5, (both located northeast of the Study Area), all other block groups within the ROI may individually be considered low-income communities (see **Table 10**). The block group with the largest low-income population is tract 2003, block group 3, in which 62.5 percent of the population is considered low-income. Tract 2015.09, block group 4, which contains the Study Area, has the third largest low-income population, at 47.1 percent. None of the block groups have a minority population that exceeds 50 percent; however, tract 2015.09, block group 3, and tract 2015.09, block group 4, have higher minority populations (46.9 percent and 47.8 percent, respectively) than the overall ROI and in comparison to Cleveland County and the state of Oklahoma. Therefore, these two block groups may also be considered EJ communities of concern with respect to race. Tract 2015.09, block group 5, is the only block group in the ROI that would not individually be considered an environmental justice community of concern.

Table 9: Socioeconomic and EJ Data for Each Block Group in the ROI

Demographic Indicators	Tract 2003, Block Group 2	Tract 2003, Block Group 3	Tract 2004, Block Group 1	Tract 2009, Block Group 1	Tract 2009, Block Group 2	Tract 2015.09, Block Group 2[1]	Tract 2015.09. Block Group 3	Tract 2015.09, Block Group 4	Tract 2015.09, Block Group 5
Socioeconomic Indicators									
Total Population	1,022	2,073	834	1,879	968	38	2,666	69	1,004
Median Household Income	$58,417	$50,000	$45,000	$44,038	$30,455	No Data	$75,372	No Data[2]	$115,118
Unemployment Rate	2.2%	7.9%	3.6%	1.6%	8.7%	No Data	0.4%	0.0%	3.5%
Population Under 18 Years	22.1%	30.8%	13.7%	17.6%	27.4%	100%	19.3%	26.1%	7.1%
EJ Indicators									
Population Below Poverty Level	33.5%	62.5%	35.6%	38.6%	57.2%	No Data	13.5%	47.1%	17.3%
Minority Population	36.8%	37.4%	33.8%	36.7%	37.4%	68.4%	46.9%	47.8%	33.2%

1. Given the absence of data for most of these metrics, and questionable data value for Population Under 18 Years, this block group has been omitted from the combined ROI analysis in **Table 8**. This data is still presented here, however, for completeness.
2. Median household income for this block group is not available. Per capita income is $34,454.

Source: (US EPA, 2023a)

The population under 18 years of age is larger within Oklahoma (24.1 percent) compared to the ROI and Cleveland County (20.5 percent and 20.9 percent, respectively), although these demographics are relatively similar. The largest population under 18 years of age, however, occurs within tract 2003, block group 3, at 30.8 percent. No children currently live on or occupy the Study Area. The occurrence of children in the vicinity of the Study Area, however, may be relatively high, given the YMCA location to the east of Halley Avenue and north of Westheimer Drive. The recreational facilities are primarily contained indoors, and outdoor playgrounds are fenced in. In addition, children participating in youth programs or placed in childcare would be supervised. It is subsequently highly improbable that children would wander from the YMCA and gain access to the RTF. Further, the RTF would be located at a sufficient distance from the YMCA so as not to result in disproportionate exposure to RF radiation (see **Section 3.11**). The Preferred Alternative is not anticipated to result in disproportionate health and safety risks to children outside of the Study Area. Therefore, protection of children does not warrant further consideration, and this resource is dismissed from analysis.

3.12.2 Environmental Consequences

3.12.2.1 Preferred Alternative

Implementation of the Preferred Alternative would *not result in disproportionate adverse impacts to air quality* in surrounding EJ communities. Construction activities would result in short-term emissions, primarily in the form of equipment exhaust and fugitive dust, and some VOC emissions from asphalt paving. These emissions may have the potential to travel off-site and reach the surrounding communities, but equipment exhaust would be consistent with existing emissions from diesel-using roadway traffic, and other emissions would be temporary and minimized to the extent practicable and would not permanently degrade air quality. Minor HAP emissions may also be released, but would not be anticipated to travel outside the Study Area. Operational emissions would be limited to occasional fuel combustion from the emergency generator, but the generator is not expected to be used frequently, and would not be used for more than 48 consecutive hours at a time. No additional vehicular traffic would access the site, so mobile emissions would not increase in the long-term. The Study Area is located in an attainment area for all NAAQS, and proposed construction and operation activities would not change the attainment status of Cleveland County. Air quality would not be degraded in the long-term and temporary impacts to air quality would not result in disproportionate exposure.

Implementation of the Preferred Alternative would *not result in disproportionate adverse impacts from noise* to surrounding EJ communities of concern. Communities located along West Robinson Street (located in tract 2009, block group 1; tract 2009, block group 2; and tract 2004, block group 1) that are within 0.2 mile of the Proposed Action Area may experience noise levels during construction that could be considered intrusive; communities at least 0.5 mile from the Proposed Action Area (located in tract 2015.09, block group 4; tract 2009, block group 1; tract 2009, block group 2; and tract 2004, block group 1) may experience construction noise equivalent to that typical of a suburban area. Since noise dissipates with increasing distance, those EJ communities located the closest to the Proposed Action Area would be impacted by a louder noise environment than those located further away; however, construction noise would be temporary and limited to daytime hours. With the implementation of BMPs and adherence to the City of Norman's Noise Control Ordinance during construction, these impacts would not be considered disproportionate.

Construction of the RTF would result in the generation of solid waste as well as potentially HTMW, but would *not result in disproportionate adverse impacts from waste* to surrounding EJ communities. Solid waste generated during construction of the RTF would be reused as able and otherwise disposed of at appropriate landfills. Any HTMW generated during construction would be containerized and disposed of in accordance with applicable regulations, and an SPCCP would be in place throughout the duration of construction activities to address any inadvertent spills that may occur, and to prevent contamination of soil

and groundwater resources. No waste would remain on-site following construction, and operation of the PAR is not anticipated to generate solid waste or HTMW. Wastes would be treated and handled to eliminate the potential for exposure to the surrounding communities, and the generation of waste would not constitute a disproportionate impact.

Operation of the PAR system would *not result in disproportionate adverse impacts to human health and safety* to surrounding EJ communities. The presence of the PAR does not present a physical danger or hazard to the general public and surrounding communities; further, members of the public would not be able to access the RTF as it would be contained behind a locked security fence. While continuous exposure to RF radiation from the PAR has the potential to result in adverse health effects, these communities are not located in sufficiently close proximity to feel any effects of radiation. NOAA has operated other radars within the Study Area since 1988, and there have been no known reports of adverse exposure to RF radiation in the community. Since the presence of the rotating PAR is not likely to increase the risk of an adverse health effect, it would not constitute a disproportionate impact.

3.12.2.2 No Action Alternative

Under the No Action Alternative, NOAA would not construct or operate the PAR system at the Norman site and there would be *no impact* to surrounding low-income communities.

3.13 CUMULATIVE EFFECTS

This section describes the potential for cumulative effects (i.e., additive or interactive effects) that would result from the incremental impact of the Proposed Action, when added to other past, present, and reasonably foreseeable future actions. Reasonably foreseeable future actions are those that are reasonably certain to occur in the project area based on existing plans. Past and present projects are generally addressed within the environmental baseline of the ROI for each resource area; thus, this analysis focuses on reasonably foreseeable future actions. NOAA has consulted regional plans and databases to identify planned projects in the surrounding vicinity that could potentially interact with the Proposed Action (see **Table 10**). While detailed timeframes for most of these projects are unknown, construction and initiation are anticipated to occur within the next five years.

3.13.1 Cumulative Effects of the Preferred Alternative

The Preferred Alternative would have no cumulative impacts with respect to the resources identified in **Table 1** that were dismissed from further consideration. In addition, the Preferred Alternative is not anticipated to result in cumulative impacts with respect to farmland and soils, and human health and safety.

The Preferred Alternative would have potential negligible or minor adverse impacts with respect to visual resources, air quality, water resources and hydrological processes, cultural resources, flora and fauna, noise, utilities and solid waste, hazardous materials, and EJ. Most of the reasonably foreseeable future actions identified in **Table 10**, with the exception of Project 3 and Project 4 occurring at the Max Westheimer Airport, would be removed from the Study Area and would not result in additional incremental impacts in the immediate vicinity of the Proposed Action Area. As discussed in **Section 3.3.2.1**, given the global nature of climate change, the localized and incremental GHG emissions from the Proposed Action would be unlikely to have a measurable effect on climate change; no additional discussion of cumulative climate change impacts is included in this section.

Table 10: Reasonably Foreseeable Future Actions

No.	Project Name	Project Type	Description
1	Resurface portion of US Route 77	Transportation	This project would resurface the approximately 5.5-mile segment of US-77 between North Flood Avenue and 12th Avenue NE. This project was included in the Oklahoma Department of Transportation's (ODOT) 2022-2030 Construction Work Plan (CWP), and is anticipated to occur in 2026 (ODOT, 2023).
2	Upgrades to State Highway 9	Transportation	This project would upgrade the utilities and right-of-way along a 4.4-mile segment of State Highway 9 between the junction with Interstate 35 and US-77. This project was included in the ODOT 2023-2030 CWP, and is still in the preliminary planning stages, but is anticipated to occur in 2029 (ODOT, 2023).
3	Max Westheimer Airport Master Plan	Aviation	The University of Oklahoma, Max Westheimer Airport is developing a master plan to facilitate infrastructure improvements, upgrades, and new construction within the airport property. The plan includes projects such as runway extension, construction of new hangars, construction of new taxiways, drainage improvements, rehabilitation of runway lighting, and preservation of areas to meet future aviation needs (University of Oklahoma, 2022; OAC, 2023). A specific timeline for implementing these projects has not been finalized, but they are anticipated to occur over the next 10 years.
4	Oklahoma Aviation Academy	Aviation	Norman Public Schools recently launched the Oklahoma Aviation Academy in partnership with other academic and industry partners. The academy currently does not have a dedicated facility, and is planning to build a stand-alone facility on the property of Max Westheimer Airport (Norman Public Schools, 2023). Space for this academy has been delineated as part of the Max Westheimer Airport Master Plan (University of Oklahoma, 2022).
5	New Groundwater Wells and Lake Thunderbird Augmentation	Infrastructure	The City of Norman has anticipated that it may face difficulties meeting water demand in the long-term due to conditions created by population growth and climate change. The City of Norman developed a Strategic Water Supply Plan, detailing proposed projects to increase water supply through 2060. The selected project portfolio includes drilling new groundwater wells, improving water treatment, expanding non-potable reuse, developing indirect potable reuse, and augmenting the Lake Thunderbird reservoir (Norman Utilities Authority, 2014).
6	Porter Avenue Corridor Plan	Development	The City of Norman developed a plan to guide future developments occurring along Porter Avenue in order to minimize land use conflicts, revitalize the corridor, encourage economic development, and manage traffic. It does not identify specific development projects, but encourages simultaneous commercial and residential development (City of Norman, 2010).
7	Norman 2025 Plan	Development	The City of Norman has created a land use and transportation plan to guide city planning efforts and development projects through 2025. It anticipates that by 2025, over 22,600 acres of land would be required to support future development needs. The plan includes goals for economic growth, residential development, enhancements to the downtown core area, and creation of a greenbelt system. It does not identify specific projects to be implemented (City of Norman, 2004).

3.13.1.1 Visual Resources

The Preferred Alternative would have long-term negligible impacts to aesthetics and visual resources from the permanent installation of the maximum 30-meter-tall (98 feet) PAR system in a primarily open, undeveloped field. The RTF would be consistent with other radars in the ROI, however, and would not constitute a novel landscape feature. Construction of new airport elements and the aviation academy adjacent at the Max Westheimer Airport next to the Study Area may further detract from the generally open aesthetic quality of the ROI, but any such developments would also be consistent with existing developments. Therefore, the cumulative impact on visual resources would be *negligible*.

3.13.1.2 Air Quality

The Preferred Alternative would have less-than-significant impacts to air quality from construction activities and fuel combustion associated with the emergency generator, but NOAA would obtain applicable permits and comply with stated requirements to minimize emissions. Construction activities occurring under reasonably foreseeable future actions would have similar emissions, although the magnitude of emissions may be greater under roadway paving, larger development plans, and increased flights from Max Westheimer Airport. Appropriate state air quality permits would be obtained by those project proponents, as applicable, to ensure that Cleveland County does not fall out of attainment with the NAAQS, and to ensure that dangerous levels of VOCs and HAPs are not emitted. Therefore, the cumulative impact on air quality would be *less-than-significant*.

3.13.1.3 Water Resources and Hydrological Processes

The Preferred Alternative could have potential less-than-significant impacts to surface waters from stormwater runoff, but NOAA would obtain applicable permits and implement appropriate BMPs to manage the quantity and quality of stormwater. LID features would also be installed to maintain permeable areas to the extent practicable and ensure continued stormwater infiltration once the PAR system is operational. Proposed activities at the Max Westheimer Airport would result in additional ground disturbance, paving, construction, and an overall increase in impermeable surfaces and thus stormwater flows. A stormwater retention and drainage area is included in the airport master plan, which should accommodate increased stormwater flows from the airport property. Proposed roadway activities would not result in an increase in impermeable surfaces since no new roads would be built. With implementation of stormwater management, future projects are not anticipated to affect surface water quality or contribute to the impairment of any waterbodies. The cumulative impacts to surface water and stormwater would be *negligible*.

Increased groundwater withdrawals may occur as a result of the City of Norman's project to augment water supply, as well as new residential and commercial developments. Additional demand on groundwater supplies may affect the availability of this resource in the long-term. Any construction projects would have the potential for inadvertent spills that could infiltrate into and affect groundwater quality, although these would be minimized through the implementation of standard BMPs to address spills. The cumulative impacts to groundwater would be *less-than-significant*.

3.13.1.4 Cultural Resources

The Preferred Alternative would have no adverse effect on historic properties. Projects occurring at the Max Westheimer Airport, as well as the construction of the Oklahoma Aviation Academy, would also occur within the APE of the Proposed Action and could impact the recorded archaeological sites within the APE. Other reasonably foreseeable future actions occurring throughout Norman would primarily consist of routine urban growth and development. These projects would be located outside of the APE and would not affect the two

archaeological sites, and new development would be consistent with other developments in Norman. The cumulative impacts to cultural resources would be *less-than-significant*.

3.13.1.5 Flora and Fauna

The Preferred Alternative would have a negligible impact on wildlife and special status species, notably from the presence of the RTF which would present a new obstacle for birds. Current operations at the Max Westheimer Airport likely account for potential bird strikes, and it would be expected that such measures to minimize bird collisions would be continued and expanded as necessary to support increased operations at the airport in the future. The other off-site cumulative projects and anticipated developments would be distant enough from the Study Area that any localized impacts to flora and fauna would not combine with impacts at the site. New developments occurring under the Norman 2025 Master Plan, however, may be located in previously undisturbed areas which could incrementally eliminate suitable habitat as projects are implemented. Some of these potential impacts would be mitigated by the concurrent creation of a greenbelt system throughout the City of Norman. The cumulative impacts to flora and fauna would be *less-than-significant*.

3.13.1.6 Noise

The Preferred Alternative would generate construction noise that may temporarily affect nearby sensitive receptors and residences, and any construction work that is occurring in the vicinity of the Study Area simultaneously would have the potential to create additive noise effects. The implementation of noise-reduction BMPs during construction would minimize noise impacts to the extent practicable, although noise would still be heard off-site. Following construction, only increased operations at the Max Westheimer Airport would be expected to be a permanent generator of meaningful operational noise. Any operational noise from the PAR system would be minimal, and would not perceptibly combine with noise generated off-site, including any noise that may be generated at Max Westheimer Airport. The cumulative impact from noise would be *less-than-significant*.

3.13.1.7 Utilities and Solid Waste

The Preferred Alternative may increase utility demand in the ROI, and implementation of the reasonably foreseeable future actions would also increase utility demand, with the exception of roadway improvements. The addition of new facilities and increased air traffic at the Max Westheimer Airport would require additional utility service, as would the potential residential and commercial developments occurring as part of the Norman 2025 Plan or Porter Avenue Corridor Plan. Additional developments would also be expected to increase solid waste generation and disposal. The cumulative impact to utilities and solid waste, excluding water, would be *less-than-significant*.

Increased development is particularly likely to result in higher water demand, potentially straining existing supplies and resulting in increased groundwater withdrawals. The Preferred Alternative would require minimal amounts of non-potable water to support maintenance of the PAR system, but would still draw this water from existing sources. Implementation of the project to augment Lake Thunderbird already accounts for this anticipated growth in water demand, and would increase the availability of water supplies to the City of Norman to address municipal and private needs. The cumulative impact to water utilities would be *beneficial*; although demand may substantially increase, plans are already in place to meet the demand and ensure adequate supplies.

3.13.1.8 Hazardous Materials

The Preferred Alternative could have less-than-significant impacts from HTMW releases during construction, but BMPs would be implemented to address inadvertent and accidental releases. All of the identified reasonably foreseeable future actions involve some degree of construction, and would have the potential for similar accidental releases. It is expected that construction plans for these projects would implement similar BMPs to manage and cleanup spills should any occur. None of the future proposed developments would be large generators of HTMW, although maintenance of the PAR system and activities at Max Westheimer Airport may involve some quantity of HTMW. Any hazardous materials would be used or disposed of in accordance with applicable regulations in order to minimize the potential for releases and contamination. Any accidental releases would be localized. The cumulative impact from HTMW would be *less-than-significant*.

3.13.1.9 Environmental Justice

The Preferred Alternative is not expected to result in disproportionate adverse impacts to nearby EJ communities. The Proposed Action in combination with reasonably foreseeable future actions may have the potential to impact EJ communities, but the contribution of effects from the Proposed Action would be minimal and would not be significantly additive to the effects from other projects. Air emissions under the Proposed Action would not degrade local air quality, operational noise from the PAR would be minimal and would not contribute to a louder ambient noise environment, wastes would be handled and removed appropriately, and no other future actions would result in additional RF radiation. The cumulative impact to EJ communities *would not be disproportionate*.

3.13.2 Cumulative Effects of the No Action Alternative

The No Action Alternative would involve no construction activities and would result in no changes to the current use of the Proposed Action Area. Since there would be no physical changes, there would be no impacts to the natural or human environment that could potentially contribute to cumulative impacts.

THIS PAGE INTENTIONALLY LEFT BLANK.

4.0 COMMUNITY INVOLVEMENT

4.1 EA PUBLIC COMMENT PERIOD

In accordance with CEQ and NOAA NEPA regulations, the Draft EA and Draft FONSI were made available for a 30-day public review and comment period between July 13, 2023, and August 12, 2023. A Notice of Availability for the Draft EA and Draft FONSI was published in the Norman Transcript on July 13, 2023.

The Draft EA and Draft FONSI were published digitally on the NOAA website at https://www.noaa.gov/administration/environmental-assessment-public-notices. Printed copies of the Draft EA and Draft FONSI were available for public review at the Pioneer Library System, Norman Public Library Central Branch, 103 W. Acres Street, Norman, Oklahoma 73069.

No members of the public commented on the Draft EA or FONSI during the public comment period.

4.2 TRIBAL AND TRIBAL NATION CONSULTATION

NEPA calls for federal agencies to invite the participation of any affected federally recognized Native American tribe or tribal nation in the environmental review process. Consistent with NHPA implementing regulations (36 CFR Part 800) and EO 13175, *Consultation and Coordination with Indian Tribal Governments*, NOAA is consulting with federally recognized tribes and tribal nations that are historically affiliated with the geographic region of Norman, Oklahoma regarding the potential for the Proposed Action to affect properties of cultural, historical, or religious significance to the tribal nations. NOAA initiated consultation with these tribal nations on June 8, 2023, and provided notification of the publication of the Draft EA on July 13, 2023. A record of this consultation is included in **Appendix C**.

NOAA contacted the following tribes and tribal nations:

- Apache Tribe of Oklahoma
- Cheyenne and Arapaho Tribes
- Citizen Potawatomi Nation, Oklahoma
- Osage Nation
- Wichita and Affiliated Tribes (Wichita, Keechi, Waco, & Tawakonie), Oklahoma

To date, no responses have been received from the tribal nations.

4.3 AGENCY CONSULTATION

Electronic copies of the Draft EA were made available to federal, state, and local agencies with jurisdiction by law or special expertise over the Proposed Action. Coordination letters were sent to these agencies to announce the availability of the Draft EA for review and comment. Copies of this correspondence are consolidated in **Appendix A**. NOAA also performed consultation with the USFWS in accordance with Section 7 of the ESA. Copies of this correspondence are included in **Appendix A**. NOAA has also consulted with the Oklahoma SHPO and OAS under Section 106 of the NHPA. Copies of this correspondence are included in **Appendix B**.

NOAA contacted the following potentially interested regulatory agencies to notify them of the publication of the Draft EA:

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- Federal Aviation Administration
- U.S. Environmental Protection Agency
- U.S. Department of Agriculture, Natural Resources Conservation Service
- Oklahoma Department of Environmental Quality
- Oklahoma Department of Wildlife Conservation
- Oklahoma Natural Heritage Inventory
- Oklahoma Historical Society (i.e., SHPO)
- Cleveland County Planning and Zoning Department

Comments on the Draft EA were received from the following agencies during the public comment period and have been considered and incorporated into the Final EA as appropriate:

- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency, Region 6
- Oklahoma Natural Heritage Inventory
- Oklahoma Department of Environmental Quality

Copies of their comment letters are provided in **Appendix A**.

5.0 CONCLUSION

This EA evaluates the potential environmental effects of the Proposed Action to construct and operate a rotating planar dual-polarization PAR system at NOAA's NSSL in Norman, Oklahoma, in order to conduct additional research on the meteorological capabilities and determine the feasibility of using PAR technology to replace the WSR-88D radar.

The findings of this EA indicate that no significant adverse effects, either individual or cumulative, would result from implementation of the Proposed Action using the Preferred Alternative, assuming adherence to the BMPs specified in this EA (see **Table 11**). Therefore, an Environmental Impact Statement is unnecessary and a FONSI would be appropriate.

NOAA determined that the Preferred Alternative provides the best location for placement of the proposed PAR system to support NOAA's intent to continue research, development, and demonstration activities with the PAR. The No Action Alternative was found not to satisfy the purpose of and need for the Proposed Action. As such, this EA recommends implementation of the Preferred Alternative.

Table 11: Summary of Anticipated Impacts and BMPs

Resource Analyzed	No Action Alternative	Preferred Action Alternative	Best Management Practices
Visual Resources	No impact	*Short-term, negligible adverse impacts* from views of construction. *Long-term, negligible adverse impacts* from location of PAR in undeveloped area.	• Perform construction within temporary fencing to limit views
Air Quality	No impact	*Short-term, less-than-significant adverse impacts* on criteria pollutants during construction. *Long-term, less-than-significant adverse impacts* on criteria pollutants during PAR operation. *Short-term, less-than-significant adverse impacts* to GHG emissions from construction equipment. *Long-term, less-than-significant adverse impacts* to GHG emissions from emergency generator.	• Apply water or use stabilization on areas of bare soil and unpaved roads • Use construction equipment that is certified in accordance with US EPA regulations for non-road engines • Cover dump trucks transporting materials • Maintain construction equipment to reduce exhaust emissions • Obtain permits for emergency generator as applicable
Water Resources and Hydrological Processes	No impact	*Short-term, less-than-significant adverse impacts* to surface water and stormwater. *No impact* on impairment status of Merkle Creek. *Short-term, negligible adverse impacts* on groundwater.	• Obtain OPDES OKR10 permit and develop SWPPP to minimize runoff and erosion • Incorporate LID features to allow stormwater infiltration • Revegetate disturbed areas • Perform routine equipment inspections • Maintain spill containment materials on-site

Resource Analyzed	No Action Alternative	Preferred Action Alternative	Best Management Practices
Cultural Resources	No impact	*Less-than-significant adverse impact* on portions of identified archaeological sites within the APE. *No adverse effect* on historic above-ground resources and the viewshed. *No effect* on tribal resources.	• In the event of an unanticipated discovery of historic resources, cease work and report the discovery to the Oklahoma SHPO, OAS, and interested tribal nations.
Flora and Fauna	No impact	*Short-term, less-than-significant adverse impacts* on vegetation during construction. *No impact* on vegetation during operation. *Short-term, less-than-significant adverse impacts* to wildlife during construction. *Long-term, negligible adverse impacts* to wildlife during operation. *No effect* to federally listed Arkansas River shiner, peppered chub, piping plover, rufa red knot, or tricolored bat. *May affect but is not likely to adversely affect* federally listed whooping crane during construction. *Short-term, negligible adverse impact* on migratory BCCs during construction. *Long-term, negligible adverse impact* on special status species during operation.	• Revegetate disturbed areas with native plants or landscape vegetation • Clean construction equipment prior to bringing on-site
Farmland and Soils	No impact	*No impact* on farmland. *Short-term, less-than-significant adverse impacts* to soil runoff and erosion during construction. *No impact* to soils during operation.	• Obtain OPDES OKR10 permit and develop SWPPP to minimize runoff and erosion
Noise	No impact	*Short-term, less-than-significant adverse impacts* to noise environment during construction. *Long-term, negligible adverse impact* to noise environment during operation.	• Limit construction activities to daytime hours between 7:00 a.m. and 9:00 p.m. • Use mufflers or other noise control devices on construction vehicles

Resource Analyzed	No Action Alternative	Preferred Action Alternative	Best Management Practices
Utilities and Solid Waste	No impact	*Short-term, negligible adverse impacts* to utilities during construction. *Short-term, negligible adverse impacts* on solid waste generation during construction. *Long-term, negligible adverse impacts* on utility demand during operation. *No impact* on solid waste during operation.	• Keep existing utilities operational until ready to connect new utilities • Notify end users in advance of anticipated utility interruptions • Dispose of solid wastes at appropriate landfills
Hazardous and Toxic Materials and Waste	No impact	*Short-term, less-than-significant adverse impacts* from HTMW releases during construction. *Long-term, negligible adverse impacts* from HTMW during operation.	• Adhere to conditions of site-specific SPCCP • Maintain spill containment materials on-site • Handle, store, and dispose of any HTMW in accordance with applicable regulations
Human Health and Safety	No impact	*Short-term, less-than-significant adverse impacts* during construction from risk of accidents and use of heavy equipment. *No impacts* to general public during operation from exposure to RF radiation. *Long-term, less-than-significant adverse impacts* to NSSL personnel during operation from exposure to RF radiation.	• Use only qualified, trained, and licensed contractors for construction • Limit construction activities to daytime hours between 7:00 a.m. and 9:00 p.m. • Perform construction within temporary fencing to prevent unauthorized access • Adhere to applicable health and safety regulations • Maintain first-aid kit and trained personnel on-site • Conduct radiation hazard survey to ensure controlled exposure compliance • Operate PAR during daytime hours between 7:00 a.m. to 6:00 p.m., except in the event of a severe weather event • Install security fencing around RTF and post RF warning signs to prevent public access • Ensure NSSL personnel are trained on potential exposure risks and ways to minimize exposure • Include safety features such as lockout safety, sector blanking, and interlocks in PAR system design • Adhere to applicable regulations on emissions,

Resource Analyzed	No Action Alternative	Preferred Action Alternative	Best Management Practices
			power density, and exposure times • Follow FCC, OSHA, and IEEE standards, and standards in NOAA Manual 209-10 for RF radiation and exposure limits
Environmental Justice	No impact	*No disproportionate adverse impacts* to nearby EJ communities with respect to air quality, noise, solid waste and HTMW, and human health and safety.	• None

6.0 LIST OF PREPARERS

6.1 NOAA PREPARERS

Name	Title
Anne Delp	Project Manager
Kurt Hondl	Deputy Director of NSSL
Segayle Thompson	Project Manager for Radar Acquisition Team
Rafael Mendoza	Technical Lead for PAR Systems
Tammy Adams	National NEPA Coordinator for OAR
Larry Hopper	Radar Research and Development Division Chief at NSSL

6.2 AECOM PREPARERS

Name	Role	Degree	Years of Experience
Jennifer Warf	Program Manager, Quality Assurance/Quality Control	M.S. in Environmental Studies B.A. in Zoology	20
Carrie Kyzar	Project Manager, EA review and oversight	M.S. in Environmental Management B.S. in Environmental Science	21
Michael Busam	Deputy Project Manager, EA preparation	B.S. in Environmental Science and Policy	8
Natalie Kisak	Preparation of EA sections	B.A. in Environmental Studies and Public Policy	4
Allison Carr	Preparation of EA sections, maps and figures	Master of City Planning B.A. in Geography	3
Sam Hartsfield	Preparation of Air Quality section	M.S. in Environmental Science and Management B.S. in Biology	15
James Petras	Preparation of Human Health and Safety section	B.S. in Biology	27

THIS PAGE INTENTIONALLY LEFT BLANK.

7.0 REFERENCES

CBD. (n.d.). *Natural History: Tricolored Bat*. Retrieved from Center for Biological Diversity: https://www.biologicaldiversity.org/species/mammals/tricolored_bat/natural_history.html

CEQ. (1997). *Environmental Justice: Guidance Under the National Environmental Policy Act.* Retrieved December 28, 2021, from https://www.epa.gov/sites/default/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf

City of Norman. (1994). *Chapter 36: Zoning, Division 36-512, A-2, Rural Agricultural District*. Retrieved from City of Norman Municipal Code: https://norman.municipalcodeonline.com/book?type=ordinances#name=36-512_A-2,_Rural_Agricultural_District

City of Norman. (2004). *Norman 2025 Land Use and Transportation Plan.* Retrieved from https://www.normanok.gov/sites/default/files/documents/2020-05/Norman%202025%20Land%20Use%20Transportation%20Plan.pdf

City of Norman. (2010). *Porter Avenue Corridor Plan - Staff Update.* Retrieved from https://www.normanok.gov/sites/default/files/documents/2020-06/porter_plan_staff_update_7.19.10.pdf

City of Norman. (2023a). *City of Norman Municipal Code, Article 16-II Noise Control*. Retrieved from https://norman.municipalcodeonline.com/book?type=ordinances#name=ARTICLE_16-II_NOISE_CONTROL

City of Norman. (2023b). *Zoning Ordinance*. Retrieved from https://www.normanok.gov/your-government/departments/planning-and-community-development/planning-and-zoning/zoning-ordinance

Cleveland, Jr., R. F., Sylvar, D. M., & Ulcek, J. L. (1997). *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.* FCC. Retrieved from https://transition.fcc.gov/oet/info/documents/bulletins/oet65/oet65.pdf

Cornell Lab of Ornithology. (2023). *eBird*. Retrieved from Species Maps: https://ebird.org/home

Cowan, J. P. (1994). *Handbook of Environmental Acoustics.* New York: Van Nostrand Reinhold.

Crocker, M. J. (2007). *Handbook of Noise and Vibration Control.* John WIley and Sons, Inc.

Egan, D. M. (1988). *Architectural Acoustics.* McGraw-Hill Book Company.

FCC. (2023). *RF Safety FAQ*. Retrieved from Radio Frequency Safety: https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety#Q4

FEMA. (2021). *FEMA Flood Map Service Center*. Retrieved from https://msc.fema.gov/portal/home

FTA. (2018). *Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123.*

IEEE. (2019). *IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz.* Retrieved from https://standards.ieee.org/ieee/C95.1/4940/

NASA. (2023). *Electromagnetics: Radio Frequencies*. Retrieved from Basics of Space Flight: Section 1: Environment, Chapter 6: Electromagnetics: https://solarsystem.nasa.gov/basics/chapter6-3/

NOAA. (2020). *Report to Congress: Weather Radar Follow-on Plan: Research and Risk Reduction to Inform Acquisition Decisions.* Retrieved from https://www.nssl.noaa.gov/publications/par_reports/RadarFollowOnPlan_ReporttoCongress_2020June_Final.pdf

NOAA. (2022). *Performance Work Statement: Phased Array Radar Test Article for Weather Observation Risk Reduction Activation.*

NOAA NSSL. (2023a). *Research Tools: Advanced Technology Demonstrator*. Retrieved from https://www.nssl.noaa.gov/tools/radar/atd/

NOAA NSSL. (2023b). *Research Tools: Dual Polarized Radar*. Retrieved from https://www.nssl.noaa.gov/tools/radar/dualpol/

Norman Public Schools. (2023). *Oklahoma Aviation Academy.* Retrieved from https://www.normanpublicschools.org/cms/lib/OK02210265/Centricity/Domain/2515/Updated%20Oklahoma%20Aviation%20Academy%20Hand%20Out%20%201-12-23.png

Norman Utilities Authority. (2014). *2060 Strategic Water Supply Plan: Norman, Oklahoma.* Retrieved from https://www.normanok.gov/sites/default/files/documents/2021-06/2060_swsp_-_august_2014_final_opt_mobile_part1.pdf

NRCS. (2023). *Web Soil Survey*. Retrieved from https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

NWS. (2021). *NEXRAD Strategic Plan.* Retrieved from https://www.roc.noaa.gov/WSR88D/PublicDocs/NEXRAD_Strategic_Plan_2021-2025_May%202021_v5.pdf

OAC. (2023). *Univ. Okla. Max Westheimer Future Capital Infrastructure Projects*. Retrieved from Oklahoma Aeronautics Commission: https://oklahoma.gov/aerospace/airports/find-an-airport/univ-okla-max-westheimer/future-capital-infrastructure-projects.htmlhttps://oklahoma.gov/aerospace/airports/find-an-airport/univ-okla-max-westheimer/future-capital-infrastructure-projects.html

ODEQ. (2022a). *Appendix C - 2022 Oklahoma 303(d) List of Impaired Waters.* Retrieved from https://www.deq.ok.gov/wp-content/uploads/water-division/OK_2022-Appendix-C-Final.pdf

ODEQ. (2022b). *Water Quality in Oklahoma: 2022 Integrated Report.* Retrieved from https://www.deq.ok.gov/wp-content/uploads/water-division/OK_2022-Integrated-Report_report-only-Final.pdf

ODEQ. (2023). *OKR10 Construction Stormwater*. Retrieved from Water Quality Division: https://www.deq.ok.gov/stormwater-permitting/okr10-construction-stormwater/

ODOT. (2023). *ODOT Construction Projects*. Retrieved from https://oklahoma.gov/odot/programs-and-projects0/8-year-construction-work-plan.html

ODWC. (2023a). *Arkansas River Shiner*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/fish/arkansas-river-shiner

ODWC. (2023b). *Oklahoma Field Guide*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide

ODWC. (2023c). *Piping Plover*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/birds/piping-plover

ODWC. (2023d). *Rufa Red Knot*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/birds/rufa-red-knot

ODWC. (2023e). *Whooping Crane*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/birds/whooping-crane

OSHA. (2023). *Radiofrequency and Microwave Radiation*. Retrieved from https://www.osha.gov/radiofrequency-and-microwave-radiation/standards

OWRB. (2023). *Groundwater Well Record Search*. Retrieved from https://owrb.maps.arcgis.com/apps/mapviewer/index.html?layers=d96fcad9d6514429a986e06dfcc45e57

SRI International. (1994). *NEXRAD Expanded Site Survey and Environmental Site Assessment Report for the Operational Support Facility-3 (OSF-3), Norman, Oklahoma.*

Tipler, P. (1976). Physics. *Worth Publishers*.

U.S. Census Bureau. (2020). *Table S2301: Employment Status*. Retrieved from American Community Survey: https://data.census.gov/table?q=unemployment+rate&g=040XX00US40_050XX00US40027&tid=ACSST5Y2020.S2301

U.S. Census Bureau. (2022). *QuickFacts: Oklahoma; Cleveland County, Oklahoma*. Retrieved from https://www.census.gov/quickfacts/fact/table/OK,clevelandcountyoklahoma/PST045221

U.S. Climate Data. (2023). *Climate Oklahoma City -- Oklahoma*. Retrieved May 12, 2023, from https://www.usclimatedata.com/climate/oklahoma-city/oklahoma/united-states/usok0400

University of Oklahoma. (2022). *Max Westheimer Airport: Airport Master Plan Planning Advisory Committee Meeting.* Retrieved from https://www.ou.edu/airport/events/master-plan/_jcr_content/contentpar/download_1278837592/file.res/Master%20Plan%20Public%20Meeting%20%232%20Powerpoint%20.pdf

US EPA. (2009). *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act.* Federal Register Docket ID 7 No. EPA-HQ-OAR-2009-0171.

US EPA. (2016). *What Climate Change Means for Oklahoma.* EPA 430-F-16-038. Retrieved from https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ok.pdf

US EPA. (2023a). *Environmental Justice Screening and Mapping Tool (Version 2.2)*. Retrieved August 22, 2023, from https://ejscreen.epa.gov/mapper/

US EPA. (2023b, March 15). *National Ambient Air Quality Standards Table*. Retrieved from https://www.epa.gov/criteria-air-pollutants/naaqs-table

US EPA. (2023c). *NEPAssist*. Retrieved from https://nepassisttool.epa.gov/nepassist/nepamap.aspx

USEPA. (1974). *Information on Levels of Environmental Noise Requisite to Proetct Public Health and Welfare with an Adequate Margin of Safety.* Retrieved from https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF

USFWS. (2023). *Bald Eagle*. Retrieved from https://www.fws.gov/species/bald-eagle-haliaeetus-leucocephalus

USFWS. (2023a). *IPaC: Information for Planning and Consulting*. Retrieved from https://ecos.fws.gov/ipac/

USFWS. (2023b). *National Wetlands Inventory*. Retrieved from https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/

USFWS. (2023c). *Peppered Chub (Macrhybopsis tetranema)*. Retrieved from ECOS: https://ecos.fws.gov/ecp/species/532

USFWS. (2023d). *Tricolored Bat (Perimyotis subflavus)*. Retrieved from ECOS: https://ecos.fws.gov/ecp/species/10515

USGS. (2018). *2018 Long-term National Seismic Hazard Map*. Retrieved from Earthquake Hazards Program: https://www.usgs.gov/media/images/2018-long-term-national-seismic-hazard-map

Woods, A. J., Omernik, J. M., Butler, D. R., Ford, J. G., Henley, J. E., Hoagland, B. W., . . . Moran, B. C. (2005). *Ecoregions of Oklahoma.* US Geological Survey. Retrieved from https://gaftp.epa.gov/EPADataCommons/ORD/Ecoregions/ok/ok_front.pdf

WSDOT. (2020). *Biological Assessment Preparation Manual: Chapter 7 Construction Noise Impact Assessment.* Olympia, WA.

APPENDIX A:

CONSULTATION WITH FEDERAL, STATE, AND LOCAL AGENCIES

THIS PAGE INTENTIONALLY LEFT BLANK.

Agencies Notified and Comments Received on Draft EA

AGENCIES AND OTHER INDIVIDUALS CONSULTED

Federal Agencies

Federal Aviation Administration
Southwest Region/Central Service Center
10101 Hillwood Parkway
Fort Worth, TX 76177
POC: Robb Ramos, Environmental Protection Specialist
Email: [redacted]

U.S Army Corps of Engineers
Tulsa District
2488 E. 81st Street
Tulsa, OK 74137
POC: Col. Timothy P. Hudson, Commander

U.S. Environmental Protection Agency
Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270
POC: Dr. Earthea Nance, Regional Administrator
Email: [redacted]

U.S. Fish and Wildlife Service
Oklahoma Ecological Services Field Office
9014 E. 21st Street
Tulsa, OK 74129
POC: Susan Minnick
Email: [redacted]

U.S. Department of Agriculture, Natural Resources Conservation Service
Oklahoma State Office
100 USDA Suite 206
Stillwater, OK 74074
POC: Stacy Riley, Acting State Conservationist
Email: [redacted]

State Agencies

Oklahoma Department of Environmental Quality
P.O. Box 1677
Oklahoma City, OK 73101
POC: Scott Thompson, Executive Director
Email: [redacted]

Oklahoma Natural Heritage Inventory
111 E. Chesapeake Street
Norman, OK 73019
POC: Kristen Comolli, Database Analyst
Email: [redacted]

Oklahoma Department of Wildlife Conservation
Wildlife Division
P.O. Box 53465
Oklahoma City, OK 73152
POC: Bill Dinkines, Wildlife Chief
Email: [redacted]

Oklahoma Historical Society
State Historic Preservation Office
800 Nazih Zuhdi Drive
Oklahoma City, OK 73105
POC: Lynda Ozan, Deputy SHPO
Email: [redacted]

Oklahoma Archaeological Society
University of Oklahoma
111 Chesapeake Street
Norman, OK 73019
POC: Dr. Kary Stackelbeck
Email: [redacted]

Local Agencies

Cleveland County Planning and Zoning Department
105 W. Caddo Street
Cleveland, OK 74020
POC: Mike Vaughan, City Manager

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072

July 13, 2023

Rob Lowe
Federal Aviation Administration
Southwest Region
10101 Hillwood Parkway
Fort Worth, TX 76177

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Mr. Lowe,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:44:56 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072

July 13, 2023

Col. Timothy Hudson
U.S. Army Corps of Engineers
Tulsa District
2488 E. 81st Street
Tulsa, OK 74137

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Col. Hudson,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:46:26 -06'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
I. Proposed Action Location

Attachment 1: Proposed Action Location

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, TULSA DISTRICT
2488 EAST 81ST STREET
TULSA, OKLAHOMA 74137-4209

July 18, 2023

Regulatory Office

Ms. Anne Delp
National Oceanic & Atmospheric Administration (NOAA)
1305 East West Highway
Silver Spring, MD 20910

Dear Ms. Delp:

Please refer to your request, dated July 17, 2023, regarding the proposed phased array radar installation, located at latitude 35.235168, longitude -97.465560, in Cleveland County, Oklahoma. We have reviewed the submitted data relative to Section 404 of the Clean Water Act (CWA).

Your proposal is not subject to regulation pursuant to Section 404 of the CWA, and a Department of the Army (DA) permit will not be required. Should your method of construction necessitate such a discharge into jurisdictional water, we suggest that you resubmit that portion of your project so that we may determine whether an individual DA permit will be required.

This No Permit Required determination does not address nor include any consideration for geographic jurisdiction on aquatic resources and shall not be interpreted as such.

Although Section 404 CWA authorization is not required, this does not preclude the possibility that a real estate interest or other Federal, State, or local permits may be required. If you desire to complete a "Customer Service Survey" on your experience with the Corps Regulatory Program, you are invited to visit https://regulatory.ops.usace.army.mil/customer-service-survey/ on the internet at your convenience and submit your comments.

Your project has been assigned Identification Number SWT-2023-347. If you have any questions, please contact Mr. Bryan Noblitt at [redacted].

Sincerely,

Bryan Noblitt

Andrew R. Commer
Chief, Regulatory Office

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072

July 13, 2023

Dr. Earthea Nance
U.S. Environmental Protection Agency
Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Dr. Nance,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted]

Sincerely,

CARLIS.DANA.LA MAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:47:16 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270-2102

August 4, 2023

Anne H. Delp
National Oceanic & Atmospheric Administration (NOAA)
U.S. Department of Commerce
1305 East West Highway, SSMC4 Rm 5309
Silver Spring, Maryland 20910

Re: Phased Array Radar System Draft Environmental Assessment

The U.S. Environmental Protection Agency (EPA) has reviewed the National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) proposal to construct and operate a phased array radar (PAR) system in Norman, Oklahoma draft Environmental Assessment (EA). The draft EA evaluates the potential environmental impacts associated with two alternatives for this Proposed Action: The Preferred Alternative and the No Action Alternative.

The Proposed Action would enable NOAA's National Severe Storms Laboratory (NSSL) to conduct research on both fixed planar and rotating phased array radar, which are advanced scan strategies that this technology would enable and investigate whether a rotating planar dual-polarization PAR system would be possible to replace the Weather Surveillance Radar-1998 Doppler (WSR88D). The WSR88D is the premier operational weather radar in the US. It is used by NOAA's National Weather Service (NWS) to detect and observe meteorological conditions and provide warnings for severe weather. The Proposed Action is needed to determine the functionality of the PAR system exclusively related to weather surveillance.

This review is pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500 – 1508), and our NEPA review authority under Section 309 of the Clean Air Act. Based upon our review of the environmental analysis provided, EPA has identified some areas for your attention and provides comments for your consideration.

Water Quality Comments

EPA suggests implementing a "no mow" buffer zone around where Merkle Creek runs in the facility, to provide wildlife habitat and nutrient pollution management.

Air Quality Comments

EPA recommends that all Non-Road Engines should be certified as in compliance with the EPA Tier 4 regulations found at 40 CFR Parts 89, 1039 which includes new and in-use nonroad regulations or Category 3 regulations at Parts 94, 1042, for marine compression-ignition engines. Additionally, should any land-clearing activities occur which result in the use of open burning to dispose of wood debris, coordination should be conducted with the Oklahoma

Department of Environmental Quality (ODEQ) to determine air quality conditions such as atmospheric inversions prior to performing open burning activities, and consider any expected air quality/visibility impacts to Class I Federal Areas identified in 40 CFR Part 81, Subpart D. Additionally, provisions should be taken to prevent particulate matter (PM) emissions during the construction activities as planned, such as applying water to disturbed areas and unpaved roads.

Environmental Justice Comments

EPA recommends NOAA identify and document in the EA the demographic of tract 2015.09, block group 4. Also provide the demographic of the adjacent communities that would be most likely to experience impacts from the Preferred Alternative, both regarding changes in socioeconomic characteristics and potential disproportionate impact.

EPA recommends NOAA provide and document in the EA the demographic of the Low-income population within the Region of Influence (ROI) to aid in the implementation of Executive Order (EO) 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, which requires analysis of direct, indirect, and cumulative impacts of agency actions on Environmental Justice communities.

EPA recommends NOAA identify the demographics makeup of the communities located along West Robinson Street that are within 0.2 miles and Communities within 0.5 miles from the Proposed Action Area; and provide an analysis of direct, indirect, and cumulative impacts of the proposed populations or communities. Also, consideration should be given to long-term impact in its totality (i.e., additional exposure to level of Radiofrequency (RF) radiation from the proposed project and exposure from other sources on daily basis).

EPA recommends NOAA identify and document any residential domestic well within the ROI and 1.0 mile of the Proposed Project.

EPA recommends that NOAA identify and document any recognized tribes and tribal nations who potentially could be adverse impacted by the proposed Project socioeconomically and environmentally; those adjacent or within 10. mile.

EPA appreciates the opportunity to provide comments on this document. We look forward to the receipt of the Record of Decision (ROD) and your responses to these concerns. Once completed, please send our office an electronic copy of the ROD when it is electronically filed with the Office of Federal Activities using the following link: https://www.epa.gov/nepa/e-nepa-guide-registration-and-preparing-eis-electronic-submission. If you have any questions, please contact Tanisha Hinton, project review lead at [redacted] or [redacted].

Sincerely,

Robert Houston
Staff Director
Office of Communities, Tribes and
Environmental Assessment

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd
Norman, OK 73072

July 13, 2023

Susan Minnick
U.S. Fish and Wildlife Service
Oklahoma Ecological Services Field Office
9014 E. 21st Street
Tulsa, OK 74129

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Ms. Minnick,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted]

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:47:46 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072

July 13, 2023

Stacy Riley
U.S. Department of Agriculture, Natural Resources Conservation Service
Oklahoma State Office
100 USDA Suite 206
Stillwater, OK 74074

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Ms. Riley,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:46:53 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd
Norman, OK 73072

July 13, 2023

Scott Thompson
Oklahoma Department of Environmental Quality
P.O. Box 1677
Oklahoma City, OK 73101

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Mr. Thompson,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:45:23 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

---------- Forwarded message ---------
From: **DEQ EnvReviews** [redacted]
Date: Tue, Aug 1, 2023 at 8:53 AM
Subject: Environmental Impact Review
To: [redacted] [redacted]

Dear Ms. Delp:

In response to your request, we have completed a general environmental impact review for the project listed below.

Project

Letter dated July 13, 2023 – Proposed Phased Array Radar System, Norman, Cleveland County, OK [35.23515, -97.46561]

Adverse Environmental Impacts Under DEQ Jurisdiction

None anticipated.

Additional Regulatory Considerations

Prior to beginning any construction activity disturbing more than one acre, you must submit an NOI and obtain authorization under OKR10, construction stormwater. If you need assistance, please contact DEQ's Stormwater Unit at (405) 702-6100.

Note: This is a summary of the most common regulatory requirements that may be applicable to your project. Other regulatory requirements may apply.

Additional recommendations to consider may be found in our guidance document, Additional Recommendations for Your Project.

For future projects, please include GPS coordinates in decimal degrees (DD.DDDDD) and continue including street addresses, section/township/range, or other location information.

Please submit future requests via either our online contact portal or email by attaching a single pdf file containing your request and any attachments.

Thank you for the opportunity to provide our comments. If you have any questions or need clarification, please contact me.

Sincerely,

_____

Jon Roberts | Env. Programs Manager III

Office of Continuous Improvement | Department of Environmental Quality

p. [redacted]

Oklahoma.gov | deq.ok.gov

True North: To lead the nation in fostering a healthy and sustainable future

through effective and innovative environmental actions.

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

OKLAHOMA Environmental Quality

Additional Recommendations for Your Project

The Department of Environmental Quality has completed a general environmental impact review for your project and offers the following information to help you make sure your project is completed in compliance with environmental regulations. There may be additional regulatory requirements not addressed by this guidance.

- If the project will disturb more than one acre of land, an Oklahoma Pollutant Discharge Elimination System (OPDES) permit for stormwater may be required.
- Removal or abatement of paint in pre-1978 housing or child-occupied facilities must conform to all relevant lead-based paint regulations.
- Disturbance of more than six square feet of paint in pre-1978 housing or child-occupied facilities must conform to all relevant renovation, repair, and painting regulations.
- Handling and/or removal of asbestos must conform to all relevant asbestos regulations.
- Reasonable precautions should be taken to protect air quality by minimizing fugitive dust emissions.
- Any solid or hazardous waste from the project must be recycled and/or disposed in accordance with all relevant solid waste and/or hazardous waste regulations.
- Removal or installation of water and/or sewer lines must conform to all relevant local and/or state plumbing codes.

If your project involves water or wastewater infrastructure, we offer the following additional guidance.

- The proposed project should not result in any adverse effects to the water quality or environment if the design and construction of all new components are in accordance with DEQ design guidelines or standards.
- Plans outlining the changes or constructions to be made, and the appropriate fee for plan review, must be submitted to DEQ's Water Quality Division for approval prior to construction.

DEQ Contacts

Asbestos	**Asbestos Program**	**405-702-4100**
Lead-Based Paint	**Lead-Based Paint Program**	**405-702-4100** **LBPReporting@deq.ok.gov**
Stormwater Permits	**ECLS Stormwater Unit**	**405-702-6100** **ECLS-Stormwater Permitting@deq.ok.gov**
Waste Recycling/Disposal	**Land Protection Division**	**405-702-5100**
Water/Wastewater Infrastructure	**Water Quality Division/ Construction Permitting Section**	**405-702-8100**

If you need further assistance, please contact DEQ's Environmental Review Coordinator at EnvReviews@deq.ok.gov.

This publication is issued by the Oklahoma Department of Environmental Quality authorized by Scott A. Thompson, Executive Director. Copies have been prepared at a cost of $0.053 each. Copies have been deposited with the publications clearinghouse of the Oklahoma Department of Libraries.
(Fact Sheets\OEA\Environmental Review Guidance.indd 8/2022)

Kisak, Natalie

From: Comolli, Kristin A. [redacted]
Sent: Friday, May 19, 2023 5:54 PM
To: Kisak, Natalie
Subject: Re: ONHI Information Request
Attachments: 2023-230-BUS-AEC.pdf

Please see attached results of your information request.

Kristin Comolli (she/her)
Database Analyst
Oklahoma Natural Heritage Inventory
University of Oklahoma
111 East Chesapeake Street
Norman, OK 73019
http://oknaturalheritage.ou.edu/

From: ONHI Information Request [redacted]
Sent: Friday, May 19, 2023 2:14 PM
To: Fagin, Todd D. [redacted]; Comolli, Kristin A. [redacted]
Cc: [redacted]
Subject: ONHI Information Request

ONHI Information Request
Organization:
Name: Natalie Kisak
Email: [redacted]
Phone: [redacted]
Project Name: Environmental Assessment (EA) for Proposed Phased Array Radar and Radar Test Facility in Norman,

Oklahoma

Project Description: The US National Oceanic and Atmospheric Administration (NOAA) is preparing an EA to evaluate the potential environmental impacts from the proposed construction and operation of a Phased Array Radar (PAR) and Radar Test Facility (RTF) in Norman, Oklahoma.

Location: The Study Area is located at NOAA's National Severe Storms Laboratory near the University of Oklahoma's Max Westheimer Airport in Norman. The general address is 1200 Westheimer Drive. The proposed Project area is in the open field west of Halley Avenue.

X: -97.46433512045965

Y: 35.23577494827366

OBS Ref. 2023-230-BUS-AEC

Natalie Kisak, May 19, 2023

We have reviewed occurrence information on federal and state threatened, endangered or candidate species currently in the Oklahoma Natural Heritage Inventory database for the following location you provided:

Sec. 24-T9N-R3W, Cleveland County

We found no occurrences of relevant species within the vicinity of the project location as described. However, absence from our database does not preclude such species from occurring in the area.

If you have any questions about this response, please send me an email, or call us at the number given below.

Although not specific to your project, you may find the following links helpful.

ONHI guide to ranking codes for endangered and threatened species:
http://www.oknaturalheritage.ou.edu/content/biodiversity-info/ranking-guide/

Information regarding the Oklahoma Natural Areas Registry:
https://okregistry.wordpress.com/

Kristin Comolli
Oklahoma Natural Heritage Inventory
[redacted]

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd
Norman, OK 73072

July 13, 2023

Todd Fagin
Oklahoma Natural Heritage Inventory
111 E. Chesapeake Street
Norman, OK 73019

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Mr. Fagin,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:46:07 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

OBS Ref. 2023-323-FED-NOAA

Dear Anne Delp, July 14, 2023

We have reviewed occurrence information on federal and state threatened, endangered, or candidate species currently in the Oklahoma Natural Heritage Inventory database for the following location you provided:

Sec. 24-T9N-R3W, Cleveland County

We found 1 occurrence of relevant species within the vicinity of the project location as described.

Species Name	Common Name	Federal Status
Haliaeetus leucocephalus	**Bald Eagle**	**Protected**
County	***TRS***	***Count***
Cleveland	Sec. 35-T10N-R3W	1

Additionally, absence from our database does not preclude such species from occurring in the area.

If you have any questions about this response, please send me an email, or call us at the number given below.

Although not specific to your project, you may find the following link helpful.

ONHI, guide to ranking codes for endangered and threatened species:
http://www.oknaturalheritage.ou.edu/content/biodiversity-info/ranking-guide/

Kristin Comolli
Oklahoma Natural Heritage Inventory
[redacted]

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd
Norman, OK 73072

July 13, 2023

Bill Dinkines
Oklahoma Department of Wildlife Conservation
Wildlife Division
P.O. Box 53465
Oklahoma City, OK 73152

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Mr. Dinkines,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:45:47 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

National Severe Storms Laboratory
120 David L. Boren Blvd
Norman, OK 73072

July 13, 2023

Mike Vaughan
Cleveland County Planning and Zoning Department
105 W. Caddo Street
Cleveland, OK 74020

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Mr. Vaughan,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your agency is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day public review and comment period is between July 13, 2023 and August 12, 2023. All correspondence or comments must be recevied no later than August 12, 2023. Please address any comments or questions to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:42:27 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

Endangered Species Act Section 7 Consultation

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OCEANIC AND ATMOSPHERIC RESEARCH
Silver Spring, MD 20910
May 12, 2023

Susan Minnick
US Fish and Wildlife Service
Oklahoma Ecological Services Field Office
9014 E. 21st Street
Tulsa, OK 74129

Dear Ms. Minnick:

Pursuant to Section 7 of the Endangered Species Act (ESA), the United States (US) National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) is requesting concurrence with our effects determinations for six species listed or proposed for listing as threatened or endangered, and under the jurisdiction of the US Fish and Wildlife Service (USFWS).

NOAA-OAR is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) and a Radar Test Facility (RTF) in Norman, Oklahoma (Proposed Action).Various sites surrounding NOAA's existing operations on University of Oklahoma-owned property in Norman, (which already supports other radar platforms), are being evaluated. NOAA-OAR is preparing this EA in accordance with the National Environmental Policy Act (NEPA), as amended (42 US Code §4321 *et seq.*), Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and NOAA Administrative Order 216-6A and its accompanying Companion Manual.

Under the Proposed Action, OAR would implement lease acquisition, construction, and subsequent operation and maintenance of an RTF at NOAA's National Severe Storms Laboratory (NSSL) near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma (see **Attachment 1**). The RTF would include a rotating planar, dual-polarization PAR system; enclosures for equipment; and all power, communications, and other support infrastructure for housing and operating the radar. Electrical, natural gas, network, and non-potable water utilities would be installed, and a paved access road and parking lot would be built at the site of the RTF, connecting the site to other nearby facilities operated by NOAA. The RTF would require at least a one (1)-acre site to support the necessary infrastructure, and would be sited at an appropriate distance from a calibration tower located approximately 425 meters north of the Advanced Technology Demonstrator (ATD), an existing NOAA PAR facility. In addition, the Proposed Action may include relocating (if necessary) the existing calibration tower to elsewhere in the Proposed Action Area, as its current location is being considered for construction of other facilities unrelated to NOAA or this Proposed Action. Construction of the RTF is anticipated to begin in 2024, with the PAR becoming operational in 2026.

The current national weather radar system is provided by the Weather Surveillance Radar – 1988 Doppler (WSR-88D), which has been operational since 1993. This radar network is undergoing a Service Life Extension Program to enable continued operation, and as part of this, NOAA is

evaluating alternatives for a WSR-88D successor. NOAA-OAR has been investigating PAR technology since 2003 to meet mission-driven expanded radar requirements that facilitate improved and enhanced weather warnings. PAR technology has demonstrated potential, but NOAA needs to address remaining technological challenges to determine if PAR would be able to replace the current radar network.

The purpose of the Proposed Action is to enable OAR-NSSL to conduct research on the types of advanced scan strategies that PAR technology would allow, to determine whether a rotating planar, dual-polarization PAR system would be a feasible option to replace the WSR-88D. The Proposed Action is needed to determine the functionality of the PAR system exclusively related to weather surveillance. OAR-NSSL needs to conduct risk reduction studies to determine the benefits, impacts, and capabilities of the PAR system, as it relates to improved weather observations and severe weather warnings.

NOAA-OAR queried the USFWS Information for Planning and Consultation (IPaC) online database for federally listed plant and animal species with the potential to occur within or near the Proposed Action Area (see **Attachment 2**). The IPaC database identified six (6) federally listed species under the ESA with potential occurrence (**Table 1**). The monarch butterfly (*Danaus plexippus*) is a candidate species that is potentially present; however, there are no legal requirements for candidate species. No critical habitat has been designated at the Proposed Action Area.

Table 1: ESA-Listed Species in Cleveland County, Oklahoma

Common Name	Scientific Name	Federal Status[1]	Habitat Type
Arkansas River Shiner	*Notropis girardi*	T	This species occupies long, wide, flowing rivers with shallow depths and sandy bottoms. It has historically occurred in the Arkansas River Basin, including the Canadian River (ODWC, 2023a).
Peppered Chub	*Macrhybopsis tetranema*	E	This species occupies the main channels of wide, shallow rivers with sandy bottoms and swift-flowing waters. It is found in the Arkansas River Basin, including the Canadian River (USFWS, 2023a).
Piping Plover	*Charadrius melodus*	T	This species uses mudflats and sandbars to forage. Piping plovers are typically documented at stopover sites in Oklahoma between the months of March to May and July to September, and do not nest or breed within the state (ODWC, 2023b).

Common Name	Scientific Name	Federal Status[1]	Habitat Type
Red Knot	*Calidris canutus rufa*	T	This species uses mudflats to forage, and this habitat is limited within Oklahoma. Red knots are typically reported during fall migration and do not nest or breed within the state (ODWC, 2023c).
Tricolored Bat	*Perimyotis subflavus*	Proposed endangered[2]	This species is found in forested edge habitats in the summer, roosting among the leaves of living or dead hardwood trees. In the winter, this species occupies caves and abandoned mines, or within road culverts in the southern US. They forage for insects in partly open habitats and over waterbodies (USFWS, 2023b; CBD, n.d.).
Whooping Crane	*Grus americana*	E	This species is only observed in Oklahoma during migration (typically April and October), and uses wetland mosaics, marshes, waterbody edges, and wet prairie and agricultural fields near water as stopover sites for feeding (ODWC, 2023d).

1. T = Threatened, E = Endangered
2. The tricolored bat was proposed for listing as an endangered species by the USFWS on September 13, 2022. The proposal is still undergoing review.

Arkansas river shiner (*Notropis girardi*) and peppered chub (*Macrhybopsis tetranema*): These species do not have suitable habitat within the Proposed Action Area; however, the Canadian River is located approximately three (3) miles southwest of the site. Merkle Creek, an intermittent tributary, is located within the Proposed Action Area, and potential impacts to this creek may impact downstream rivers. Due to the small scale of the Proposed Action, limited ground disturbance that would occur, and proposed standard erosion and sediment control best management practices (in accordance with the National Pollutant Discharge Elimination System), any impacts to downstream water quality would be negligible. Further, the Proposed Action would not result in direct habitat modification or take of these species. Therefore, the Proposed Action would have *no effect* on the Arkansas river shiner and the peppered chub.

Piping plover (*Charadrius melodus*) and red knot (*Calidris canutus rufa*): These species are typically only observed in Oklahoma during migration periods, using mudflats as stopover forage habitat. Fewer than five (5) individual red knots are documented in the state annually (ODWC, 2023c). Suitable habitat is not present within the Proposed Action Area for either species. Due to the absence of suitable habitat and the rare occurrences with which these species are observed in Oklahoma, the Proposed Action would have *no effect* on piping plover and red knot.

Tricolored bat (*Perimyotis subflavus*): The tricolored bat does not have suitable habitat at or within the vicinity of the Proposed Action Area, and is not likely to be present at the site. The site consists primarily of flat, open, agricultural land and does not contain forested edge habitat that could support this species. No caves or mines are present in the surrounding area. Although Merkle Creek intersects the site and could provide foraging habitat, this species would likely opt to forage at other nearby water bodies that are not located in a large, open area. Due to the absence of suitable habitat, the Proposed Action would have *no effect* on the tricolored bat.

Whooping crane (*Grus americana*): Suitable habitat for the whooping crane may be present at and in the vicinity of the Proposed Action Area. Merkel Creek and the fields surrounding it may provide potential stopover habitat for this species. Various other wet features that may support whooping cranes are also located within a 3-mile radius, including a reservoir, wilderness park, and wetland mosaics. This species typically only uses stopover sites in the western part of the state, although it has occasionally been documented in central Oklahoma, including near Oklahoma City (ODWC, 2023d). Given the potential presence of suitable habitat, but the marginal quality of the habitat and rarity of this species' occurrence in central Oklahoma, the Proposed Action *may affect, but is not likely to adversely affect* the whooping crane.

Pursuant to ESA Section 7, NOAA-OAR requests USFWS review and concur with the effects determinations stated in this letter. NOAA-OAR also solicits input on the Proposed Action and its potential to impact other plant or animal species of concern or interest to USFWS. NOAA-OAR respectfully requests your review and concurrence within **thirty (30) days** from receipt of this correspondence so that we may complete our environmental review in a timely manner.

If you have any specific items of interest about this proposal, please contact Anne Delp within 30 days of receipt of this letter by email to: [redacted]; or by mail to: 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910.

Sincerely,

Emily Menashes
Acting Assistant Administrator

Attachments:

1. Proposed Action Location
2. IPaC Official Species List

References:

CBD. (n.d.). *Natural History: Tricolored Bat*. Retrieved from Center for Biological Diversity: https://www.biologicaldiversity.org/species/mammals/tricolored_bat/natural_history.html

ODWC. (2023a). *Arkansas River Shiner*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/fish/arkansas-river-shiner

ODWC. (2023b). *Piping Plover*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/birds/piping-plover

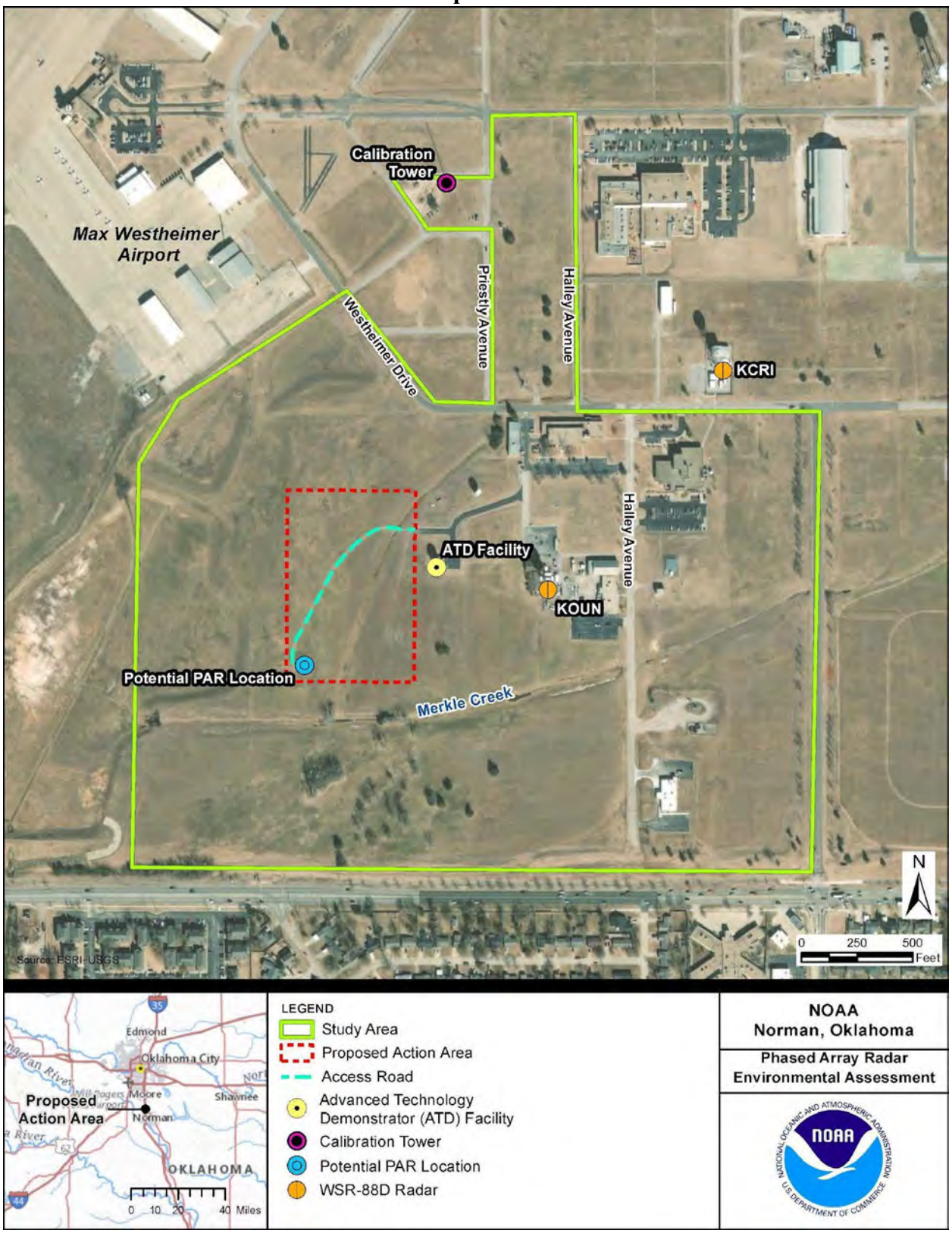
ODWC. (2023c). *Rufa Red Knot*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/birds/rufa-red-knot

ODWC. (2023d). *Whooping Crane*. Retrieved from https://www.wildlifedepartment.com/wildlife/field-guide/birds/whooping-crane

USFWS. (2023a). *Peppered Chub (Macrhybopsis tetranema)*. Retrieved from ECOS: https://ecos.fws.gov/ecp/species/532

USFWS. (2023b). *Tricolored Bat (Perimyotis subflavus)*. Retrieved from ECOS: https://ecos.fws.gov/ecp/species/10515

Attachment 1: Proposed Action Location



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
Phone: (918) 581-7458 Fax: (918) 581-7467

In Reply Refer To:
Project Code: 2023-0062340
Project Name: NOAA Phased Array Radar EA

March 30, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Oklahoma Ecological Services Field Office
9014 East 21st Street
Tulsa, OK 74129-1428
(918) 581-7458

PROJECT SUMMARY

Project Code: 2023-0062340
Project Name: NOAA Phased Array Radar EA
Project Type: Meteorological Tower New Construction
Project Description: NOAA is proposing to acquire, construct, and operate a PAR and RTF at the NSSL in Norman, Oklahoma, in order to research the capabilities of dual-polarization PAR technology and determine the potential for PAR technology to replace the existing WSR-88D. The Proposed Action includes acquisition of a property lease at the Norman site, construction of the RTF, operation and maintenance of the RTF, and relocation of a calibration tower located at the NSSL, if necessary.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@35.2352779,-97.46323677243507,14z

Counties: Cleveland County, Oklahoma

ENDANGERED SPECIES ACT SPECIES

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

FISHES

NAME	STATUS
Arkansas River Shiner *Notropis girardi* Population: Arkansas River Basin (AR, KS, NM, OK, TX) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4364	Threatened
Peppered Chub *Macrhybopsis tetranema* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/532	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Oct 15 to Jul 31

NAME	BREEDING SEASON
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Chestnut-collared Longspur *Calcarius ornatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

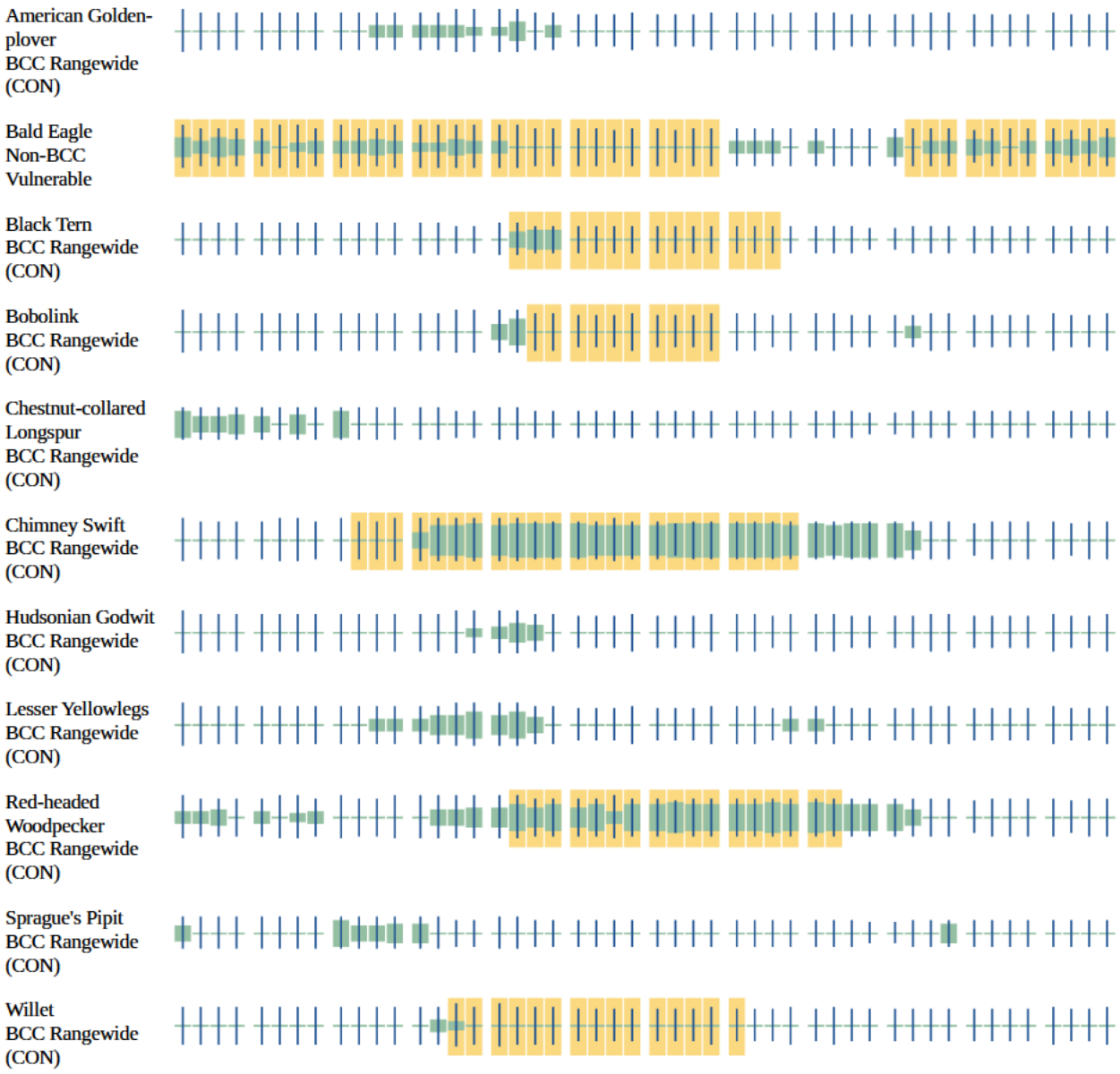
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

▪ probability of presence ▪ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC



Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of

certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R4SBC

IPAC USER CONTACT INFORMATION

Agency: AECOM
Name: Natalie Kisak
Address: 12420 Milestone Center Drive
City: Germantown
State: MD
Zip: 20876
Email [redacted]
Phone: [redacted]

---------- Forwarded message ---------
From: **Riggs, Georgia J** [redacted]

Date: Thu, Jun 8, 2023 at 3:41 PM
Subject: Re: Request for Concurrence Pursuant to ESA Section 7 Interagency Consultation
To: [redacted]
Cc: [redacted], Levesque, Laurence P [redacted], Fenner, Daniel [redacted]

Ms. Mauppa,

Thank you for requesting U.S. Fish and Wildlife Service, Oklahoma Ecological Services Field Office (OKESFO) review of the proposed project "NOAA Phased Array Radar EA". Our comments are provided in accordance with the Endangered Species Act. Other aspects to address NEPA should be coordinated with the appropriate agency.

We concur that the proposed project will not affect federally threatened or endangered species. We advise that you also consider impacts to migratory birds in accordance with the Migratory Bird Treaty Act. You can contact our regional office's Migratory Bird Program (https://www.fws.gov/page/migratory-birds-southwest-region) for additional assistance regarding migratory birds.

For future similar requests, please utilize our project review website. The Oklahoma Ecological Services Field Office has developed measures to streamline the threatened and endangered species consultation process and other requests for technical assistance. The information you have requested is available on our Project Review website at:
https://www.fws.gov/office/oklahoma-ecological-services/project-reviews.

Please review these streamlining measures and if additional review for future projects by the Service is requested, please submit a complete project review package request electronically, as described on our Project Review website. For assistance in navigating the website, please contact our office at (918) 581-7458.

Sincerely,

Georgia Riggs

Georgia Riggs (she/her)
Fish and Wildlife Biologist
Oklahoma Ecological Services Field Office
U.S. Fish and Wildlife Service
9014 East 21st Street
Tulsa, OK 74129
[redacted]

APPENDIX B:

NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION

THIS PAGE INTENTIONALLY LEFT BLANK.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH
National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072

June 8, 2023

Ms. Lynda Ozan
State Historic Preservation Office
Oklahoma Historical Society
800 Nazih Zuhdi Drive
Oklahoma City, OK 73105

Subject: Environmental Assessment for Proposed Phased Array Radar and Radar Test Facility in Norman, Oklahoma

Dear Ms. Ozan:

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) proposes to construct and operate a Phased Array Radar (PAR) and Radar Test Facility (RTF) in Norman, Oklahoma. The project is an undertaking subject to review under the National Historic Preservation Act (NHPA) Section 106 process (54 USC § 306108).

Attachment 1 provides details of the proposed undertaking, discussion of the proposed Area of Potential Effects (APE), and results of identification and assessment of the potential of the undertaking to affect Historic Properties. Based on the information presented, we request your concurrence on the APE and a determination of "no adverse effect" as described in 36 CFR § 800.5(a)(1).

NOAA is the federal agency for the undertaking. Rafael Mendoza, [redacted], is the local project lead. John Battle, [redacted], is the NOAA Federal Preservation Officer. Anne Delp, a[redacted], is the Project Environmental Engineer.

Due to the nature and scope of this undertaking, in accordance with 36 CFR 800.2(c), NOAA is sending duplicate information to American Indian tribal stakeholders to NOAA (Attachment 2). We will address any comments or concerns therefrom. Please contact Ms. Anne Delp, Environmental Engineer, at [redacted] if you have any questions. We thank you for your review and assistance.

Sincerely,

CARLIS.DANA.LAMAR.1365868464

Digitally signed by CARLIS.DANA.LAMAR.1365868464
Date: 2023.06.08 10:25:28 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachments:
1. NOAA Cultural Resources Section 106 Project Review
2. Consulting/Interested Parties

ATTACHMENT 1

National Oceanic and Atmospheric Administration, Office of Oceanic and Atmospheric Research

Section 106 Project Review for Proposed Phased Array Radar and Radar Test Facility in Norman, Oklahoma

Undertaking: Construct and Operate Phased Array Radar and Radar Test Facility

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) proposes to construct and operate a phased array radar (PAR) and radar test facility (RTF) in Norman, Oklahoma (Undertaking). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL) within OAR. NOAA is evaluating various sites surrounding its existing leased space on University of Oklahoma-owned property in Norman, which already supports other radar platforms owned by NOAA NSSL.

NSSL has been investigating PAR technology since 2003 to facilitate improved weather warnings and to determine the suitability of PAR in replacing the existing Weather Surveillance Radar – 1988 Doppler (WSR-88D) network. PAR is a promising technology that has potential to improve warnings for various types of severe weather, primarily through more rapid volumetric updates and adaptive scanning capabilities. Previous PAR development and research has been conducted in conjunction with other federal agencies concerned with aviation and surveillance applications, but NOAA is now ready to validate this technology for use in weather surveillance by testing exclusively for this purpose.

Due to NOAA's intent to test the PAR's meteorological applications and assess the capability of PAR to replace WSR-88D, NOAA proposes to procure a rotating planar dual-polarization PAR system dedicated to weather surveillance. The purpose of the Undertaking, therefore, is to enable NSSL to conduct research on the types of advanced scans that this technology would enable and investigate whether a rotating planar dual-polarization PAR system would be possible to replace the WSR-88D. The Undertaking is needed to determine the functionality of the PAR system exclusively related to weather surveillance. NSSL needs to conduct studies to determine the benefits, impacts, and capabilities of the PAR system as it relates to improved weather observations and severe weather warnings.

Project Details:

The Undertaking includes the acquisition of a property lease and construction of the RTF, including the PAR antenna and associated facilities, operation and maintenance of the RTF, and possible relocation of an existing calibration tower to a location east of Priestly Avenue from the current location, if necessary (**Figure 1** and **Figure 2**). The center of the PAR antenna would be elevated from ground level by approximately 15 meters (49 feet), with a resulting structure of no more than 30 meters (98 feet) in height. The RTF facility would be encompassed by a perimeter chain link fence 3 meters (9.8 feet) in height placed at least 10 meters (33 feet) from the structure. A new 6,000-square-foot paved parking lot would also be constructed adjacent to the facility, connected to the existing NOAA facilities on-site via a new paved access road approximately 200 to 240 meters (656 to 787 feet) in length and 7 meters (23 feet) wide. New utilities would be installed at the site and connected to existing utilities. The calibration tower currently reaches a maximum height of 150 feet (46 meters) and would maintain its current height if relocated.

Steps Taken to Identify the Area of Potential Effects (APE):

The APE for the Undertaking (36 Code of Federal Regulations (CFR) 800.16(d)) consists of the limits of disturbance (LOD) for all possible construction activities in addition to a 0.5-mile buffer around the LOD

to account for visual effects. The maximum potential LOD covers approximately 6.9 acres for a variety of ground disturbing activities including construction of new facilities, modification of existing facilities requiring ground disturbance, underground utility work, roadway modification, surface grading, and other activities (**Figure 2**).

During construction of the Undertaking, there will be temporary visual (equipment and disturbance), audible (noise), and potentially atmospheric (dust and exhaust fumes) effects. Permanent direct effects include the construction of a new RTF and the possible relocation of an existing calibration tower, if needed.

Potential for Impacts to Historic Properties:

The RTF will be constructed to not exceed a maximum height of 30 meters (98 feet). Several other radar facilities are located within the immediate area, including a WSR-88D radar tagged as KCRI operated by the NOAA National Weather Service (NWS) Radar Operations Center, along with a WSR-88D radar tagged as KOUN and the Advanced Technology Demonstrator (ATD) radar, both operated by NSSL. KCRI was constructed to a maximum base height of 30 meters (98 feet) and KOUN to a maximum base height of 20 meters (66 feet). As such, construction of the RTF would represent a similar impact to the surrounding environment as the two previously constructed radar facilities. The Undertaking may also include the relocation of the existing calibration tower located approximately 0.2 miles north of the proposed RTF location, immediately south of Galileo Street. If necessary, the calibration tower would be relocated to a location east of the current tower location, on the east side of Priestly Avenue. The final location for the possible relocated calibration tower has not yet been determined, and as such, an area of approximately 3.2 acres has been identified as the broadest possible area the tower may be relocated within. This possible relocation area is bounded to the north by Lexington Avenue, to the west by Priestley Avenue, to the east by Halley Avenue, and to the south by a line parallel to Wright Place extending east from its intersection with Priestley Avenue to Halley Avenue.

To assess the potential of the Undertaking to impact historic properties, NOAA reviewed research and investigations to identify historic properties within the APE and determine the potential effects, if any, of the Undertaking. According to a cultural resources record review conducted by the Oklahoma Archaeological Survey (OAS), two previously recorded archaeological sites (34CL179 and an unnamed site associated with survey FY23-0943) are located within the Project APE (**Figure 3**). Additionally, two previously recorded cultural resource surveys (FY23-0943 and Legacy Survey 2,992) have been completed within or immediately adjacent to the APE (**Figure 4**). Survey FY23-0943 is a recently completed survey, with no attribution data available for type/scope of project or surveyor/report author information. One archaeological site was identified as a result of this survey, and no additional information is available. Legacy Survey 2,992 was a pedestrian survey conducted in 1988 by the Oklahoma Department of Transportation (ODOT) in preparation for construction of U.S. Route 77 (Hartley 1988). No sites were identified as a result of this survey.

Site 34CL179 – "Mount Williams, Norman Naval Air Station"– is located within the LOD. The official designation of this facility is the Naval Air Technical Training Center Norman (NATTC Norman). The site boundary encompasses the portion of the APE north of West Robinson Street and west of North Flood Avenue and extends outside of it. The site is classified as an historic period archaeological site and includes a WWII-era facility constructed in 1942-1943. The site was first surveyed in 1993 in preparation for the construction of U.S. Route 77 (Hartley 1993). A component of the larger site, the large earthen berm known as Mount Williams – located approximately 0.5 miles west of the APE – was recommended eligible for listing in the National Register of Historic Places (NRHP). Archaeological mitigation was conducted of the Mount Williams component by ODOT in 2005-2006 (Hartley 2018). Mount Williams was demolished following the mitigation work. The area is now the location of commercial development.

According to the site files for 34CL179, NATTC Norman was established in 1942 as a naval flight training center, co-located with the University of Oklahoma's Westheimer Airport. Military usage of NATTC Norman declined following the end of World War II and would be briefly reactivated between 1952 and 1959 as a result of the Korean War. Following the Korean War, the base was turned back over to the University of Oklahoma to be used as a civilian airfield and training facility. No structures or features related to NATTC Norman have been identified within the APE via previous cultural resource surveys. Both the 1993 and 2005-2006 surveys focused primarily on the area immediately around Mount Williams.

Included within the 1993 and 2018 reports on archaeological excavations at NATTC Norman is a figure depicting the original 1943 US Navy plan map of the facility. This plan depicted buildings, runways, Mount Williams, and machine gun and rifle ranges associated with NATTC Norman. One structure is located within the LOD on the 1943 plan, which is discussed in more detail below (**Figure 5**).

No structures are indicated within the LOD of the RTF on USGS Topographic Quadrangle Maps of Norman, Oklahoma for the years 1893, 1925, 1936, 1965, 1983, and 1995 (**Figures 6** through **11**). Additionally, historic aerial imagery available from 1957 to 2019 indicates no structures within the RTF LOD (NETR 2023). A structure is present within the LOD of the proposed new location of the calibration tower. This structure is indicated on the 1943 US Navy plan and is also indicated on 1965 and 1995 USGS topographic maps of the area. The structure, located at 1734 Halley Avenue, is identified as 'Building 601' on the US Navy plan. Historic aerial imagery indicates a structure in this location from at least 1957. The structure was demolished sometime between 2010 and 2013.

A total of 704 structures are located within the APE, approximately 512 of which are located within a neighborhood development of single-family domestic structures south of West Robinson Street (**Figure 12**). The northern boundary of the neighborhood is approximately 750 feet south of the RTF LOD. No formal historic structure inventory survey has been conducted for this neighborhood, which was first laid out east of North Berry Road sometime between 1936 and 1956. More development would follow by 1962, with more houses erected north of Woods Avenue by that year. Construction of more single-family houses north of Denison Drive would occur by 1969, and by 1975 the neighborhood would be fully settled to the extent that it is today.

A neighborhood is located east of North Flood Avenue in the easternmost portion of the APE, of which approximately 107 structures are located within the APE. The western boundary of the neighborhood is located approximately 0.4 miles east of the proposed calibration tower relocation LOD. The neighborhood was first laid out sometime between 1969 and 1975. The neighborhood consists primarily of manufactured homes, with a few larger industrial and commercial structures located west and north of the neighborhood.

A development of primarily industrial buildings and warehouses – approximately 48 of which are in the APE – began to take shape immediately north and west of the North Flood Avenue neighborhood sometime between 1962 and 1969, as indicated by historic aerial imagery. Prior to this development, the land was primarily farmland. Only two structures fronting North Flood Avenue were in place by 1969, with the remainder of structures along North Flood Avenue and West Rock Creek Road having been constructed by 1975. Construction would continue eastward with additional structures appearing east of the core development on historical aerial imagery between 1981 and 2008, by which point the neighborhood would resemble its current built environment.

Approximately 20 structures associated with Max Westheimer Airport are located in the western portion of the APE. Most structures within the Airport were constructed between 1975 and 1981, as indicated by historic aerial imagery. Three small aircraft hangars located in the northern portion of the airport appear to have been constructed between 1969 and 1975.

A structure located at 2113 Goddard Avenue is currently in operation as the University of Oklahoma Sooner Flight Academy. The structure has been in this location since at least 1981. Immediately northeast of the Flight Academy at 2207 Goddard Avenue is the Norman Fire Department – Fire Station 7. This structure was constructed sometime between 1995 and 2003, as indicated by historic aerial imagery.

Several structures in the central portion of the APE are operated by either the University of Oklahoma, NOAA and related offices, or other private businesses. One structure is located approximately 1,000 feet east of the RTF LOD. The structure, located at 1205 Halley Avenue, first appears in aerial imagery beginning in 1981 and is currently operated by the American Red Cross for Military and Veteran Services.

Two structures are indicated in the central portion of the APE on the west side of Halley Avenue in 1965. These structures are also present on the 1983 and 1995 USGS topographic maps. The location of 1424 Halley Avenue belongs to the NWS Radar Operations Center. The location of 1426 Halley Avenue belongs to NSSL.

A structure is indicated in the northern portion of the APE on the south side of Westheimer Drive on the 1965 USGS Topographic Map. A structure is also present in this location in 1983 and 1995 and likely represents the standing structure at 1306 Westheimer Drive currently in use as the NWS Radar Operations Center Building 600. A prefabricated structure located immediately west of Building 600 first appears in historic aerial imagery in 2003. A structure is located immediately east of Building 600 on the 1995 USGS topographic map; this structure is not present on the 1983 map, and likely represents the standing structure at 1200 Westheimer Drive and in use as the NWS Radar Operations Center. Several other small, ancillary buildings are indicated in the vicinity of these two structures on the 1995 map that are not present on the 1983 map. Northeast of this structure – on the north side of Westheimer Drive – is a radar antenna and associated structures. This collection of buildings first appears on historic aerial imagery in 2003. A prefabricated building located northwest of the radar antenna on a paved driveway extending north from Westheimer Drive appears on historic aerial imagery in 1969.

The City of Norman operates a large facility located at 1300 Da Vinci Street in the northern portion of the APE. This structure is indicated on historic maps as far back as 1965, and in historic aerial imagery to at least 1957. There is no structure indicated in this location on the 1943 US Navy plan or on the 1936 USGS topographic map.

The structure at 1005 Lexington Avenue – a former military hangar currently utilized as basketball courts operated by the Norman Optimist Club – has been present in its current location since at least 1943, as indicated on the US Navy plan of that year. While the structure appears to have undergone extensive modifications in the years since, the footprint of the building is essentially the same and likely represents the same building present in 1943. A large building immediately west of the Optimist Club at 1350 Lexington Avenue is occupied by the Cleveland County Family YMCA and was constructed sometime between 1981 and 1995.

A structure is located north of the Norman Optimist Club on the north side of Lexington Avenue. Google Maps labels the structure, “Well Construction Technology Center” and the structure has appeared in this location since 2003 (Google 2023).

The University of Oklahoma Merrick Computer Center is located at the corner of Westheimer Drive and Newton Drive in the east-central portion of the APE. The original structure was built at this location sometime between 1957 and 1962, with a substantial addition added between 1969 and 1975. The structure is not indicated on the 1943 US Navy plan.

Very few of the original structures indicated on the 1943 NNAS plan within the APE are still standing today. The Norman Optimist Club building is one of those, in addition to a small hangar located at 2113 Goddard Avenue and currently under operation as the University of Oklahoma Sooner Flight Academy. A structure is present in this location on the 1943 US Navy plan and both historic maps and aerial imagery to the present day. The vast majority of the NATTC Norman structures have been demolished since the land was reacquired by the University of Oklahoma, and there are no known components of NATTC Norman structures located within the LOD.

Determination of Effects:

Based on the above analysis, NOAA proposes a determination of "*no adverse effect"* as described in 36 CFR § 800.5(d)(1). Though the Undertaking may have an effect on an historic property, none of the characteristics which contribute to the property's NRHP eligibility will be significantly affected.

Portions of one previously recorded archaeological site (34CL179) are located within the APE. The site was first identified in 1993 and archaeological mitigation was conducted for a portion of the site in 2005-2006. The archaeological site boundaries were drawn to include the entirety of the NATTC Norman property, an area encompassing approximately 1,183 acres. Though some individual components of the site were recommended as eligible for inclusion in the NRHP, those components are displaced by >0.5 miles from the APE. Though the Oklahoma State Historic Preservation Office determined the entire site to be eligible in 1993, numerous structures have been built within the site boundaries since that date. Mount Williams was demolished following archaeological mitigation in 2005-2006. While Building 601, associated with NATTC Norman, once stood within the area proposed for the possible relocation of the calibration tower, this building was mechanically demolished ca. 2010-2013, and it is unlikely that any intact archaeological deposits remain.

Additionally, no structures or features relating to the time period of interest of 34CL179 were identified within the LOD during the 1993 or 2005-2006 surveys. No map-documented structures have been identified within the LOD of the RTF, and no structures appear in the area of the RTF on the 1943 US Navy plan of NATTC Norman. Although the LOD of the RTF is located in close proximity to two ephemeral headwater streams, and the landscape does not appear to have been extensively modified in recent history, no documented Precontact period archaeological sites have been identified within the APE. The area has been determined to have a low potential to contain Precontact period sites due to the distance from a perennial water source.

The construction of the RTF and the potential relocation and construction of the calibration tower will have no adverse effect on above-ground historic properties in the APE. The RTF (and potentially the calibration tower) are facilities in-line with the built environment of the APE and will have no impacts on the existing character of the APE. If relocation of the calibration tower is required, the overall impact to the viewshed will be minimal as the calibration tower will only be moving approximately 200-250 feet east of its current location. There are no known historic resources within the LOD of the existing calibration tower or the proposed RTF LOD.

Should potential impacts to historic properties be identified in the future due to a change in the submitted scopes of work, proposed locations, or due to activities proposed beyond the scope of the Undertaking, follow-up Section 106 consultation will occur as required.

Due to the nature and scope of this Undertaking, in accordance with 36 CFR 800.2(c), NOAA has sent project review documentation to the Oklahoma State Historic Preservation Officer, and affiliated Native American tribes, and will address any comments or concerns therefrom (Attachment 2 to the transmittal letter for the present attachment).

References

Google
2023 "Google Maps location of Project Area". Accessed 15 May 2023 at https://goo.gl/maps/MVwfyMKSYo27eHxc8

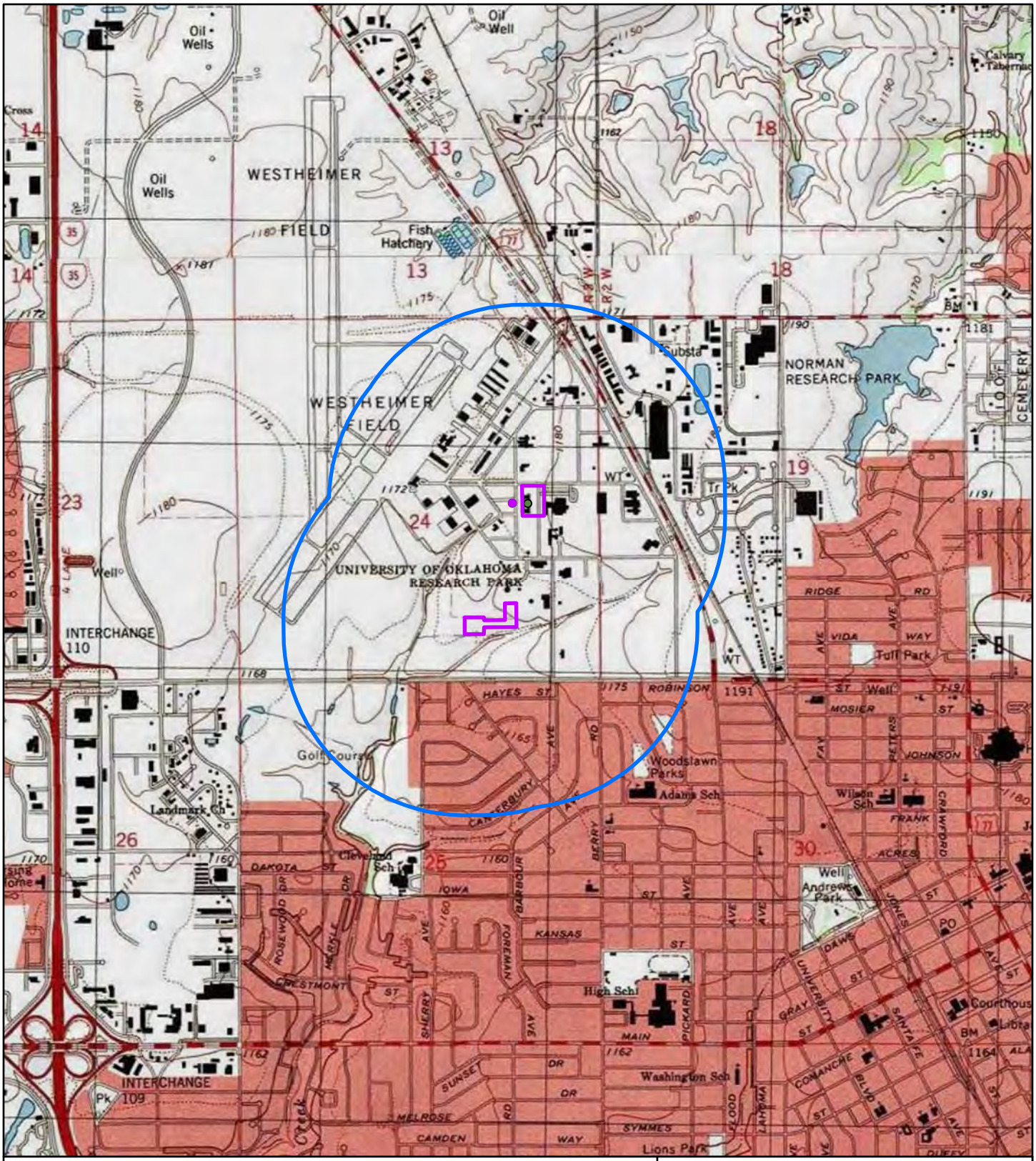
Hartley, J.D.
2018 Mount Williams: Archaeology at the World War II Norman Naval Air Station Machine Gun and Rifle Range in Noman, Oklahoma. ODOT Cultural Resources Research Report Series, No. 5. Report on file, Oklahoma Archaeological Survey, Norman, OK.

Holt, James
2022 TCNS244652:AT&T Norman_802_19B Small Cell Facility. Report on file, Oklahoma Archaeological Survey, Norman, OK.

Hartley, John
1993 Cultural Resources Survey, Cleveland County Project SH-77T, STP-14C(315), J/P 12548(04). Report on file, Oklahoma Archaeological Survey, Norman, OK.
1988 Project completed as part of US-77 construction. Report on file, Oklahoma Archaeological Survey, Norman, OK.

Nationwide Environmental Title Research, LLC (NETR)
2023 Historic Aerials by NETROnline. Accessed on 11 April 2023 at https://www.historicaerials.com/

United States Geological Survey (USGS)
1893 Norman, Oklahoma Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1925 Norman No. 2, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1936 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1965 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1983 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1995 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

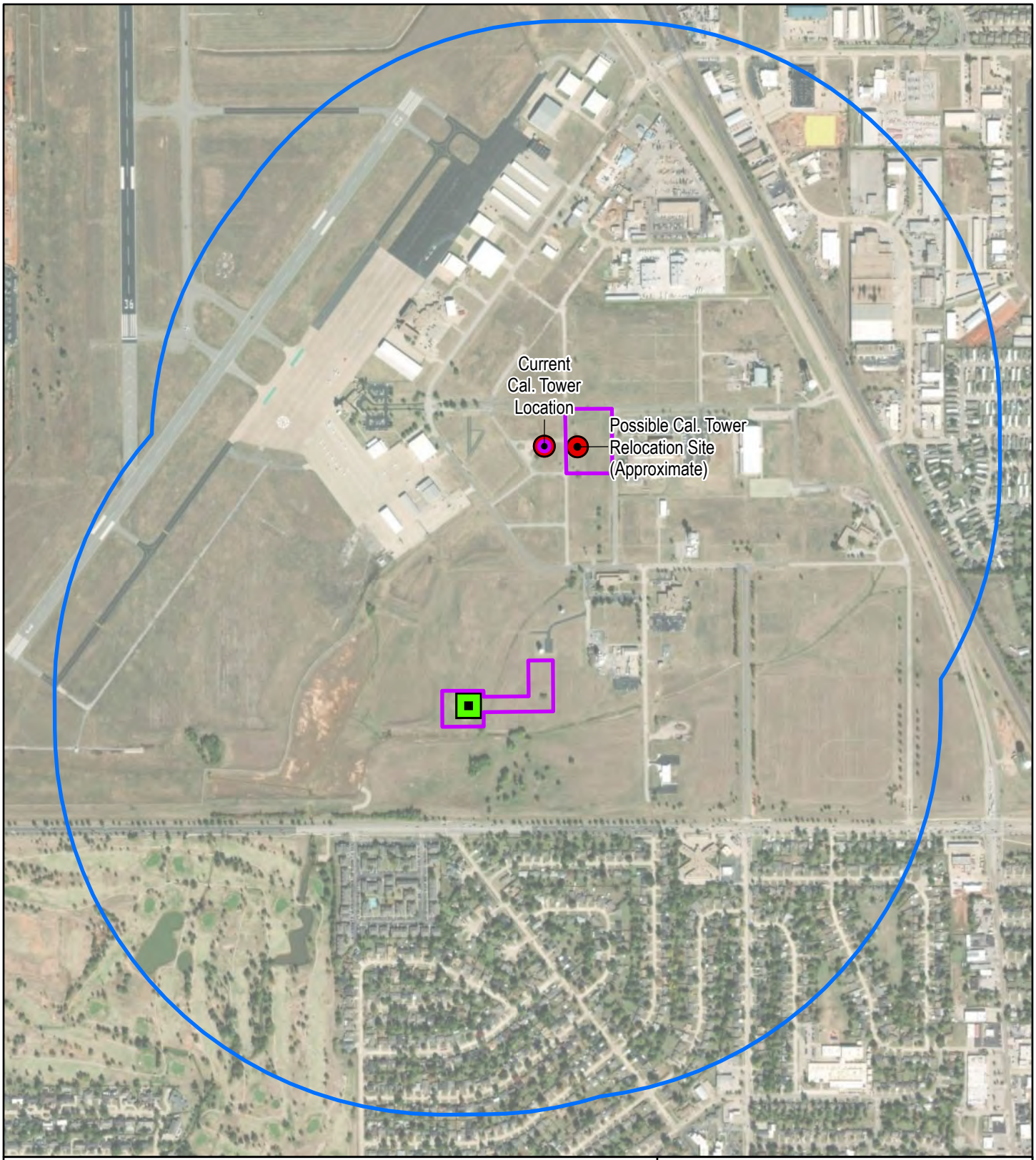
0 250 500 750 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Project Location
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 1



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)
- Calibration Tower
- Proposed PAR Location

N

0 300 600 900 ft

0 100 200 300 m

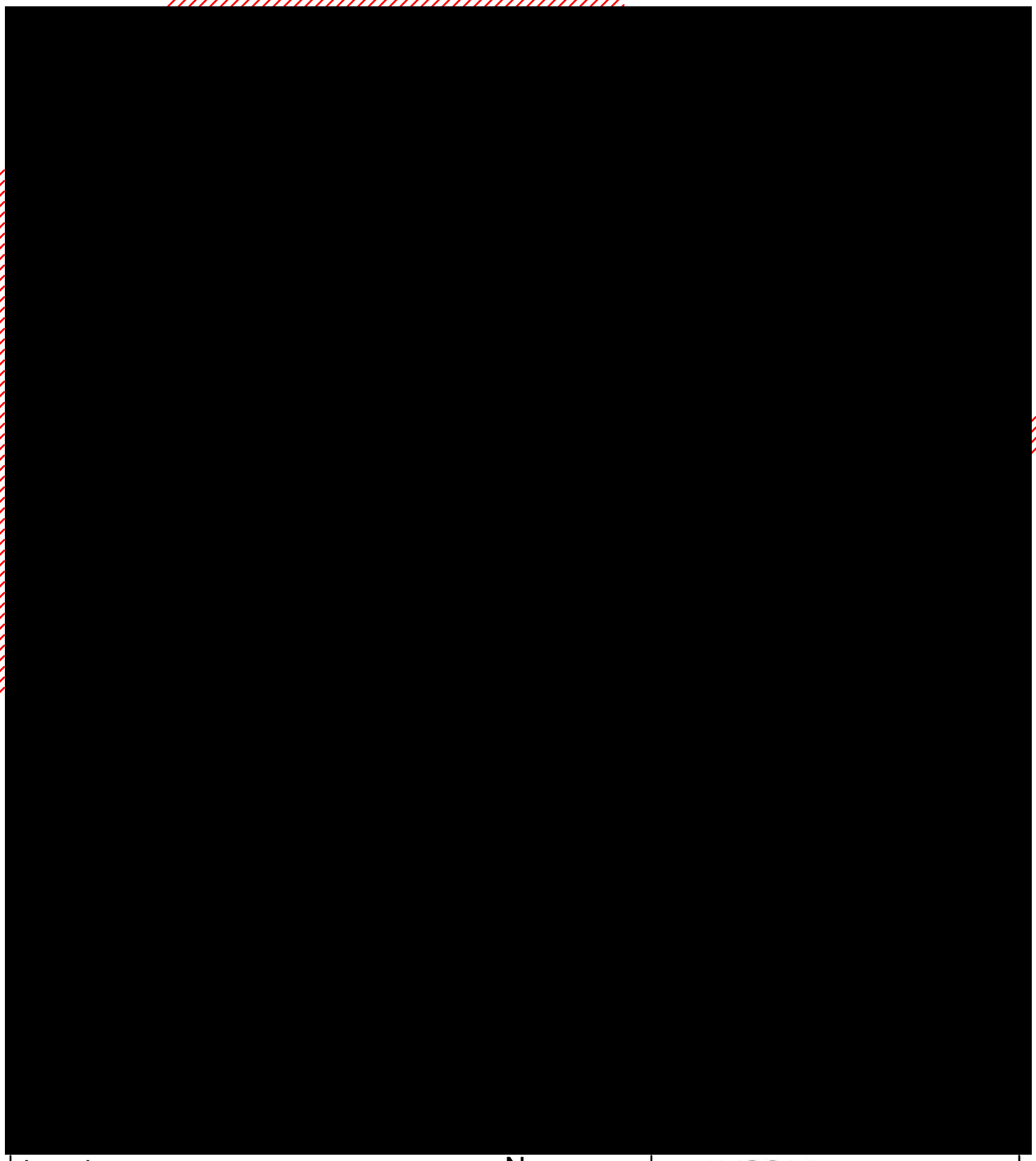
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Aerial
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/31/2023	Figure 2



Legend

- Area of Potential Effects (APE)
- Limit of Disturbance (LOD)
- Previously Recorded Archaeological Sites
- Proposed PAR Location

N

0 500 1,000 1,500 ft

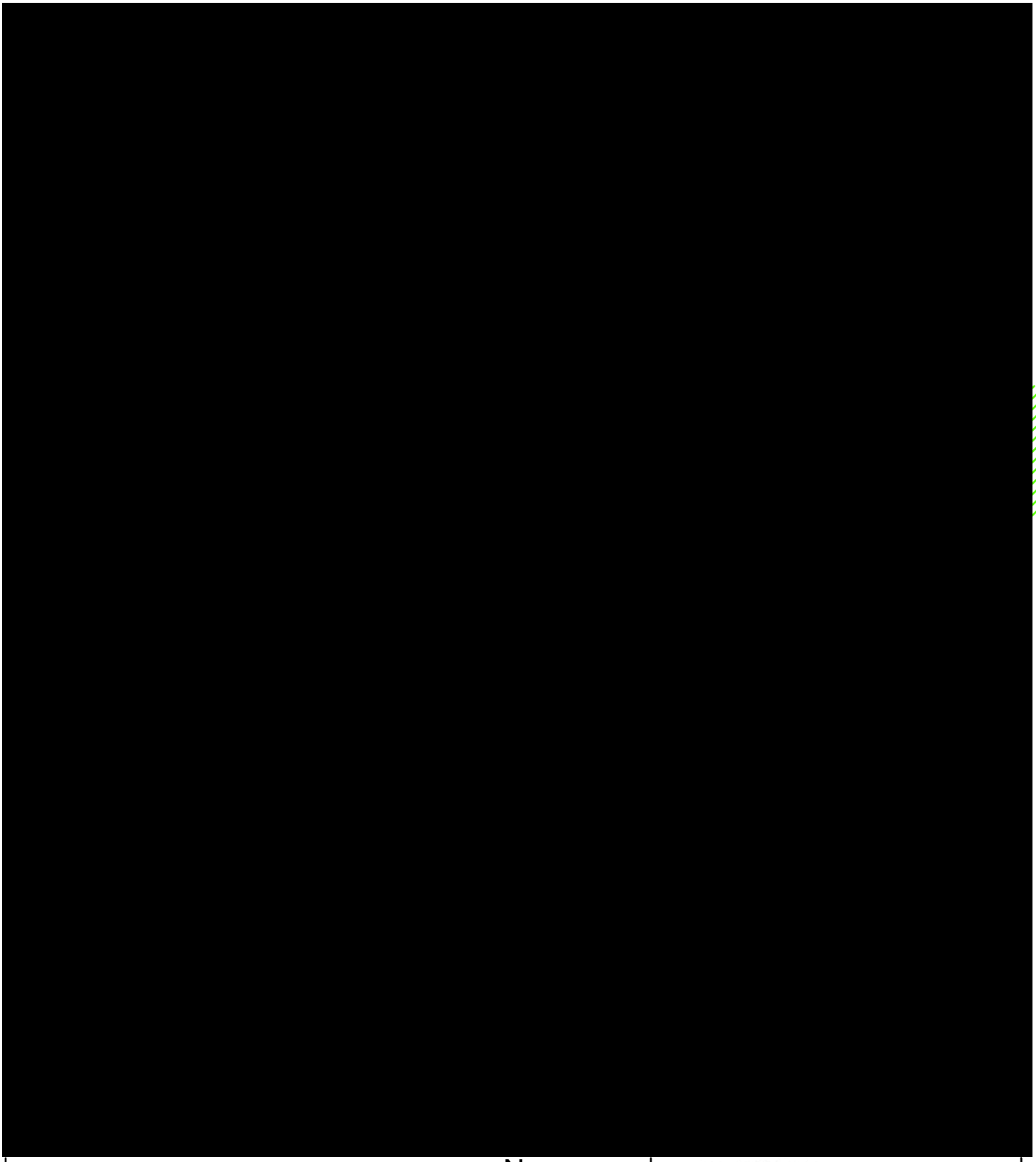
0 150 300 450 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Previously Recorded Archaeological Sites within Study Area
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 3



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)
- Previously Recorded Archaeological Surveys
- Proposed PAR Location

N

0 500 1,000 1,500 ft

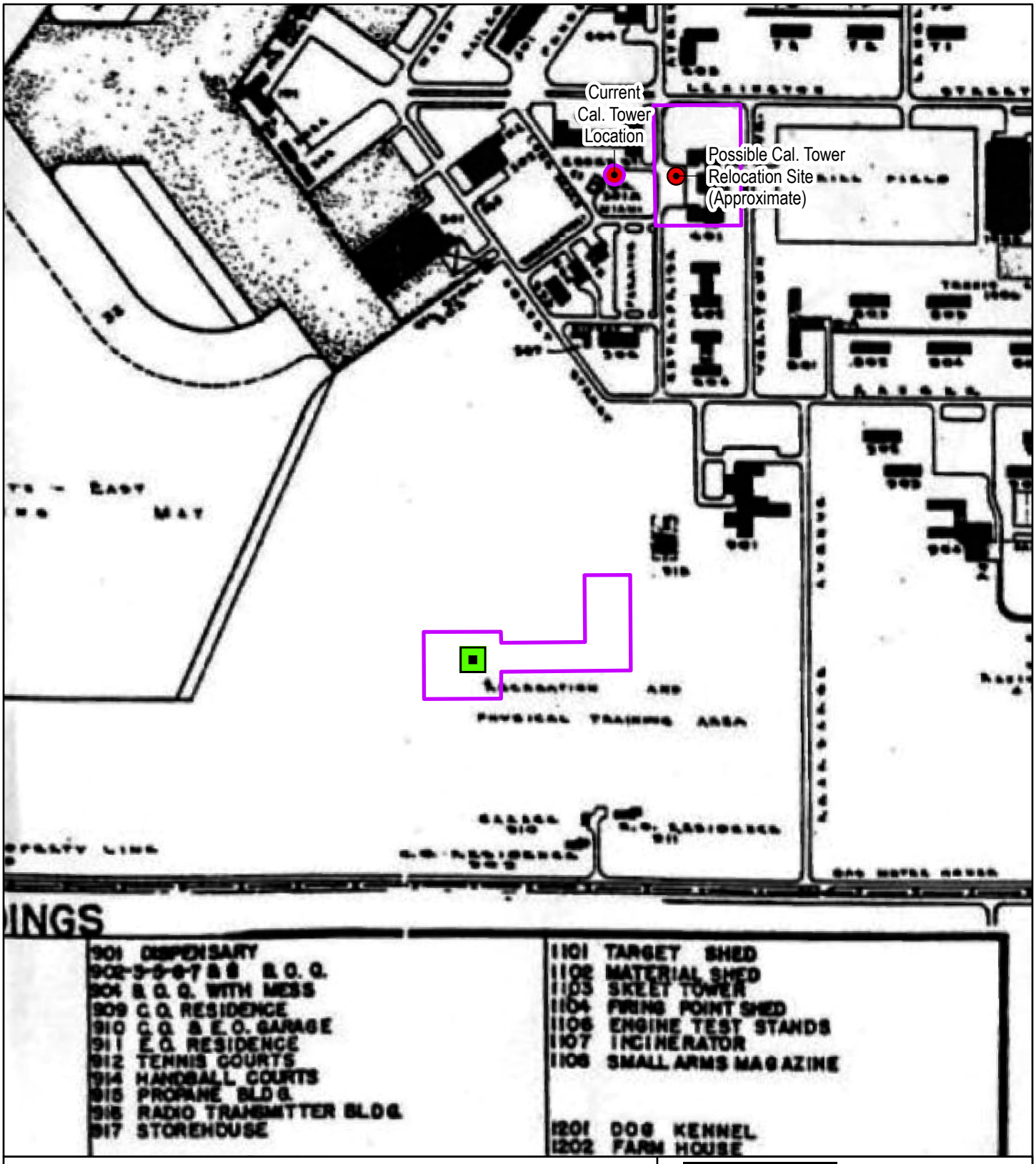
0 150 300 450 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Previously Recorded Archaeological Surveys within APE
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 4



Legend

- Area of Potential Effects (APE)
- Limit of Disturbance (LOD)
- Calibration Tower
- Proposed PAR Location

N

0 150 300 450 ft

0 50 100 150 m

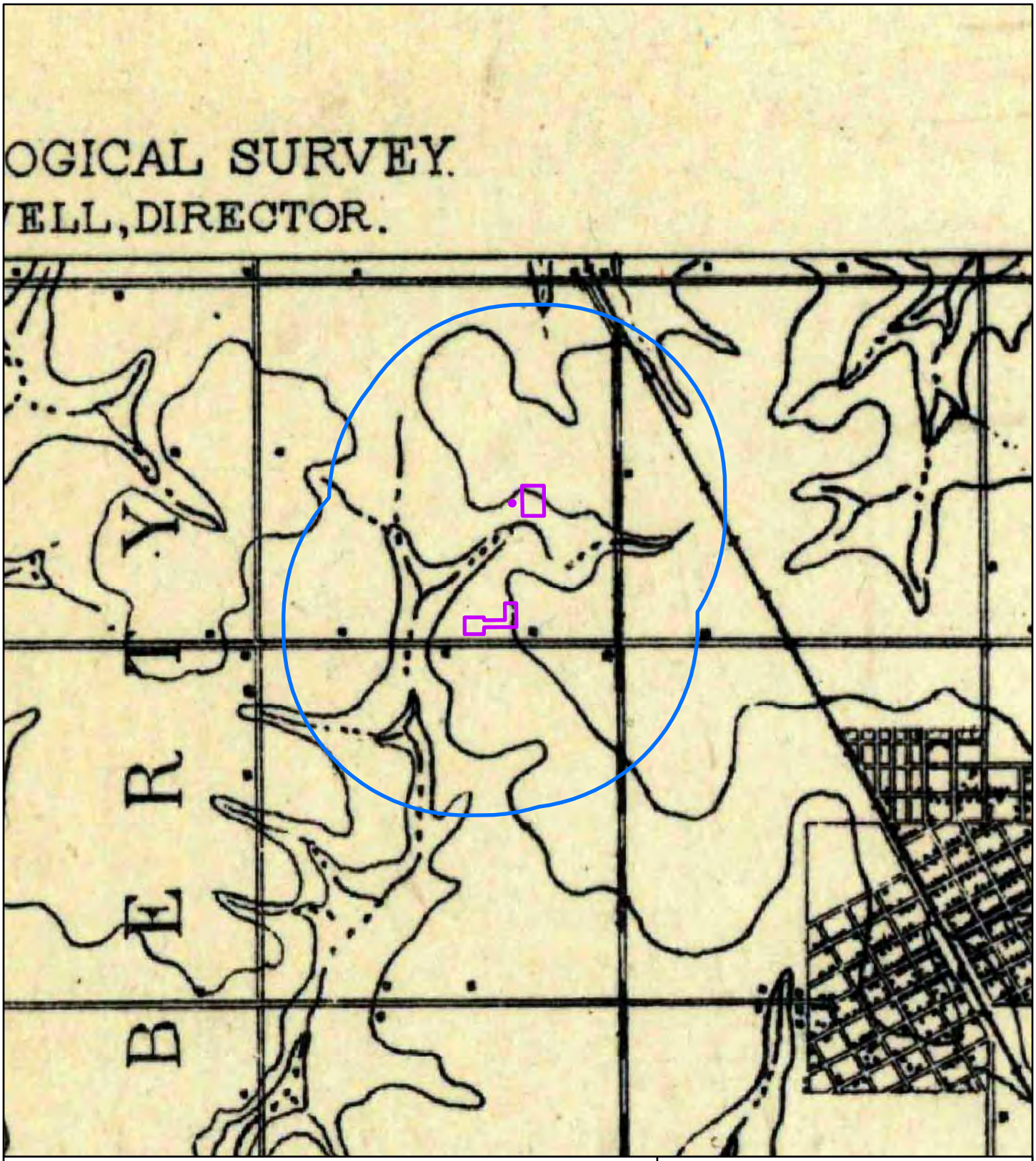
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1943
US Navy Plan of NNAS Map
NOAA Phased Array Radar Project

Source: 1943 US Navy

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 5



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

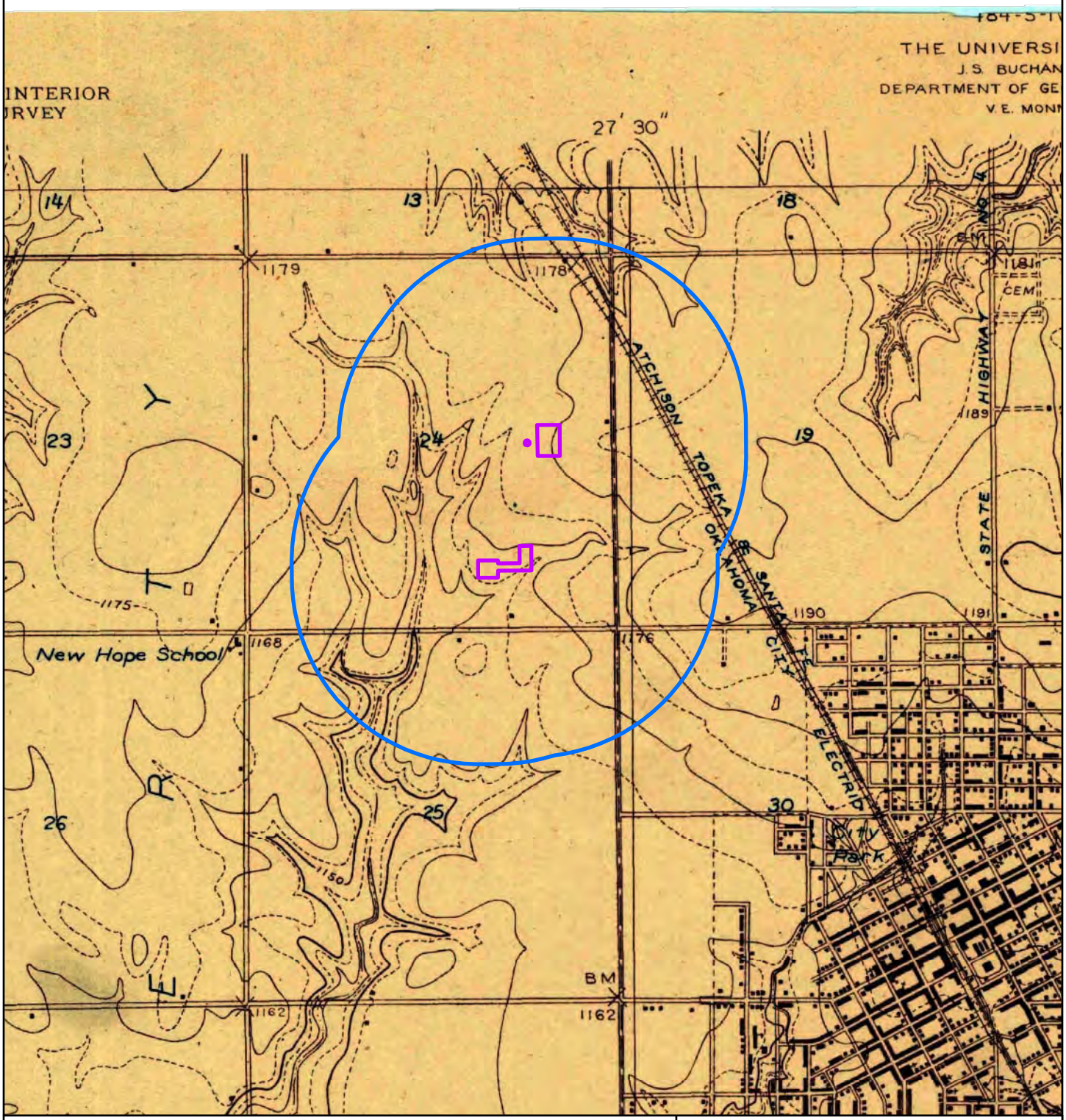
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1893
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1893

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 6



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

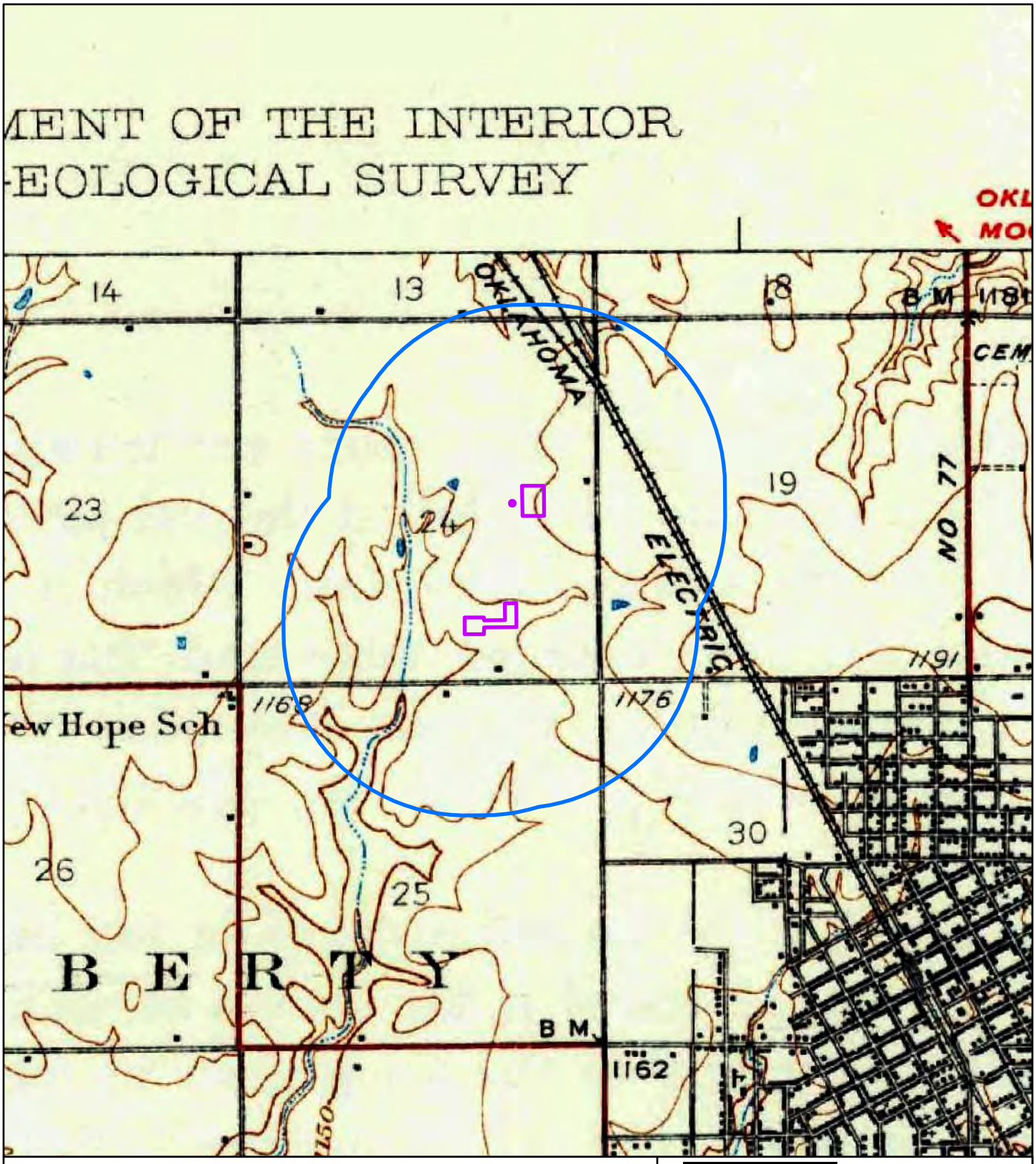
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1925
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1925

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 7



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

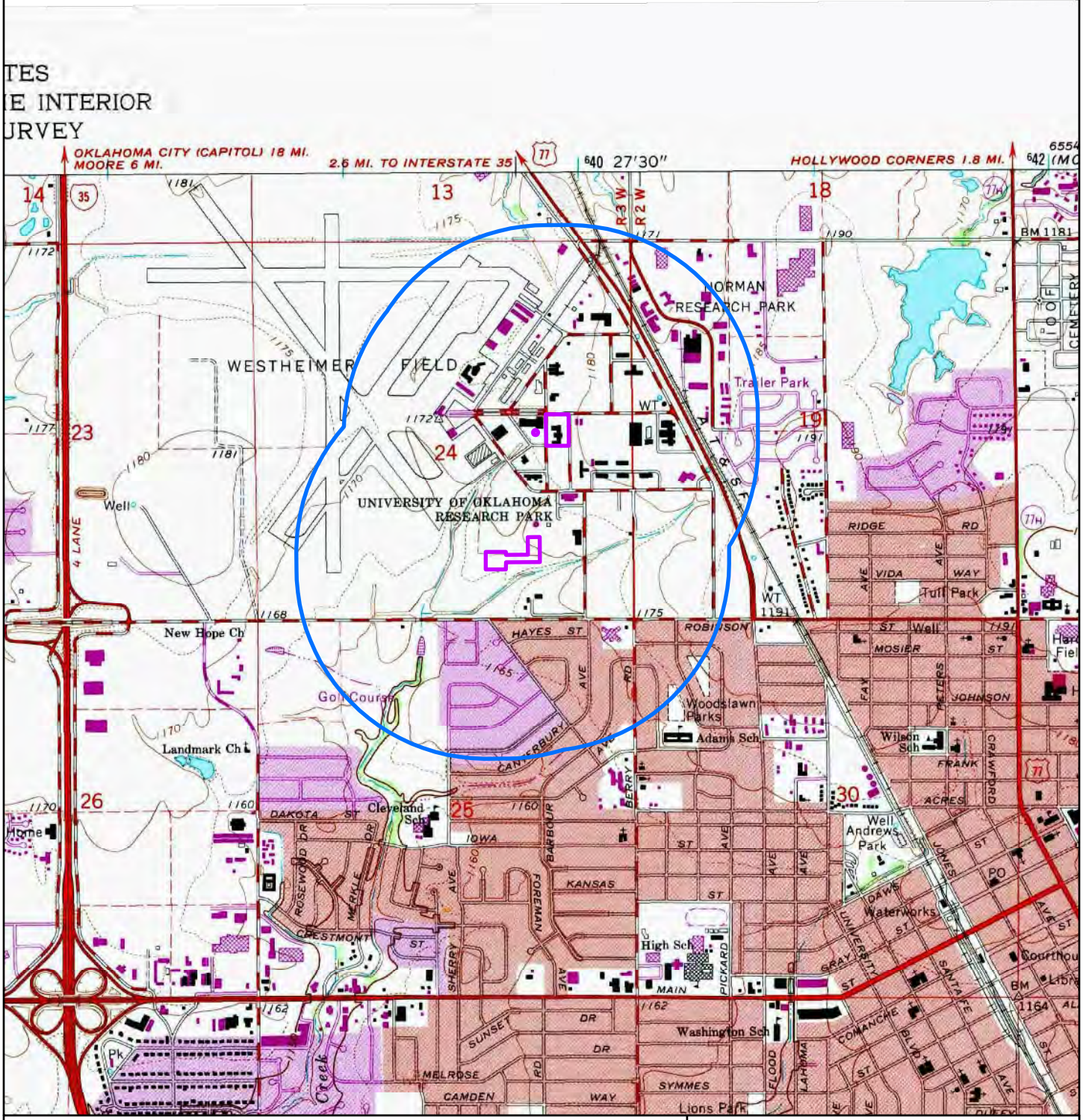
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1936
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1936

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 8



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

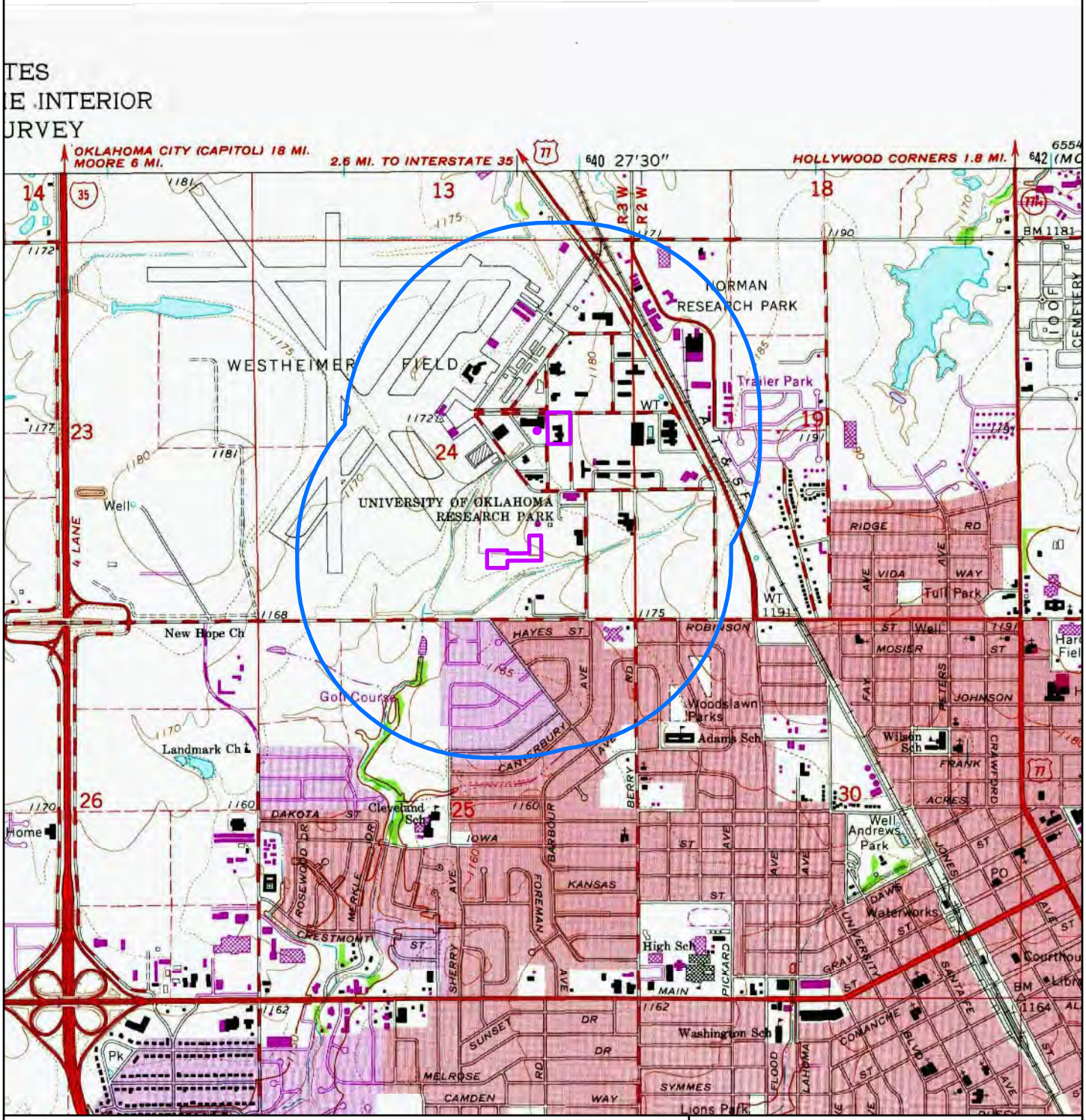
0 250 500 750 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1965
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1965

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 9



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

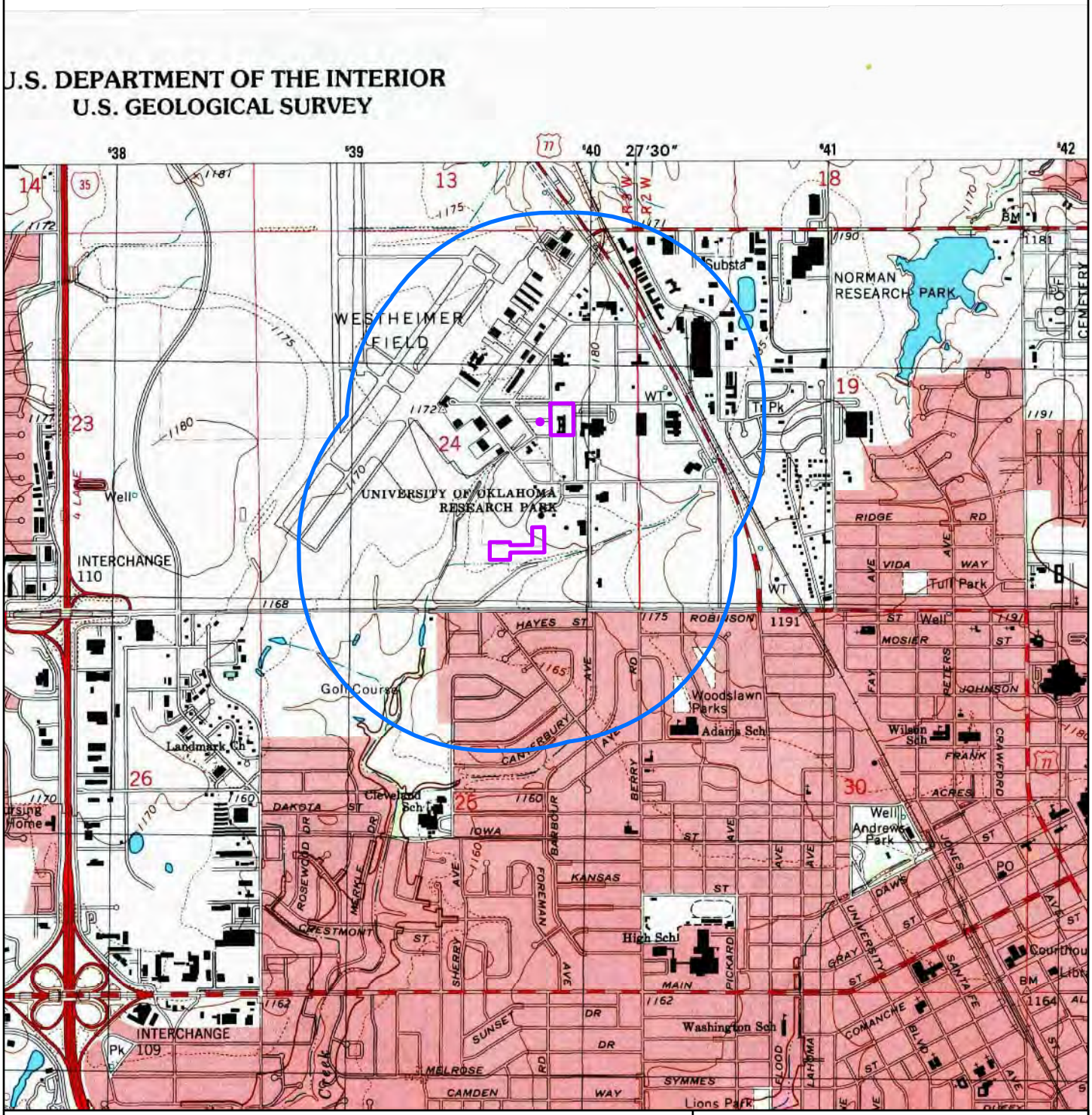
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1983
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1983

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 10



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

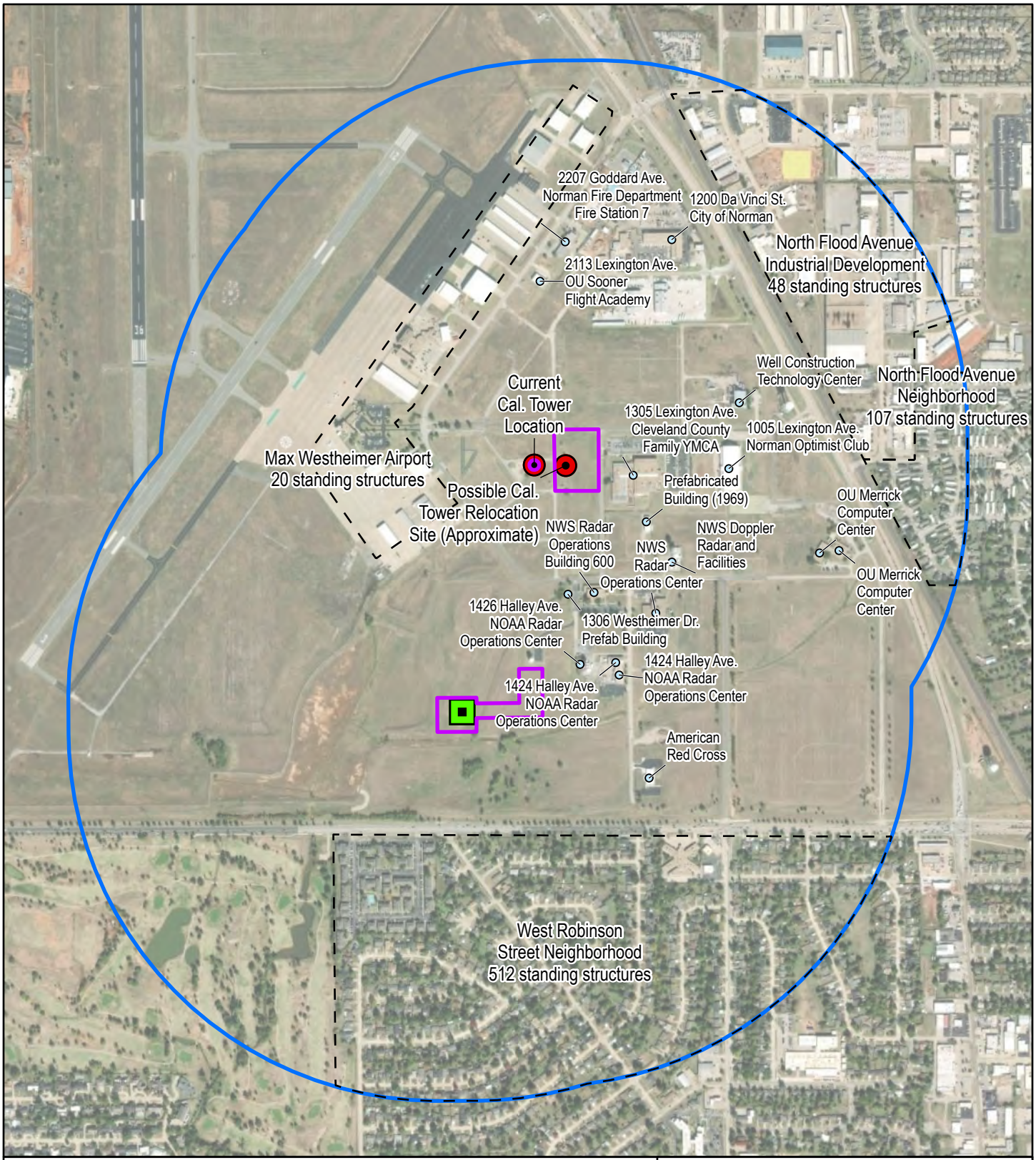
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1995
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1995

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 11



Legend

- Area of Potential Effects (APE)
- Limit of Disturbance (LOD)
- Informal Neighborhood Boundaries
- Calibration Tower
- Proposed PAR Location
- Standing Structure

N

0 300 600 900 ft

0 100 200 300 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Project Aerial
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 12

ATTACHMENT 2
Consulting/Interested Parties

Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, OK 73005
POC: Bobby Komardley, Chairman
Email: [redacted]

Cheyenne and Arapaho Tribes, Oklahoma
700 Black Kettle Blvd.
Concho, OK 73022
POC: Max Bear, THPO
Email: [redacted]

Citizen Potawatomi Nation, Oklahoma
1601 S. Gordon Cooper Drive
Shawnee, OK 74801
POC: Kelli Mosteller, THPO
Email: [redacted]

Osage Nation
627 Grandview Avenue
Pawhuska, OK 74056
POC: Andrea Hunter, Director and THPO
Email: [redacted]

Wichita and Affiliated Tribes (Wichita, Keechi, Waco, & Tawakonie), Oklahoma
P.O. Box 729
Anadarko, OK 73005
POC: Gary McAdams, THPO
Email: [redacted]

Oklahoma Historical Society
State Historic Preservation Office
800 Nazih Zuhdi Drive
Oklahoma City, OK 73105
POC: Lynda Ozan, Deputy SHPO
Email: [redacted]

Oklahoma Historical Society
State Historic Preservation Office

June 22, 2023

Dr. DaNa Carlis, Director
NOAA National Severe Storms Laboratory
Office of Oceanic & Atmospheric Research
120 David L. Boren Boulevard
Norman, OK 73072

RE: File #1797-23; NOAA Proposed Phased Array Radar & Radar Test Facility in Norman, Cleveland County, Oklahoma, including 34CL179

Dear Dr. Carlis:

We have received and reviewed the documentation submitted on the referenced project. Additionally, we have examined the information contained in the Oklahoma Landmarks Inventory (OLI) files and other materials on historic resources available in our office. We find that there are no known historic properties affected within the referenced project's area of potential effect.

In addition to our review, you must contact the Oklahoma Archeological Survey (OAS), 111 East Chesapeake, #102, Norman OK 73019-5111 (#405-325-7211, FAX #405-325-7604), to obtain a determination about the presence of prehistoric resources that may be eligible for the National Register of Historic Places. Should the OAS conclude that there are no prehistoric archaeological sites or other types of "historic properties," as defined in 36 CFR Part 800.16(l), which are eligible for inclusion in the National Register of Historic Places within the project area and that such sites are unlikely to occur, we concur with that opinion.

The OAS may conclude that an on-site investigation of all or part of the project impact area is necessary to determine the presence of archaeological resources. In the event that such an investigation reveals the presence of prehistoric archaeological sites, we will defer to the judgment of the OAS concerning whether or not any of the resources should be considered "historic properties" under the Section 106 review process. If sites dating from the historic period are identified during the survey or are encountered during implementation of the project, additional assessments by the State Historic Preservation Office will be necessary.

Should further correspondence pertaining to this project be necessary, please reference the above underlined file number. If you have any questions, please contact Kristina Wyckoff, Historical Archaeologist, at [redacted]. Thank you.

Sincerely,

Lynda Ozan
Deputy State Historic
Preservation Officer

LO:pm

800 Nazih Zuhdi Drive, Oklahoma City, OK 73105-7917
405-521-6249 | Fax 405-522-0816 | www.okhistory.org/shpo

OKLAHOMA

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH
National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072

July 13, 2023

Dr. Kary Stackelbeck
State Archaeologist
Oklahoma Archaeological Survey
University of Oklahoma
111 Chesapeake Street
Norman, OK 73019

Subject: Environmental Assessment for Proposed Phased Array Radar and Radar Test Facility in Norman, Oklahoma

Dear Dr. Stackelbeck:

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) proposes to construct and operate a Phased Array Radar (PAR) and Radar Test Facility (RTF) in Norman, Oklahoma. The project is an undertaking subject to review under the National Historic Preservation Act (NHPA) Section 106 process (54 USC § 306108).

Attachment 1 provides details of the proposed undertaking, discussion of the proposed Area of Potential Effects (APE), and results of identification and assessment of the potential of the undertaking to affect Historic Properties. Based on the information presented, we request your concurrence on the APE and a determination of "no adverse effect" as described in 36 CFR § 800.5(a)(1).

NOAA contacted the Oklahoma Historical Society (State Historic Preservation Office [SHPO]) on May 8, 2023. In their response dated June 22, 2023, they did not identify any known historic properties within the proposed APE. NOAA is now contacting your agency to obtain a determination about the presence of prehistoric resources that may be present, consistent with the Oklahoma SHPO's response.

NOAA is the federal agency for the undertaking. Rafael Mendoza, [redacted], is the local project lead. John Battle, [redacted], is the NOAA Federal Preservation Officer. Anne Delp, [redacted], is the Project Environmental Engineer.

Due to the nature and scope of this undertaking, in accordance with 36 CFR 800.2(c), NOAA sent duplicate information to American Indian tribal stakeholders, concurrent with the previous letter sent to the Oklahoma SHPO (Attachment 2). The Draft Environmental Assessment (EA) became available for public review and comment on July 13, 2023, and the comment period will

last until August 12, 2023. The Draft EA can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. We will address any comments or concerns therefrom. Please contact Ms. Anne Delp, Environmental Engineer, at [redacted] if you have any questions. We thank you for your review and assistance.

Sincerely,

CARLIS.DANA.LAMAR.1365868464

Digitally signed by CARLIS.DANA.LAMAR.1365868464
Date: 2023.07.14 12:53:02 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachments:

1. NOAA Cultural Resources Section 106 Project Review
2. Consulting/Interested Parties

ATTACHMENT 1

National Oceanic and Atmospheric Administration, Office of Oceanic and Atmospheric Research

Section 106 Project Review for Proposed Phased Array Radar and Radar Test Facility in Norman, Oklahoma

Undertaking: Construct and Operate Phased Array Radar and Radar Test Facility

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) proposes to construct and operate a phased array radar (PAR) and radar test facility (RTF) in Norman, Oklahoma (Undertaking). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL) within OAR. NOAA is evaluating various sites surrounding its existing leased space on University of Oklahoma-owned property in Norman, which already supports other radar platforms owned by NOAA NSSL.

NSSL has been investigating PAR technology since 2003 to facilitate improved weather warnings and to determine the suitability of PAR in replacing the existing Weather Surveillance Radar – 1988 Doppler (WSR-88D) network. PAR is a promising technology that has potential to improve warnings for various types of severe weather, primarily through more rapid volumetric updates and adaptive scanning capabilities. Previous PAR development and research has been conducted in conjunction with other federal agencies concerned with aviation and surveillance applications, but NOAA is now ready to validate this technology for use in weather surveillance by testing exclusively for this purpose.

Due to NOAA's intent to test the PAR's meteorological applications and assess the capability of PAR to replace WSR-88D, NOAA proposes to procure a rotating planar dual-polarization PAR system dedicated to weather surveillance. The purpose of the Undertaking, therefore, is to enable NSSL to conduct research on the types of advanced scans that this technology would enable and investigate whether a rotating planar dual-polarization PAR system would be possible to replace the WSR-88D. The Undertaking is needed to determine the functionality of the PAR system exclusively related to weather surveillance. NSSL needs to conduct studies to determine the benefits, impacts, and capabilities of the PAR system as it relates to improved weather observations and severe weather warnings.

Project Details:

The Undertaking includes the acquisition of a property lease and construction of the RTF, including the PAR antenna and associated facilities, operation and maintenance of the RTF, and possible relocation of an existing calibration tower to a location east of Priestly Avenue from the current location, if necessary (**Figure 1** and **Figure 2**). The center of the PAR antenna would be elevated from ground level by approximately 15 meters (49 feet), with a resulting structure of no more than 30 meters (98 feet) in height. The RTF facility would be encompassed by a perimeter chain link fence 3 meters (9.8 feet) in height placed at least 10 meters (33 feet) from the structure. A new 6,000-square-foot paved parking lot would also be constructed adjacent to the facility, connected to the existing NOAA facilities on-site via a new paved access road approximately 200 to 240 meters (656 to 787 feet) in length and 7 meters (23 feet) wide. New utilities would be installed at the site and connected to existing utilities. The calibration tower currently reaches a maximum height of 150 feet (46 meters) and would maintain its current height if relocated.

Steps Taken to Identify the Area of Potential Effects (APE):

The APE for the Undertaking (36 Code of Federal Regulations (CFR) 800.16(d)) consists of the limits of disturbance (LOD) for all possible construction activities in addition to a 0.5-mile buffer around the LOD

to account for visual effects. The maximum potential LOD covers approximately 6.9 acres for a variety of ground disturbing activities including construction of new facilities, modification of existing facilities requiring ground disturbance, underground utility work, roadway modification, surface grading, and other activities (**Figure 2**).

During construction of the Undertaking, there will be temporary visual (equipment and disturbance), audible (noise), and potentially atmospheric (dust and exhaust fumes) effects. Permanent direct effects include the construction of a new RTF and the possible relocation of an existing calibration tower, if needed.

Potential for Impacts to Historic Properties:

The RTF will be constructed to not exceed a maximum height of 30 meters (98 feet). Several other radar facilities are located within the immediate area, including a WSR-88D radar tagged as KCRI operated by the NOAA National Weather Service (NWS) Radar Operations Center, along with a WSR-88D radar tagged as KOUN and the Advanced Technology Demonstrator (ATD) radar, both operated by NSSL. KCRI was constructed to a maximum base height of 30 meters (98 feet) and KOUN to a maximum base height of 20 meters (66 feet). As such, construction of the RTF would represent a similar impact to the surrounding environment as the two previously constructed radar facilities. The Undertaking may also include the relocation of the existing calibration tower located approximately 0.2 miles north of the proposed RTF location, immediately south of Galileo Street. If necessary, the calibration tower would be relocated to a location east of the current tower location, on the east side of Priestly Avenue. The final location for the possible relocated calibration tower has not yet been determined, and as such, an area of approximately 3.2 acres has been identified as the broadest possible area the tower may be relocated within. This possible relocation area is bounded to the north by Lexington Avenue, to the west by Priestley Avenue, to the east by Halley Avenue, and to the south by a line parallel to Wright Place extending east from its intersection with Priestley Avenue to Halley Avenue.

To assess the potential of the Undertaking to impact historic properties, NOAA reviewed research and investigations to identify historic properties within the APE and determine the potential effects, if any, of the Undertaking. According to a cultural resources record review conducted by the Oklahoma Archaeological Survey (OAS), two previously recorded archaeological sites (34CL179 and an unnamed site associated with survey FY23-0943) are located within the Project APE (**Figure 3**). Additionally, two previously recorded cultural resource surveys (FY23-0943 and Legacy Survey 2,992) have been completed within or immediately adjacent to the APE (**Figure 4**). Survey FY23-0943 is a recently completed survey, with no attribution data available for type/scope of project or surveyor/report author information. One archaeological site was identified as a result of this survey, and no additional information is available. Legacy Survey 2,992 was a pedestrian survey conducted in 1988 by the Oklahoma Department of Transportation (ODOT) in preparation for construction of U.S. Route 77 (Hartley 1988). No sites were identified as a result of this survey.

Site 34CL179 – "Mount Williams, Norman Naval Air Station"– is located within the LOD. The official designation of this facility is the Naval Air Technical Training Center Norman (NATTC Norman). The site boundary encompasses the portion of the APE north of West Robinson Street and west of North Flood Avenue and extends outside of it. The site is classified as an historic period archaeological site and includes a WWII-era facility constructed in 1942-1943. The site was first surveyed in 1993 in preparation for the construction of U.S. Route 77 (Hartley 1993). A component of the larger site, the large earthen berm known as Mount Williams – located approximately 0.5 miles west of the APE – was recommended eligible for listing in the National Register of Historic Places (NRHP). Archaeological mitigation was conducted of the Mount Williams component by ODOT in 2005-2006 (Hartley 2018). Mount Williams was demolished following the mitigation work. The area is now the location of commercial development.

According to the site files for 34CL179, NATTC Norman was established in 1942 as a naval flight training center, co-located with the University of Oklahoma's Westheimer Airport. Military usage of NATTC Norman declined following the end of World War II and would be briefly reactivated between 1952 and 1959 as a result of the Korean War. Following the Korean War, the base was turned back over to the University of Oklahoma to be used as a civilian airfield and training facility. No structures or features related to NATTC Norman have been identified within the APE via previous cultural resource surveys. Both the 1993 and 2005-2006 surveys focused primarily on the area immediately around Mount Williams.

Included within the 1993 and 2018 reports on archaeological excavations at NATTC Norman is a figure depicting the original 1943 US Navy plan map of the facility. This plan depicted buildings, runways, Mount Williams, and machine gun and rifle ranges associated with NATTC Norman. One structure is located within the LOD on the 1943 plan, which is discussed in more detail below (**Figure 5**).

No structures are indicated within the LOD of the RTF on USGS Topographic Quadrangle Maps of Norman, Oklahoma for the years 1893, 1925, 1936, 1965, 1983, and 1995 (**Figures 6** through **11**). Additionally, historic aerial imagery available from 1957 to 2019 indicates no structures within the RTF LOD (NETR 2023). A structure is present within the LOD of the proposed new location of the calibration tower. This structure is indicated on the 1943 US Navy plan and is also indicated on 1965 and 1995 USGS topographic maps of the area. The structure, located at 1734 Halley Avenue, is identified as 'Building 601' on the US Navy plan. Historic aerial imagery indicates a structure in this location from at least 1957. The structure was demolished sometime between 2010 and 2013.

A total of 704 structures are located within the APE, approximately 512 of which are located within a neighborhood development of single-family domestic structures south of West Robinson Street (**Figure 12**). The northern boundary of the neighborhood is approximately 750 feet south of the RTF LOD. No formal historic structure inventory survey has been conducted for this neighborhood, which was first laid out east of North Berry Road sometime between 1936 and 1956. More development would follow by 1962, with more houses erected north of Woods Avenue by that year. Construction of more single-family houses north of Denison Drive would occur by 1969, and by 1975 the neighborhood would be fully settled to the extent that it is today.

A neighborhood is located east of North Flood Avenue in the easternmost portion of the APE, of which approximately 107 structures are located within the APE. The western boundary of the neighborhood is located approximately 0.4 miles east of the proposed calibration tower relocation LOD. The neighborhood was first laid out sometime between 1969 and 1975. The neighborhood consists primarily of manufactured homes, with a few larger industrial and commercial structures located west and north of the neighborhood.

A development of primarily industrial buildings and warehouses – approximately 48 of which are in the APE – began to take shape immediately north and west of the North Flood Avenue neighborhood sometime between 1962 and 1969, as indicated by historic aerial imagery. Prior to this development, the land was primarily farmland. Only two structures fronting North Flood Avenue were in place by 1969, with the remainder of structures along North Flood Avenue and West Rock Creek Road having been constructed by 1975. Construction would continue eastward with additional structures appearing east of the core development on historical aerial imagery between 1981 and 2008, by which point the neighborhood would resemble its current built environment.

Approximately 20 structures associated with Max Westheimer Airport are located in the western portion of the APE. Most structures within the Airport were constructed between 1975 and 1981, as indicated by historic aerial imagery. Three small aircraft hangars located in the northern portion of the airport appear to have been constructed between 1969 and 1975.

A structure located at 2113 Goddard Avenue is currently in operation as the University of Oklahoma Sooner Flight Academy. The structure has been in this location since at least 1981. Immediately northeast of the Flight Academy at 2207 Goddard Avenue is the Norman Fire Department – Fire Station 7. This structure was constructed sometime between 1995 and 2003, as indicated by historic aerial imagery.

Several structures in the central portion of the APE are operated by either the University of Oklahoma, NOAA and related offices, or other private businesses. One structure is located approximately 1,000 feet east of the RTF LOD. The structure, located at 1205 Halley Avenue, first appears in aerial imagery beginning in 1981 and is currently operated by the American Red Cross for Military and Veteran Services.

Two structures are indicated in the central portion of the APE on the west side of Halley Avenue in 1965. These structures are also present on the 1983 and 1995 USGS topographic maps. The location of 1424 Halley Avenue belongs to the NWS Radar Operations Center. The location of 1426 Halley Avenue belongs to NSSL.

A structure is indicated in the northern portion of the APE on the south side of Westheimer Drive on the 1965 USGS Topographic Map. A structure is also present in this location in 1983 and 1995 and likely represents the standing structure at 1306 Westheimer Drive currently in use as the NWS Radar Operations Center Building 600. A prefabricated structure located immediately west of Building 600 first appears in historic aerial imagery in 2003. A structure is located immediately east of Building 600 on the 1995 USGS topographic map; this structure is not present on the 1983 map, and likely represents the standing structure at 1200 Westheimer Drive and in use as the NWS Radar Operations Center. Several other small, ancillary buildings are indicated in the vicinity of these two structures on the 1995 map that are not present on the 1983 map. Northeast of this structure – on the north side of Westheimer Drive – is a radar antenna and associated structures. This collection of buildings first appears on historic aerial imagery in 2003. A prefabricated building located northwest of the radar antenna on a paved driveway extending north from Westheimer Drive appears on historic aerial imagery in 1969.

The City of Norman operates a large facility located at 1300 Da Vinci Street in the northern portion of the APE. This structure is indicated on historic maps as far back as 1965, and in historic aerial imagery to at least 1957. There is no structure indicated in this location on the 1943 US Navy plan or on the 1936 USGS topographic map.

The structure at 1005 Lexington Avenue – a former military hangar currently utilized as basketball courts operated by the Norman Optimist Club – has been present in its current location since at least 1943, as indicated on the US Navy plan of that year. While the structure appears to have undergone extensive modifications in the years since, the footprint of the building is essentially the same and likely represents the same building present in 1943. A large building immediately west of the Optimist Club at 1350 Lexington Avenue is occupied by the Cleveland County Family YMCA and was constructed sometime between 1981 and 1995.

A structure is located north of the Norman Optimist Club on the north side of Lexington Avenue. Google Maps labels the structure, “Well Construction Technology Center” and the structure has appeared in this location since 2003 (Google 2023).

The University of Oklahoma Merrick Computer Center is located at the corner of Westheimer Drive and Newton Drive in the east-central portion of the APE. The original structure was built at this location sometime between 1957 and 1962, with a substantial addition added between 1969 and 1975. The structure is not indicated on the 1943 US Navy plan.

Very few of the original structures indicated on the 1943 NNAS plan within the APE are still standing today. The Norman Optimist Club building is one of those, in addition to a small hangar located at 2113 Goddard Avenue and currently under operation as the University of Oklahoma Sooner Flight Academy. A structure is present in this location on the 1943 US Navy plan and both historic maps and aerial imagery to the present day. The vast majority of the NATTC Norman structures have been demolished since the land was reacquired by the University of Oklahoma, and there are no known components of NATTC Norman structures located within the LOD.

Determination of Effects:

Based on the above analysis, NOAA proposes a determination of "*no adverse effect"* as described in 36 CFR § 800.5(d)(1). Though the Undertaking may have an effect on an historic property, none of the characteristics which contribute to the property's NRHP eligibility will be significantly affected.

Portions of one previously recorded archaeological site (34CL179) are located within the APE. The site was first identified in 1993 and archaeological mitigation was conducted for a portion of the site in 2005-2006. The archaeological site boundaries were drawn to include the entirety of the NATTC Norman property, an area encompassing approximately 1,183 acres. Though some individual components of the site were recommended as eligible for inclusion in the NRHP, those components are displaced by >0.5 miles from the APE. Though the Oklahoma State Historic Preservation Office determined the entire site to be eligible in 1993, numerous structures have been built within the site boundaries since that date. Mount Williams was demolished following archaeological mitigation in 2005-2006. While Building 601, associated with NATTC Norman, once stood within the area proposed for the possible relocation of the calibration tower, this building was mechanically demolished ca. 2010-2013, and it is unlikely that any intact archaeological deposits remain.

Additionally, no structures or features relating to the time period of interest of 34CL179 were identified within the LOD during the 1993 or 2005-2006 surveys. No map-documented structures have been identified within the LOD of the RTF, and no structures appear in the area of the RTF on the 1943 US Navy plan of NATTC Norman. Although the LOD of the RTF is located in close proximity to two ephemeral headwater streams, and the landscape does not appear to have been extensively modified in recent history, no documented Precontact period archaeological sites have been identified within the APE. The area has been determined to have a low potential to contain Precontact period sites due to the distance from a perennial water source.

The construction of the RTF and the potential relocation and construction of the calibration tower will have no adverse effect on above-ground historic properties in the APE. The RTF (and potentially the calibration tower) are facilities in-line with the built environment of the APE and will have no impacts on the existing character of the APE. If relocation of the calibration tower is required, the overall impact to the viewshed will be minimal as the calibration tower will only be moving approximately 200-250 feet east of its current location. There are no known historic resources within the LOD of the existing calibration tower or the proposed RTF LOD.

Should potential impacts to historic properties be identified in the future due to a change in the submitted scopes of work, proposed locations, or due to activities proposed beyond the scope of the Undertaking, follow-up Section 106 consultation will occur as required.

Due to the nature and scope of this Undertaking, in accordance with 36 CFR 800.2(c), NOAA has sent project review documentation to the Oklahoma State Historic Preservation Officer, and affiliated Native American tribes, and will address any comments or concerns therefrom (Attachment 2 to the transmittal letter for the present attachment).

References

Google
2023 "Google Maps location of Project Area". Accessed 15 May 2023 at https://goo.gl/maps/MVwfyMKSYo27eHxc8

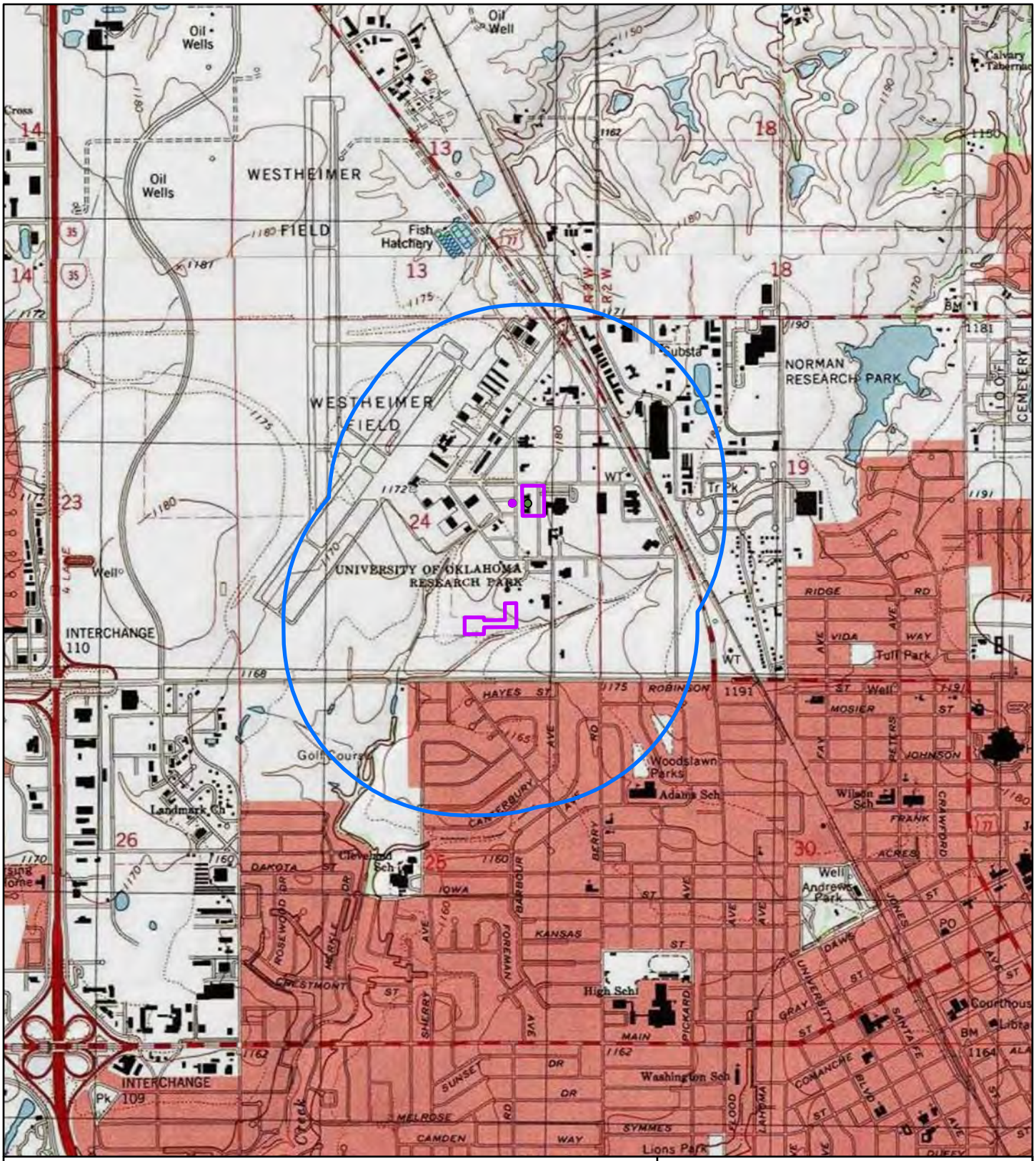
Hartley, J.D.
2018 Mount Williams: Archaeology at the World War II Norman Naval Air Station Machine Gun and Rifle Range in Noman, Oklahoma. ODOT Cultural Resources Research Report Series, No. 5. Report on file, Oklahoma Archaeological Survey, Norman, OK.

Holt, James
2022 TCNS244652:AT&T Norman_802_19B Small Cell Facility. Report on file, Oklahoma Archaeological Survey, Norman, OK.

Hartley, John
1993 Cultural Resources Survey, Cleveland County Project SH-77T, STP-14C(315), J/P 12548(04). Report on file, Oklahoma Archaeological Survey, Norman, OK.
1988 Project completed as part of US-77 construction. Report on file, Oklahoma Archaeological Survey, Norman, OK.

Nationwide Environmental Title Research, LLC (NETR)
2023 Historic Aerials by NETROnline. Accessed on 11 April 2023 at https://www.historicaerials.com/

United States Geological Survey (USGS)
1893 Norman, Oklahoma Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1925 Norman No. 2, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1936 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1965 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1983 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.
1995 Norman, Oklahoma 7.5-minute Topographic Quadrangle Map. United States Department of the Interior, Reston, VA.



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

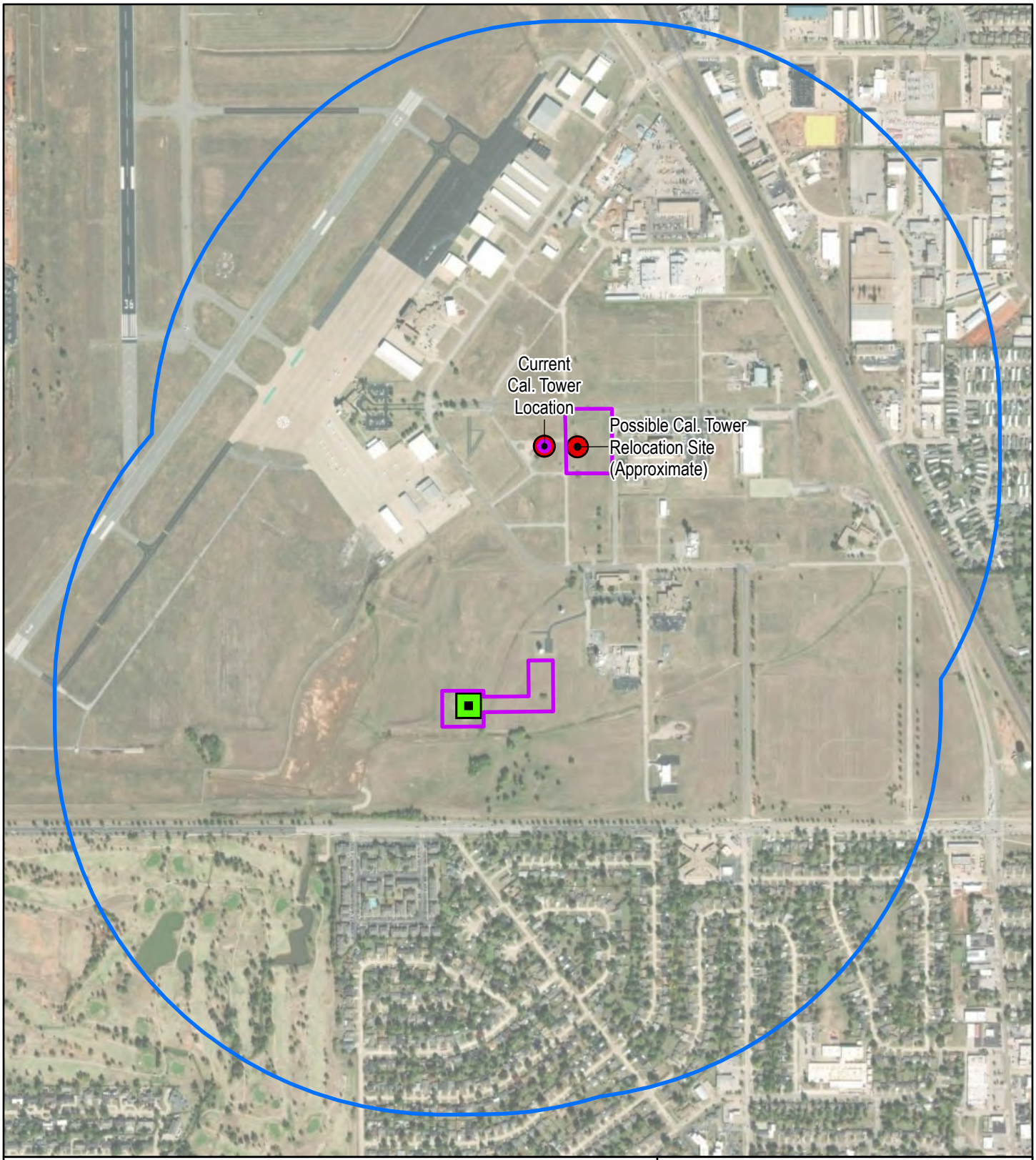
0 250 500 750 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Project Location
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 1



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)
- Calibration Tower
- Proposed PAR Location

N

0 300 600 900 ft

0 100 200 300 m

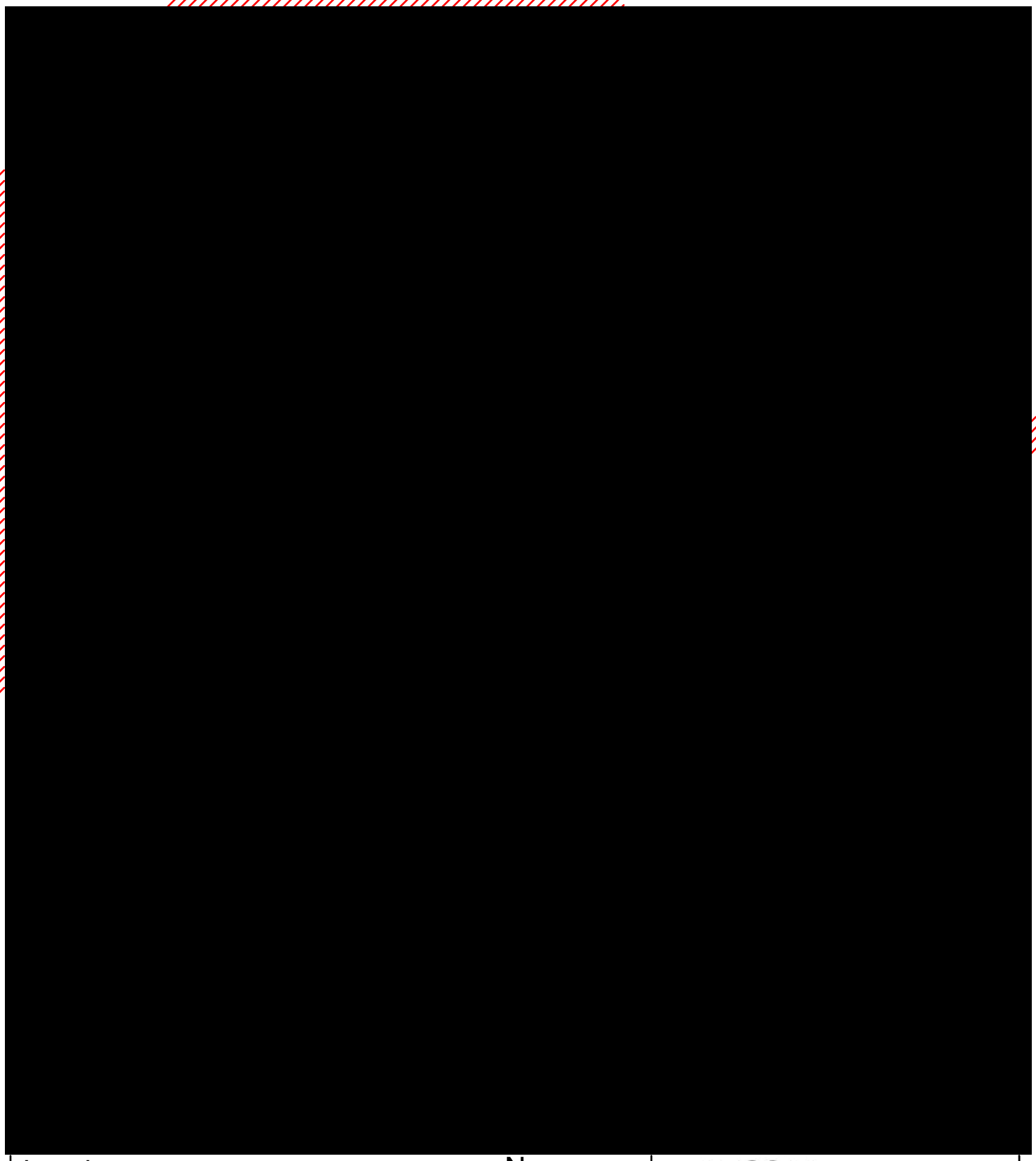
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Aerial
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/31/2023	Figure 2



Legend

- Area of Potential Effects (APE)
- Limit of Disturbance (LOD)
- Previously Recorded Archaeological Sites
- Proposed PAR Location

N

0 500 1,000 1,500 ft

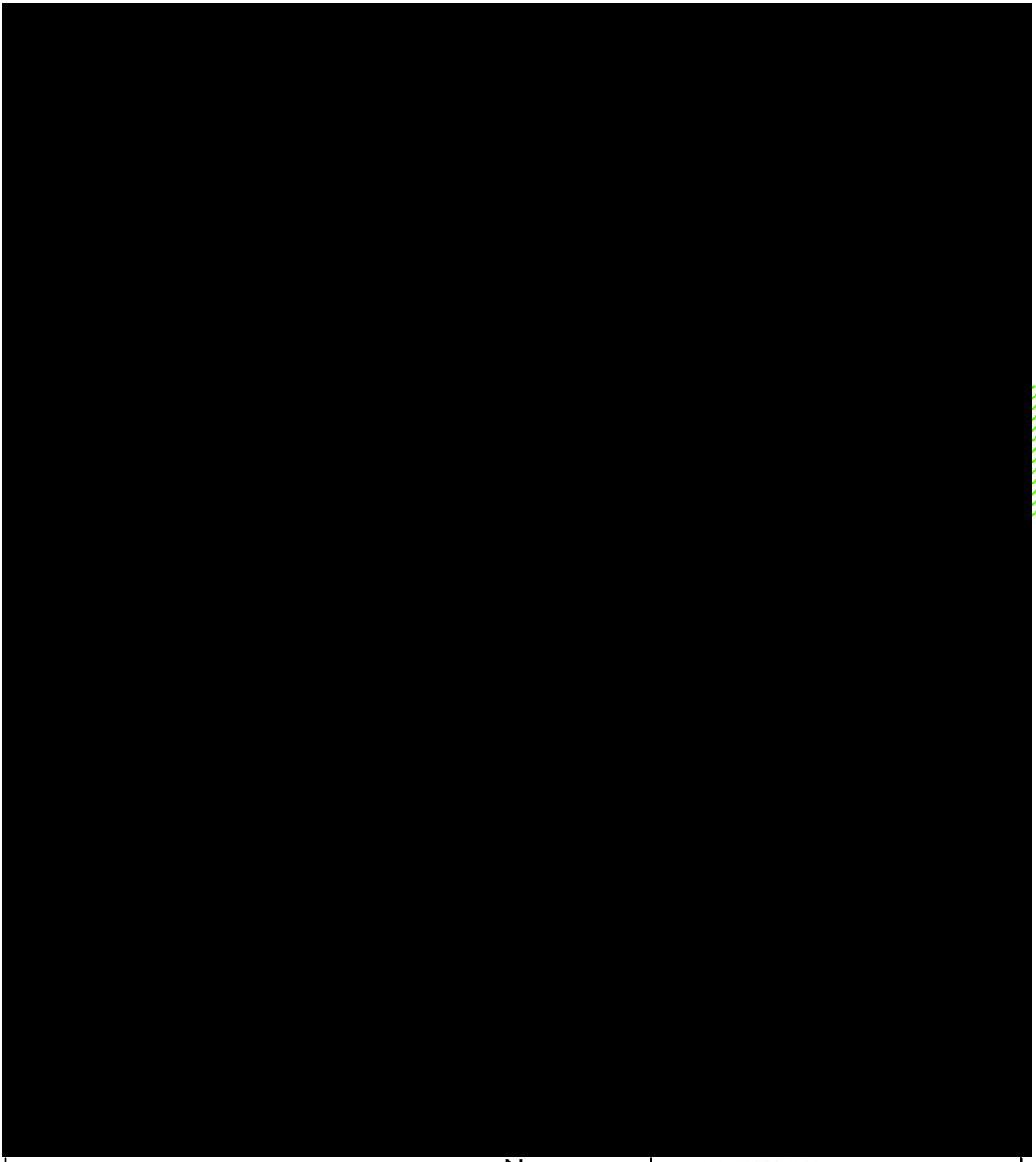
0 150 300 450 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Previously Recorded Archaeological Sites within Study Area
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 3



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)
- Previously Recorded Archaeological Surveys
- Proposed PAR Location

N

0 500 1,000 1,500 ft

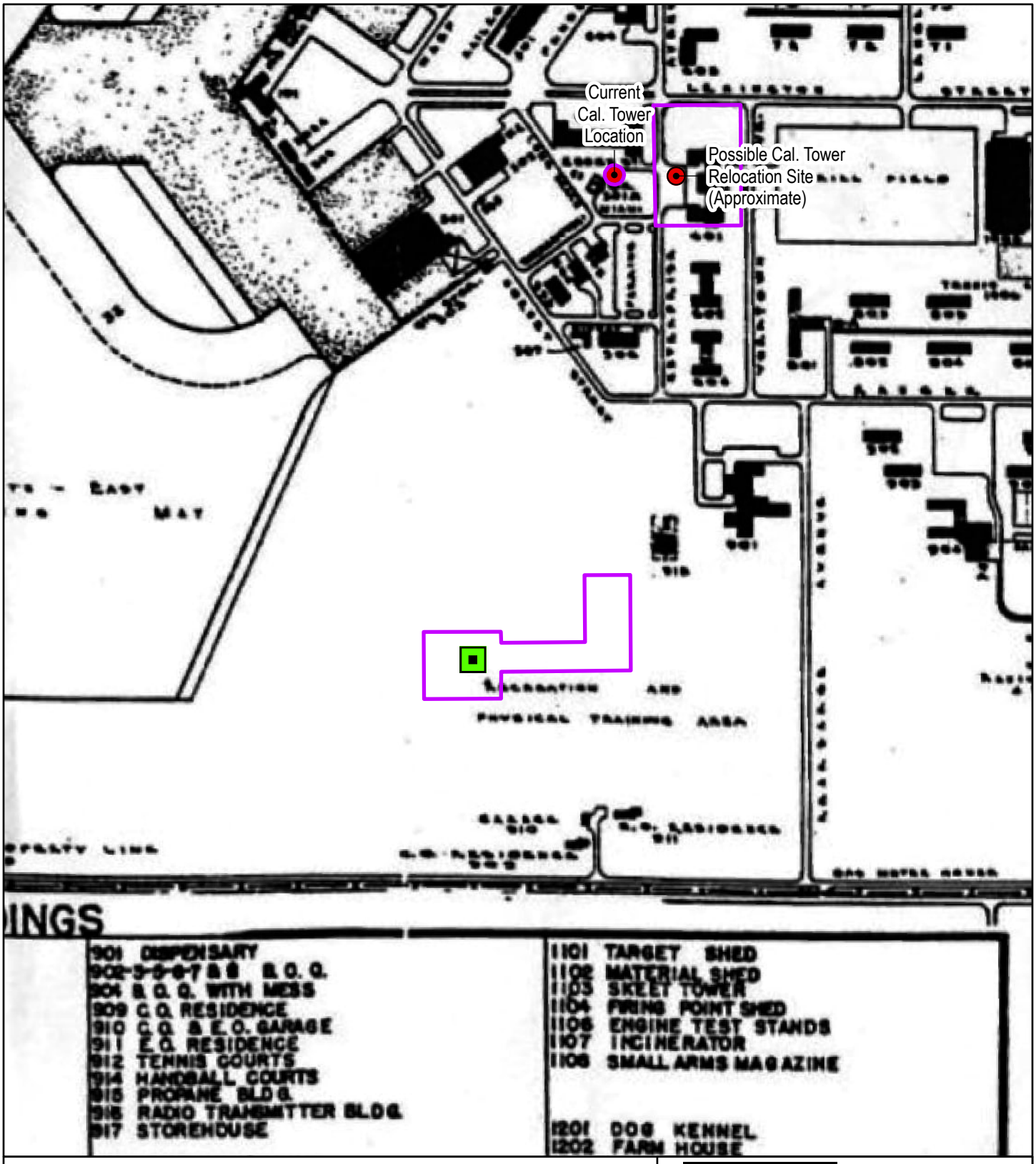
0 150 300 450 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Previously Recorded Archaeological Surveys within APE
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 4



Legend

- Area of Potential Effects (APE)
- Limit of Disturbance (LOD)
- Calibration Tower
- Proposed PAR Location

N

0 150 300 450 ft

0 50 100 150 m

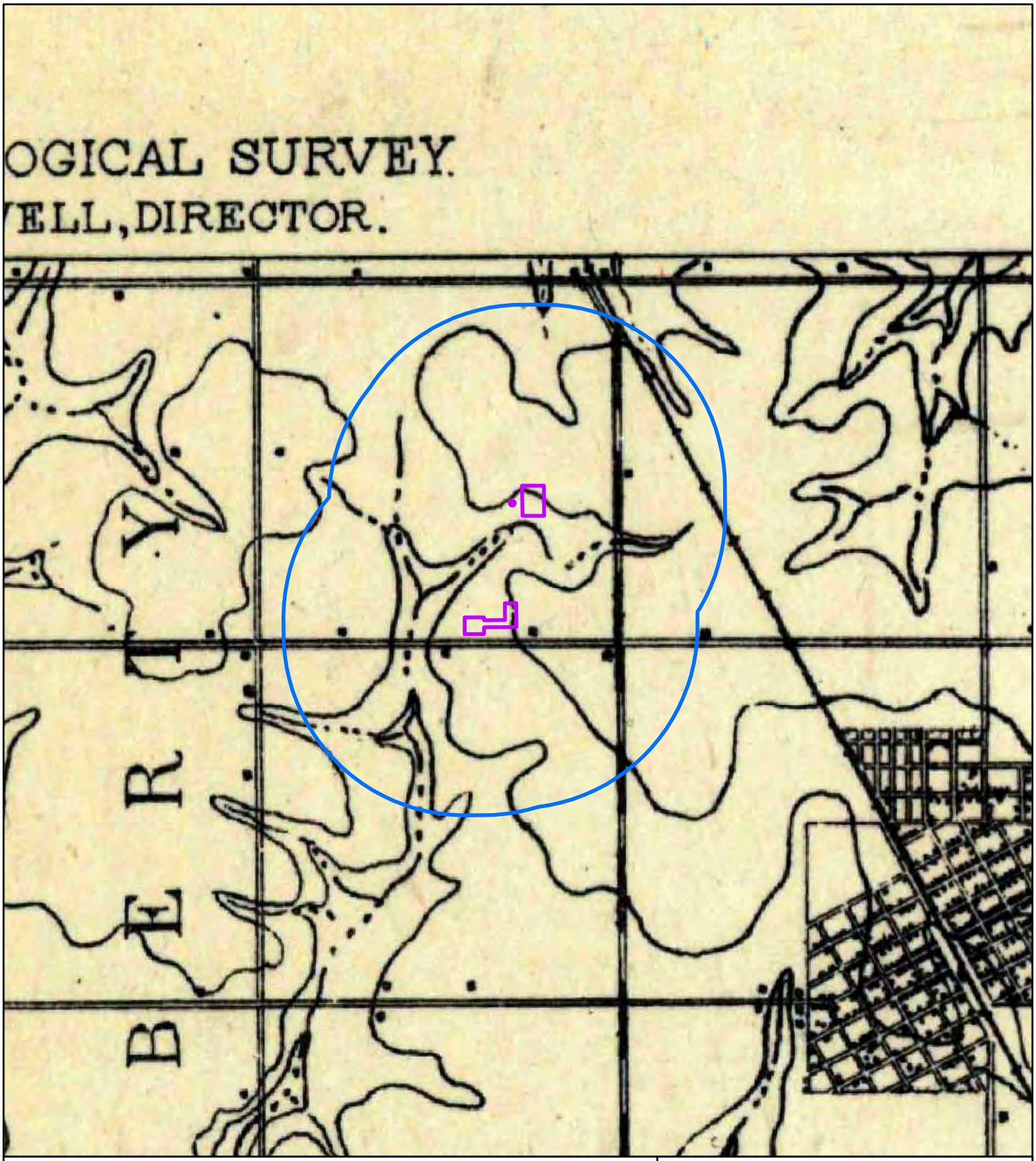
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1943
US Navy Plan of NNAS Map
NOAA Phased Array Radar Project

Source: 1943 US Navy

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 5



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

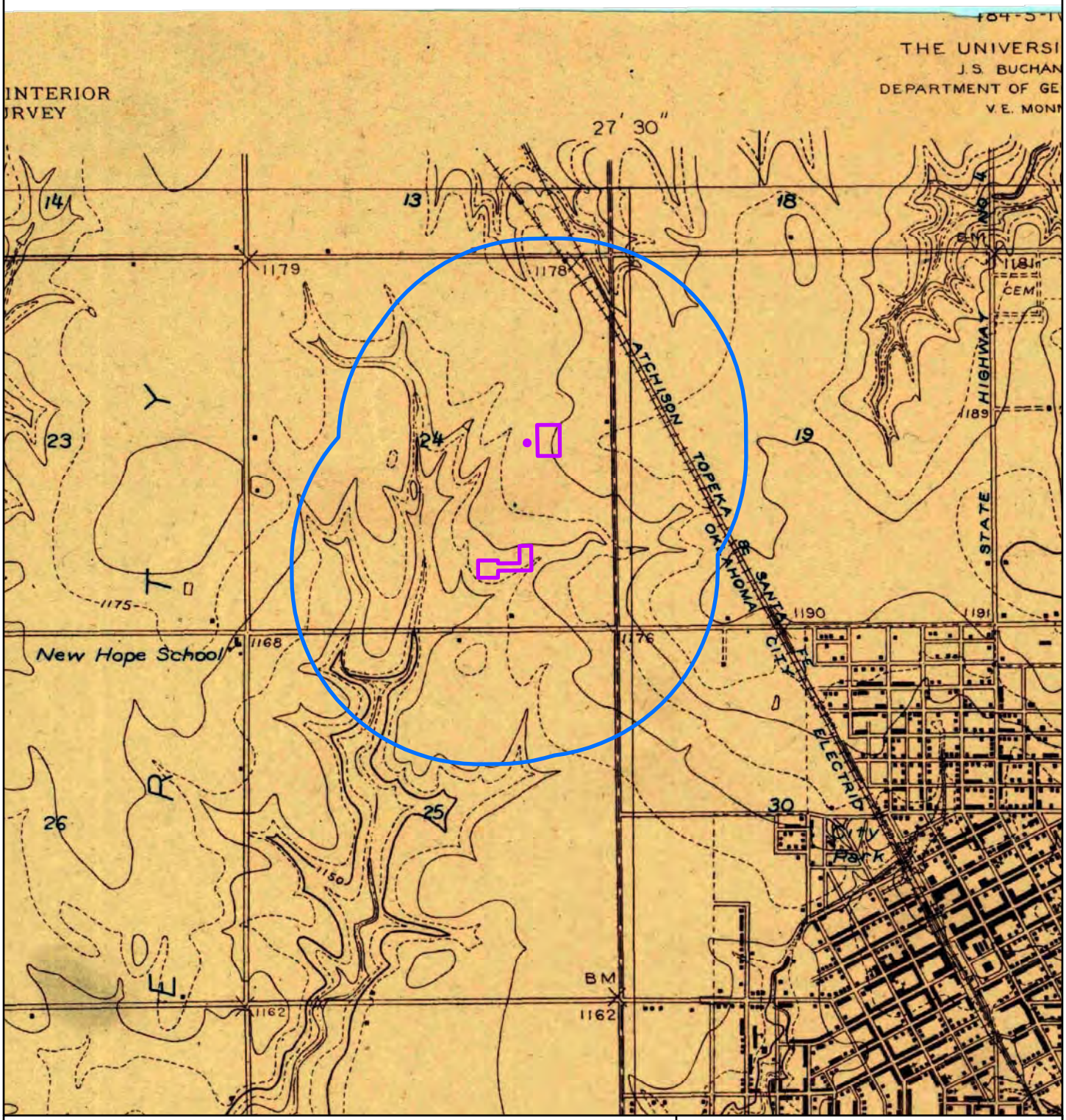
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1893
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1893

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 6



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

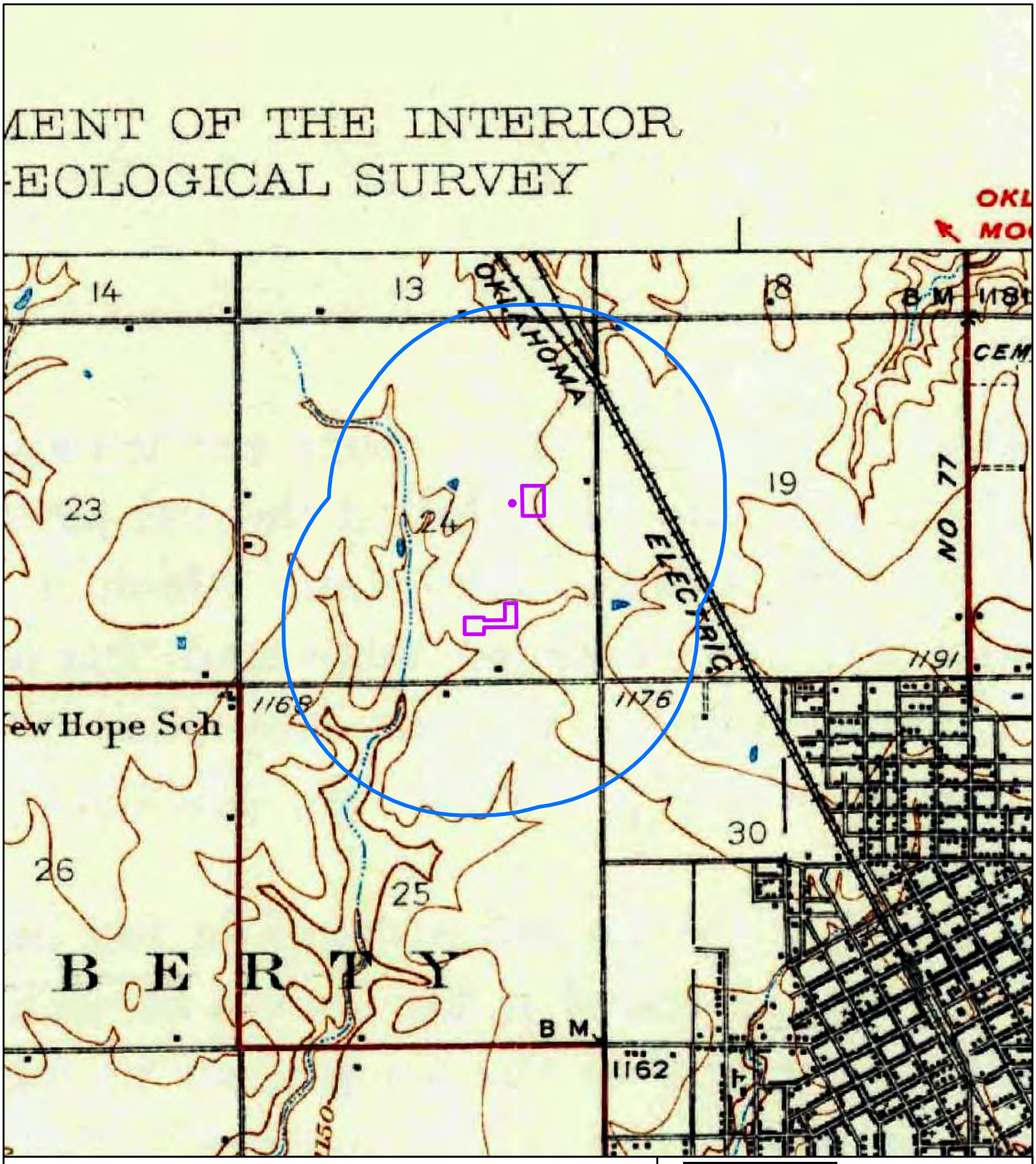
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1925
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1925

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 7



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

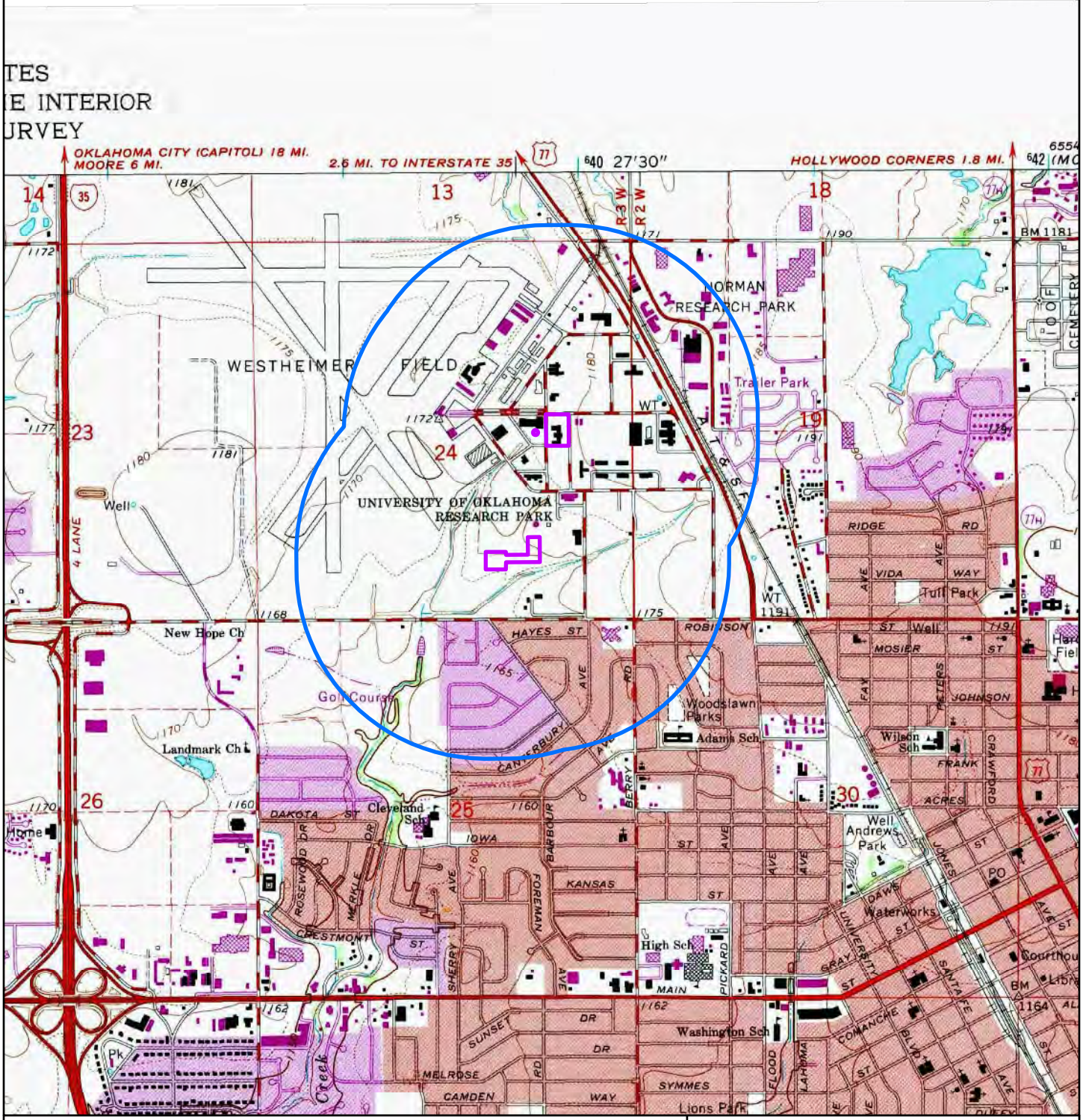
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1936
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1936

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 8



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

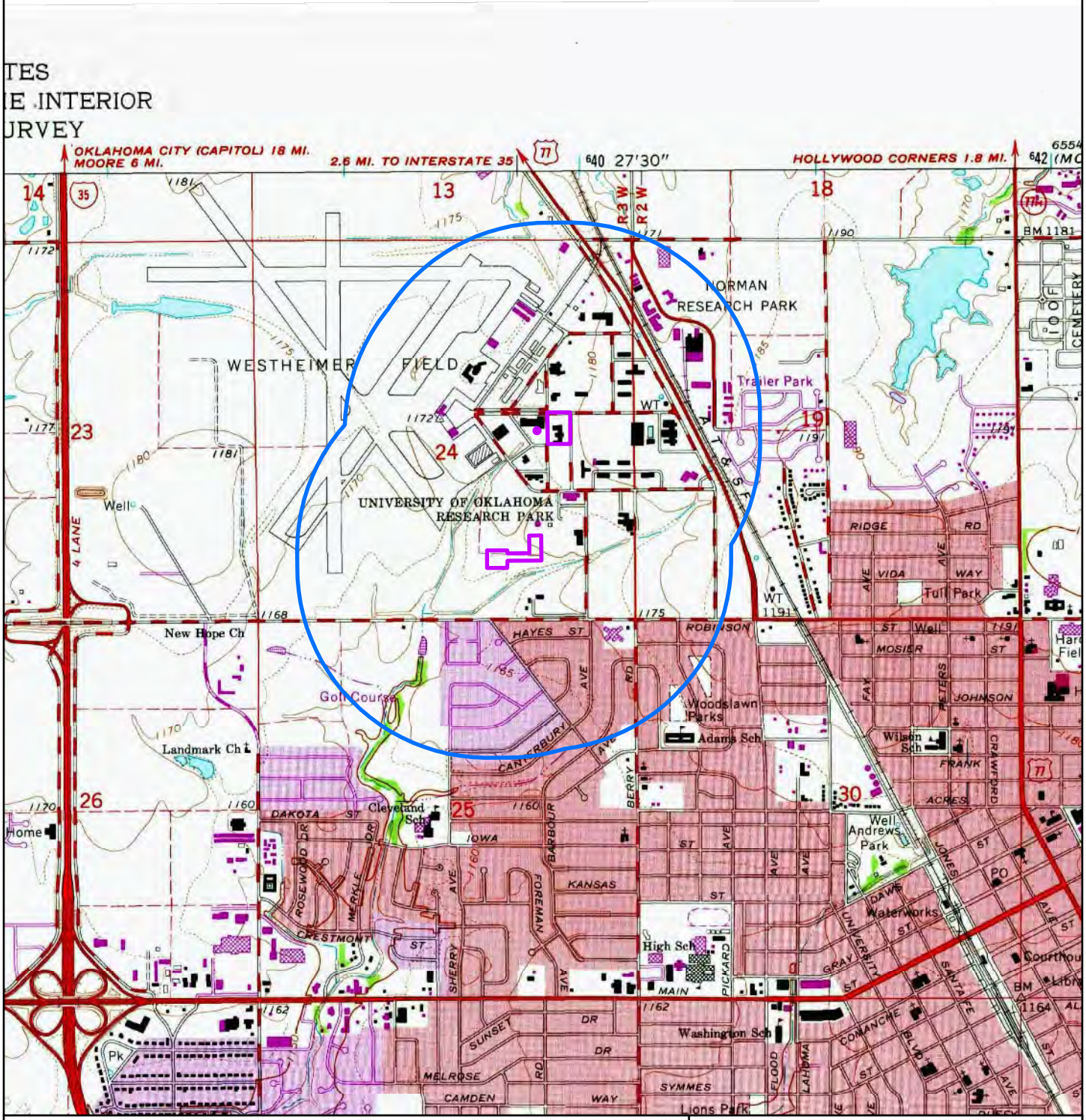
0 250 500 750 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1965
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1965

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 9



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

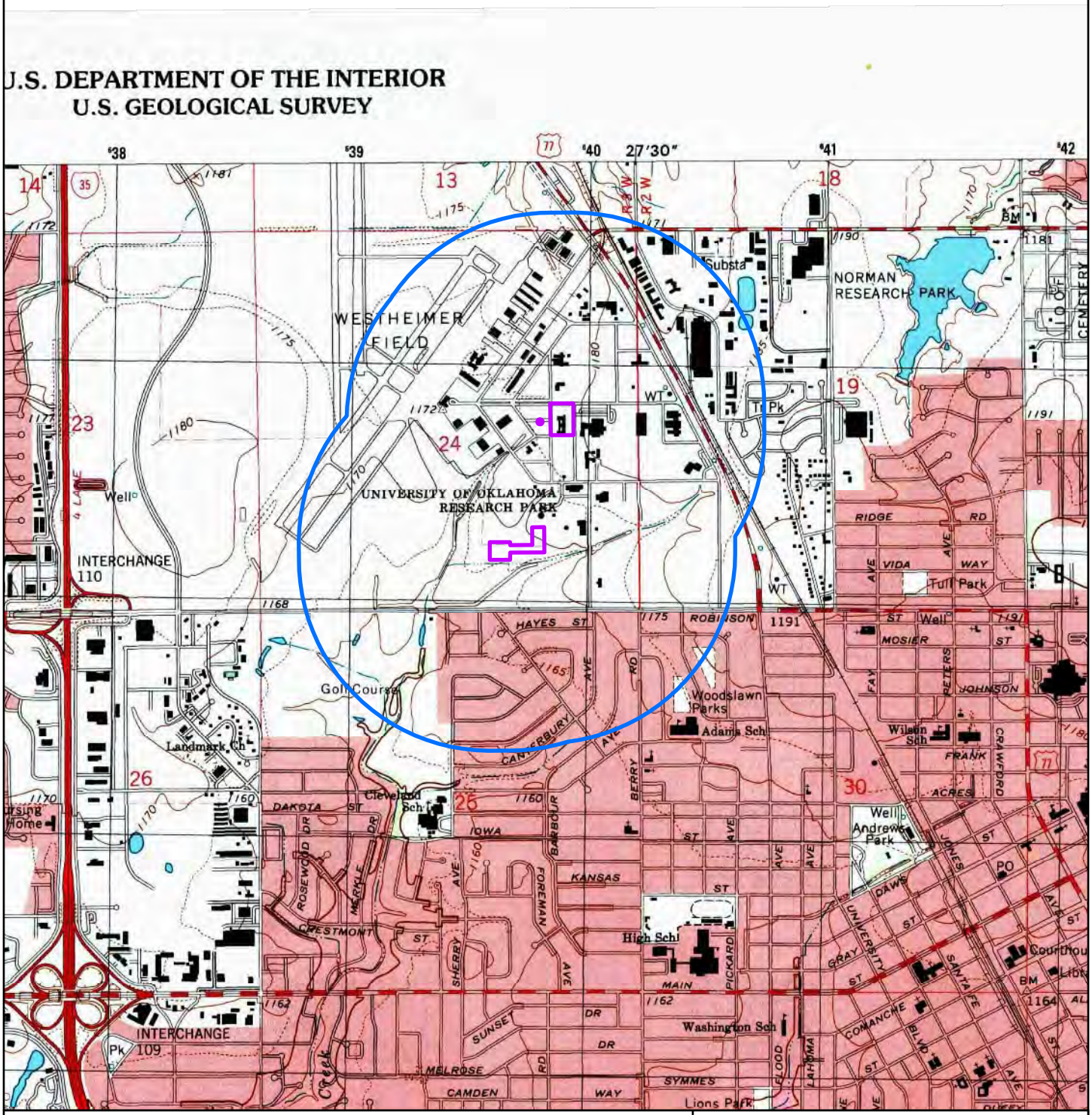
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1983
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1983

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 10



Legend

- Limit of Disturbance (LOD)
- Area of Potential Effects (APE)

N

0 1,000 2,000 3,000 ft

0 250 500 750 m

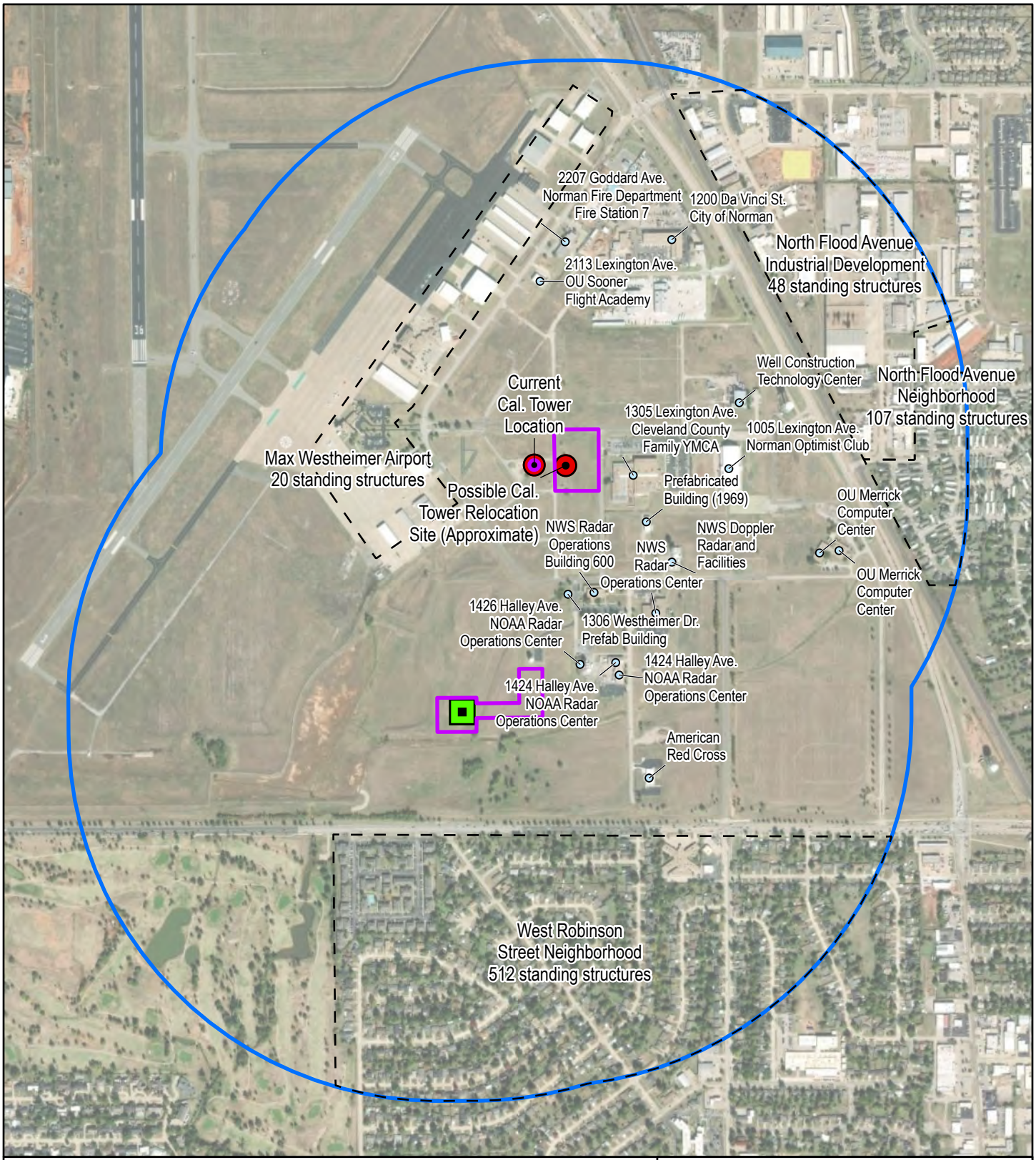
AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

Project Area on 1995
USGS Topographic Map
NOAA Phased Array Radar Project

Source: USGS 1995

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 11



Legend

- Area of Potential Effects (APE)
- Limit of Disturbance (LOD)
- Informal Neighborhood Boundaries
- Calibration Tower
- Proposed PAR Location
- Standing Structure

N

0 300 600 900 ft

0 100 200 300 m

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

Project Aerial
NOAA Phased Array Radar Project

Source: Esri 2023

Project No.	Prepared by	Date	
60687346	JTS	5/30/2023	Figure 12

ATTACHMENT 2
Consulting/Interested Parties

Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, OK 73005
POC: Bobby Komardley, Chairman
Email: [redacted]

Cheyenne and Arapaho Tribes, Oklahoma
700 Black Kettle Blvd.
Concho, OK 73022
POC: Max Bear, THPO
Email: [redacted]

Citizen Potawatomi Nation, Oklahoma
1601 S. Gordon Cooper Drive
Shawnee, OK 74801
POC: Kelli Mosteller, THPO
Email: [redacted]

Osage Nation
627 Grandview Avenue
Pawhuska, OK 74056
POC: Andrea Hunter, Director and THPO
Email: [redacted]

Wichita and Affiliated Tribes (Wichita, Keechi, Waco, & Tawakonie), Oklahoma
P.O. Box 729
Anadarko, OK 73005
POC: Gary McAdams, THPO
Email: [redacted]

Oklahoma Historical Society
State Historic Preservation Office
800 Nazih Zuhdi Drive
Oklahoma City, OK 73105
POC: Lynda Ozan, Deputy SHPO
Email: [redacted]

Oklahoma Archeological Survey
THE UNIVERSITY OF OKLAHOMA

July 19, 2023

NOAA National Severe Storms Laboratory
Attn: Dr. DaNa Carlis
Director
120 David L. Boren Blvd
Norman, OK 73072

Re: OAS FY23-2158 NOAA Environmental Assessment for Proposed Phased Array Radar and Radar Test Facility in Norman.
Legal Description : NW ¼ NE ¼ SE ¼ & NE ¼ SW ¼ SE ¼ Section 24, T9N, R3W, Cleveland County, Oklahoma.

Dear Dr. Carlis:

The Community Assistance Program staff of the Oklahoma Archeological Survey has reviewed the above referenced project to identify areas that may potentially contain prehistoric or historic archeological materials (historic properties). The location of your project has been crosschecked with the state site files containing approximately 27,000 archaeological sites, which are currently recorded for the state of Oklahoma. Our records indicate that your project area has been previously surveyed for other projects and that historic archaeological site, **34CL179** was documented. An additional field inspection is not considered necessary for your project as it pertains to prehistoric archaeological resources. **However, we defer comment on the impacts to historic site 34CL179 with the State Historic Preservation Office (SHPO), Oklahoma Historical Society.** Should construction activities expose buried archeological materials such as chipped stone, tools, pottery, bone, historic crockery, glass, metal items or building materials, this agency should be contacted immediately at (405)325-7211.

This environmental review and evaluation are done in cooperation with the State Historic Preservation Office, Oklahoma Historical Society. The responsible federal agency or their official delegate must also have a letter from that office to document consultation pursuant to Section 106 of the National Historic Preservation Act.

In addition to our review comments, under 36CFR Part 800.3 you are reminded of your responsibility to consult with the appropriate Native American tribe/groups to identify any concerns they may have pertaining to this undertaking and potential impacts to properties of traditional and/or ceremonial value.

Sincerely,

Daniel Lestarjette
Staff Archaeologist

Kary L. Stackelbeck, Ph.D.
State Archaeologist

: dkg
cc: SHPO

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDIX C:

NATIVE AMERICAN CONSULTATION

THIS PAGE INTENTIONALLY LEFT BLANK.

To support this EA, NOAA consulted with federally recognized tribes that are historically affiliated with the geographic region of Norman, Oklahoma. Tribes were formally requested to participate in the Section 106 process on June 8, 2023. The list of tribal nations contacted and a summary of responses are included in **Table C-1.** Copies of all correspondence are included in the Administrative Record.

Table C-1: Record of Tribal Outreach

Tribal Nation	Consultation Initiated (Mailed and Emailed Letter)	Follow-up Correspondence (Emailed Notification Letter)	Summary Response
Apache Tribe of Oklahoma	6/8/2023	7/13/2023	No response has been received to date.
Cheyenne and Arapaho Tribes	6/8/2023	7/13/2023	No response has been received to date.
Citizen Potawatomi Nation, Oklahoma	6/8/2023	7/13/2023	No response has been received to date.
Osage Nation	6/8/2023	7/13/2023	No response has been received to date.
Wichita and Affiliated Tribes (Wichita, Keechi, Waco, & Tawakonie), Oklahoma	6/8/2023	7/13/2023	No response has been received to date.

SAMPLE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH
National Severe Storms Laboratory
120 David L. Boren Blvd.
Norman, OK 73072

July 13, 2023

Bobby Komardley
Apache Tribe of Oklahoma
P.O. Box 1330
Anadarko, OK 73005

Subject: Environmental Assessment for Proposed Phased Array Radar System in Norman, OK

Dear Mr. Komardley,

The National Oceanic and Atmospheric Administration (NOAA), Office of Oceanic and Atmospheric Research (OAR) has prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental impacts resulting from the proposed construction and operation of a Phased Array Radar (PAR) system in Norman, Oklahoma (Proposed Action). The PAR would be used in weather observation risk reduction studies and would be operated by the National Severe Storms Laboratory (NSSL), a division of OAR. NOAA is evaluating a potential 3.65-acre site (see Attachment 1) near existing NOAA facilities located near the University of Oklahoma's Max Westheimer Airport in Norman, Oklahoma, which already support other radar systems. Under the Proposed Action, NOAA would acquire a property lease at the Norman site, acquire the radar test article (RTA) and construct the radar test facility (RTF), operate and maintain the PAR system, and relocate the existing calibration tower, if necessary.

The Draft *Environmental Assessment for Proposed Phased Array Radar System* assessed impacts to various environmental resources. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action.

Your tribe is invited to review and provide comments on the Draft EA and Draft Finding of No Significant Impact (FONSI), which can be viewed online at: https://www.noaa.gov/administration/environmental-assessment-public-notices. The 30-day review and comment period is between July 13, 2023 and August 12, 2023. Please provide any comments or questions by August 12, 2023, addressed to Anne Delp, National Oceanic and Atmospheric Administration, 1305 East West Highway, SSMC4 Room 5309, Silver Spring, MD 20910; or via email to: [redacted].

Sincerely,

CARLIS.DANA.LAMAR.1365868464 Digitally signed by CARLIS.DANA.LAMAR.1365868464 Date: 2023.07.07 09:48:05 -05'00'

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Attachment:
1. Proposed Action Location

Attachment 1: Proposed Action Location

THIS PAGE INTENTIONALLY LEFT BLANK.