

**FINAL
FINDING OF NO SIGNIFICANT IMPACT (FONSI)
PROPOSED PHASED ARRAY RADAR SYSTEM
NORMAN, OKLAHOMA**

Pursuant to provisions of 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 the National Oceanic and Atmospheric Administration (NOAA) Administrative Order 216-6A and its accompanying Companion Manual, NOAA prepared the attached Final Environmental Assessment (EA) to assess the potential environmental consequences associated with the Proposed Action to construct and operate a phased array radar (PAR) system near existing NOAA facilities in Norman, Oklahoma.

Purpose and Need

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 to detect and observe meteorological conditions and provide warnings for severe weather. The NEXRAD Service Life Extension Program (SLEP) began in 2015 to replace and refurbish major components of the radars to extend their operational capabilities, and additional updates following the program would enable continued use of the NEXRAD network into the 2030s. NOAA needs to make a key decision by 2028 either to continue maintaining NEXRAD or to replace it with a new radar network. NOAA is engaged in planning for the Analysis of Alternatives (AoA) for a WSR-88D successor, with one alternative being the replacement of WSR-88D with PAR technology.

NOAA’s Office of Oceanic and Atmospheric Research (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, but technological challenges still exist that must be addressed before determining if PAR can replace the current radar network. To address these challenges, NOAA developed and installed the first dual-polarization, S-band PAR specifically for weather applications, known as the Advanced Technology Demonstrator (ATD), which was installed at NOAA’s National Severe Storms Laboratory (NSSL) in Norman, Oklahoma in 2018. The ATD has been used to conduct experiments since 2021, and PAR technology is now 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. Therefore, NOAA proposes to procure a rotating planar dual-polarization PAR system exclusively for weather surveillance to support an informed decision regarding the use of this technology to replace the NEXRAD network.

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.

Description of Proposed Action and Alternatives

The Proposed Action involves construction and operation of a rotating PAR system at NOAA’s NSSL near the University of Oklahoma’s Max Westheimer Airport in Norman, Oklahoma. The Proposed Action includes

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 rotating PAR system, and relocation of a calibration tower also located near the University of Oklahoma's Max Westheimer Airport, if necessary. Following an evaluation of potential alternatives, NOAA determined that construction of a rotating planar dual-polarization PAR system at the NSSL location best meets the purpose of and need for the Proposed Action (herein referred to as the "Preferred Alternative"). In addition to the Preferred Alternative, the No Action Alternative is also being considered.

Preferred Alternative. The Preferred Alternative includes four primary components:

- 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 PAR system. This leased site (i.e., the Proposed Action Area) would be approximately 3.73 acres in size and located to the southwest of the existing ATD. The leased area would be free of obstructions and within the appropriate distance (i.e., 450 to 1,000 meters) from the calibration tower.
- The RTA, which would consist of the PAR antenna along with any associated electronics, computer servers, radio frequency (RF) equipment, mechanical equipment, cooling equipment, and other necessary components, would be acquired from an independent contractor. The RTF would be constructed within the new leased site concurrently, and would include the radar tower, enclosures for equipment, and all other support infrastructure. The RTA would be installed in the RTF once complete. The total height of the RTF, including the PAR antenna, would not exceed 30 meters. The RTF would be encompassed by a perimeter chain link fence, and a new paved parking lot and access road would be constructed outside the fence that would connect to the ATD access road.
- Once operational, the PAR system would be operated and controlled remotely. The PAR system would only operate during normal daytime business hours, except in the event of significant after-hours weather events.
- The Proposed Action may also include relocation of the existing calibration tower, which is currently located to the east of Max Westheimer Airport. 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 tall, and may be moved to the east side of Priestly Avenue in order to maintain appropriate distances between the tower and the existing ATD.

Construction of the RTF, including installation of the RTA, is anticipated to be completed within three years of the start of construction, and would include site preparation, including 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 activities would be conducted in accordance with the applicable requirements of the National Pollutant Discharge Elimination System (NPDES) and Section 438 of the Energy Independence and Security Act (EISA) to manage stormwater discharges and restore the pre-development hydrology of the Proposed Action Area.

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 rotating 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.

Summary of Environmental Impacts

The EA evaluates the existing conditions and potential environmental consequences of implementing the Proposed Action with regard to 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 (EJ), and cumulative effects. NOAA has concluded that the Proposed Action would not affect the following resources: land use, geological resources, recreational resources, wetlands, floodplains, transportation, and socioeconomics; thus, these resources were eliminated from detailed analysis in the EA. Environmental impacts are summarized below.

Visual Resources: Construction of the Preferred Alternative would temporarily alter viewsheds in the Region of Influence (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. 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.

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) structure (not to exceed 30 meters [98 feet], maximum). The RTF would constitute a new built feature on a primarily flat, open, lightly developed landscape; however, the design and the height of the RTF would be consistent with the ATD and two WSR-88D radars installed within the Study Area. 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; however, the lights would be focused at the Proposed Action Area and would not contribute to light pollution in the surrounding area. The rotating PAR system may also be equipped with a red lamp on top, if required by the Federal Aviation Administration, which would have no meaningful effect on visual resources.

Air Quality: Construction activities would result in exhaust emissions from construction equipment used for site preparation, building construction, and equipment installation. Site preparation and grading activities would generate particulate matter. Fugitive volatile organic compounds 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. Operational emissions would be limited to occasional fuel combustion in the single emergency generator that would be installed at the site. No additional employee commute emissions would be incurred. Implementation of best management practices (BMPs), such as using stabilization measures on unpaved roads and areas of bare soil and maintaining construction equipment to reduce emissions, would be anticipated to limit air quality impacts to the immediate area surrounding the site.

The Preferred Alternative would result in some GHG emissions from fuel combustion in construction equipment and construction employee commute vehicles; however, the localized and limited GHG emissions from the Proposed Action are unlikely to have a measurable effect on climate change. Minor hazardous air pollutant (HAP) emissions increases would occur 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. Prior to installation of the emergency generator, NOAA would be

required to coordinate any necessary air quality permitting through the Oklahoma Department of Environmental Quality (ODEQ) Air Quality Division.

Water Resources and Hydrological Processes: 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. Proposed construction activities would disturb over 1 acre of land and 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) to identify erosion and sediment control measures to minimize pollutants and stormwater runoff from the Proposed Action Area. NOAA would also comply with Section 438 of the EISA to manage stormwater runoff from the site during operation of the PAR system. The ground within the fence line of the RTF would be covered with gravel to remain in a permeable condition, and disturbed areas outside the fence line would be revegetated.

Construction and operation of the PAR system would not be expected to intersect groundwater resources, involve groundwater withdrawals, impact existing municipal or domestic wells, or intentionally release materials into groundwater resources. 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 carrying out 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.

Cultural Resources: Two previously recorded archaeological sites are located within the Area of Potential Effects (APE) for the Preferred Alternative, and no above-ground historic properties have been identified. One archaeological site is considered eligible for the National Register of Historic Places, but the individual components that are recommended eligible for inclusion are located outside of the APE. Previous ground disturbance within the APE has reduced the likelihood that any intact archaeological deposits remain, and further, no documented Precontact period archaeological sites have been identified within the APE. The Preferred Alternative is anticipated to result in no adverse effect to historic properties. Should any unanticipated cultural resources be encountered, work would cease and the discovery would be reported to the Oklahoma State Historic Preservation Office, Oklahoma Archaeological Survey, and federally recognized tribes and tribal nations for consultation on how to proceed.

Flora and Fauna: Proposed construction occurring under the Preferred Alternative would clear approximately 3.73 acres of grassland vegetation present within the Proposed Action Area. No tree removal would occur, and no impacts to vegetation outside the Proposed Action Area would be anticipated. 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. 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. Operation of the PAR system would not have any impacts on vegetation. Access to the site would be provided by a paved access road, and no vehicles would drive over undisturbed areas.

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. Mobile wildlife species would likely relocate to areas of similar habitat. Although disturbance, displacement, or inadvertent wildlife mortality from construction impacts would constitute an adverse impact, such impacts would occur at the individual level, and would not inhibit the continued presence of common wildlife

populations. 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. Operation of the PAR may affect wildlife species due to RF radiation emitted from the radar; it is unlikely, however, that such species would experience the high intensity of radiation required to produce adverse effects.

No potential suitable habitat is present within the ROI for the federally listed Arkansas River shiner, peppered chub, piping plover, rufa red knot, or tricolored bat. Potential suitable stopover habitat for the whooping crane is present; however, due to the rarity of the species in central Oklahoma, the Preferred Alternative is not anticipated to result in adverse impacts. Therefore, construction *may affect but is not likely to adversely affect* the whooping crane. Operation of the PAR system 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 within the Study Area. Limited human activity and disturbance would occur at the site during operation. The U.S. Fish and Wildlife Service concurred that the Proposed Action would not affect federally listed threatened or endangered species.

In accordance with NOAA Administrative Order 216-6A and its accompanying Companion Manual, NOAA also evaluated the degree to which the Proposed Action may adversely affect a variety of marine, aquatic, and fish resources. Given the nature of the Proposed Action and considering that no-in water work would occur, the Proposed Action would have no potential to impact stocks of marine mammals, managed fish species, essential fish habitat, vulnerable marine or coastal ecosystems, or biodiversity and ecosystem functioning.

Farmland and Soils: Construction of the RTF would result in soil disturbance and removal in order to lay the foundation, pave the access road and parking lot, and place the security fence. No farmland soils would be impacted by construction. Throughout construction, to minimize the potential for runoff and erosion, NOAA would obtain an OPDES OKR10 permit and would comply with applicable erosion and sediment control measures and BMPs. Operation of the PAR system is not expected to involve any future disturbance of soils.

Noise: 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 construction equipment. Noise impacts would be 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. The nearest sensitive receptors are approximately 0.2 mile (about 1,000 feet) from the Proposed Action Area, and construction noise levels would mostly dissipate to 69 dBA or less at that distance, which would be consistent with typical ambient noise levels in an urban area. Construction work would only occur during daytime hours, in accordance with the City of Norman's Noise Control Ordinance. Noise reduction BMPs, such as the use of mufflers on construction equipment, would also minimize noise impacts. Changes to the noise environment during operation of the PAR system would be negligible. The moving assemblies of the radar, the generator, and the HVAC system may all generate some noise, but it would generally be imperceptible. Operation of the PAR system would be consistent with residential permissible sound levels.

Utilities and Solid Waste: 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 system. During construction, these utilities would be connected to the RTF from elsewhere within the Study 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. Construction activities would generate solid waste, primarily in the form of excess construction materials. Materials considered unsuitable for reuse would be removed and disposed of at appropriate landfills in accordance with applicable solid waste

regulations. Portable restrooms would also be placed at the construction site, and construction contractors would be responsible for removing sanitary waste.

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. 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.

Hazardous and Toxic Materials and Waste: Operation of construction equipment would create the potential for discharge, spills, and contamination from products such as diesel fuel, gasoline, oil, antifreeze, and lubricants. Multiple minor releases could have potential effects to the environment within the ROI; however, such releases would be addressed via adherence to the on-site Spill Prevention, Control and Countermeasure Plan (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. Operation of the Preferred Alternative would not result in the generation of hazardous waste. Routine maintenance could create the potential for discharge, spills, and contamination from commonly used hazardous materials, but any potential releases would be handled in accordance with the SPCCP and applicable local, state, and federal regulations. If the backup generator for the PAR system 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.

Human Health and Safety: Construction of the RTF would be performed by qualified, trained, and licensed contractors, and in accordance with applicable federal and state occupational safety and health regulations and requirements. 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. 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.

Operation of the PAR may 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 gigahertz (GHz) (2,700 to 3,100 megahertz [MHz]), which is outside of the frequency range where the human body most efficiently absorbs radiation. Operation of the PAR would adhere to RF safety standards provided by the Federal Communications Commission (FCC), Occupational Safety and Health Administration (OSHA), and the Institute of Electrical and Electronics Engineers (IEEE). Prior to beginning operation of the PAR, NOAA's contractor would conduct a radiation hazard survey to ensure exposure compliance in publicly accessible areas and in areas accessible only to NSSL personnel. The radiation hazard survey would also validate the functionality of safety features such as interlocks and sector blanking. Secure safety fencing would be installed around the RTF as an additional barrier to access, and RF warning signs may be posted on the fence to alert members of the public to the possibility of exposure, should anyone approach it. 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 only access the PAR to conduct maintenance and ensure correct operation. When it is necessary to access the RTF, the PAR would be turned off to cease RF radiation and prevent exposure. The PAR system would also include other safety features to minimize occupational exposure, including lockout safety mechanisms, sector blanking, and interlocks. Further, personnel who would be accessing the PAR system 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. NSSL personnel would adhere to safety standards in NOAA Manual 209-10.

Environmental Justice (EJ): Implementation of the Preferred Alternative would not result in disproportionate adverse impacts to air quality, noise, waste, or human health and safety in surrounding EJ communities. Air emissions may have the potential to travel off-site, but would be temporary and would not permanently degrade air quality, and mobile emissions would not increase in the long-term. Communities near the Proposed Action Area, including low-income communities along West Robinson Street, may experience noise levels during construction that could be considered intrusive; however, construction noise would be temporary and limited to daytime hours. Construction contractors would implement noise reduction BMPs and adhere to the City of Norman's Noise Control Ordinance to minimize impacts. Solid waste generated during construction would be disposed of at appropriate landfills, and any hazardous materials or waste would be containerized and disposed of in accordance with applicable regulations. No waste would remain on-site following construction, and any wastes would be handled to eliminate the potential for exposure to the surrounding communities. The rotating PAR system would not be accessible to members of the public, and nearby communities are far enough away from the PAR system such that they would experience no adverse health effects. To date, there have been no known reports of adverse exposure to RF radiation from the existing radars at the NSSL.

Cumulative Effects: NOAA identified and reviewed past, present, and reasonably foreseeable actions that have or are planned to occur within the Proposed Action's ROI and analyzed the potential cumulative impacts of the Proposed Action with these other reasonably foreseeable actions. Past and present projects are generally addressed within the environmental baseline of the ROI for each resource area. NOAA has consulted regional plans to identify planned projects in the surrounding vicinity that could potentially interact with the Proposed Action; these projects are a mix of transportation, aviation, infrastructure, and development projects. Implementation of the Preferred Alternative when taken into consideration with reasonably foreseeable future projects could lead to cumulative impacts to visual resources, air quality, water resources and hydrological processes, cultural resources, flora and fauna, noise, utilities and solid waste, hazardous materials, and EJ. These impacts would be minimized to the extent practicable through implementation of BMPs and adherence to regulatory guidelines under the Proposed Action. No significant adverse impacts would occur.

Regulatory Compliance Measures and Mitigation Measures

NOAA would comply with all federal and state laws and regulations, including consultation and permitting requirements. With implementation of these measures and other BMPs mentioned in the EA, the Proposed Action would be anticipated to have no significant impacts. As such, no resource-specific mitigation measures are recommended.

Public Review

NOAA published a Notice of Availability (NOA) of the Draft EA and Draft FONSI in the *Norman Transcript* on July 13, 2023. These documents were available for public review and comment through August 12,

2023. Comments received during the public review period have been considered and incorporated into the Final EA, as appropriate.

Agency and Tribal Consultation

NOAA coordinated with federal, state, and local agencies with jurisdiction by law or special expertise over the Proposed Action to inform the range of issues to be addressed in the EA. NOAA also consulted 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 tribes. Contact with tribal nations was initiated on June 8, 2023. Federal agencies were provided with the opportunity to comment on the Draft EA following its publication on July 13, 2023. Responses have been considered and incorporated in the EA, as appropriate. Records of agency and tribal correspondence are included in **Appendix A**, **Appendix B**, and **Appendix C** of the EA.

Findings

Finding of No Significant Impact. After review of the EA prepared in accordance with the requirements of NEPA and CEQ regulations, and which is hereby incorporated by reference, I have determined that the proposed PAR system project will not have a significant impact on the quality of the human or natural environment with implementation of the regulatory compliance measures and BMPs identified. Accordingly, an Environmental Impact Statement is not required. This decision has been made after taking into account all submitted information and considering a full range of practical alternatives that meet project requirements and are within the legal authority of NOAA. The signing of this FONSI completes the environmental impact analysis process.

Dr. DaNa Carlis
Director
NOAA National Severe Storms Laboratory

Date

Attachment: Final Environmental Assessment for Proposed Phased Array Radar System