September

2024

Final

Supplemental Environmental Assessment

Addressing Energy Readiness Support, White Sands Missile Range, New Mexico

United States Army
White Sands Missile Range

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PRIVACY ADVISORY

The Draft Supplemental Environmental Assessment (SEA) was provided for public comment in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] Section 4331 et seq.), implemented by the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508) and 32 CFR Part 651, *Environmental Analysis of Army Actions*.

Written comments and inquiries regarding the document were directed by mail to Department of the Army, U.S. Army Garrison White Sands Environmental Division, Building 163/DPW, ATTN: Customer Support Branch, White Sands Missile Range, NM 88002-5000, or via email to *USARMYGarrisonWSMREnvironmentalAssessments@army.mil*.

Public commenting allows the Army to make better, informed decisions. As required by law, comments provided were addressed in this Final SEA and made available to the public. Providing personal information is voluntary. Any personal information provided was used only to identify the desire to make a statement during the public comment period or to fulfill requests for copies of the SEA or associated documents. Private addresses were compiled to develop a mailing list for those requesting copies of the Draft SEA; however, only the names of the individuals making comments and specific comments were disclosed. Personal home addresses and phone numbers are not published in this Final SEA.

FINAL
FINDING OF NO SIGNIFICANT IMPACT FOR THE SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT ADDRESSING ENERGY READINESS SUPPORT AT WHITE SANDS MISSILE RANGE, NEW MEXICO

Name of the Proposed Action: Supplemental Environmental Assessment (SEA) Addressing Energy Readiness Support at White Sands Missile Range (WSMR), New Mexico.

Description of the Proposed Action: U.S. Army Garrison (USAG) WSMR is proposing to install, operate, and maintain additional energy readiness systems at WSMR, New Mexico. The Proposed Action incorporates the use of various technological approaches to promote energy resiliency for WSMR. These technical approaches include (1) expanding the existing 6-megawatt (MW) solar photovoltaic (PV) system on the Main Post by adding a 20-MW solar PV system, with a the local utility company providing services (i.e., equipment, installation, operation, and maintenance) through a real estate transaction; (2) installing microgrid systems designed to incorporate carports and ground-level and roof-top PV panels at the Stallion Range Center and other locations where appropriate; (3) installing Energy Storage Systems (ESS) and additional generators powered by natural gas, propane, or diesel contributing to the desired goal of having 14 days of backup power capacity for critical facilities at the Main Post and Stallion Range Center cantonment areas; and (4) installing electric vehicle charging stations within disturbed areas near existing facilities. All energy readiness projects could include maintenance activities, such as mowing, vegetation removal, application of pesticides and herbicides, and disposal of replaced/end-of-life solar panels and ESS. Replaced/end of life panels would be recycled or reused to the greatest extent possible. These actions would help to address Army Directive 2020-03 to provide critical facilities at WSMR with 14 days of backup energy supply. The current energy resilience capability at WSMR is zero days.

Purpose and Need: The purpose of the Proposed Action is to assist WSMR in meeting energy resilience requirements established in Army Directive 2020-03 and Department of Defense Instruction (DoDI) 4170.11. Army Directive 2020-03 establishes policy to strengthen energy and water resilience to reduce the risk to Army missions resulting from utility disruptions. Additionally, it outlines the plan to sustain energy for critical facilities for a minimum of 14 days. DoDI 4170.11 establishes Department of Defense (DoD) policy to implement the requirements of Executive Orders (EOs) 13693 and 13221. It also establishes that DoD shall strive to modernize infrastructure, increase utility and energy conservation, enhance demand reduction, and improve energy resilience.

WSMR is presently not in compliance with Army Directive 2020-03. Per the *Army Installation Energy and Water Strategic Plan*, Army installations are not exempt from threats, both man-made and natural, associated with power grids, natural gas pipelines, and water resources. Threats to these systems can jeopardize mission capabilities and the Army must increase installation energy and water resilience to anticipate and withstand future threats. The Army must identify and mitigate vulnerabilities to ensure it can continue critical missions through any disruption of utility services. Additionally, the Proposed Action would assist WSMR in meeting recommendations outlined in the 2020 Army Installation Energy & Water Plan to increase renewable energy generation, reduce downtime from power outages, improve energy security, and enhance resilience for the Stallion Range Center. Implementation of the Proposed Action is vital to ensuring that WSMR energy infrastructure is resilient, efficient, and affordable.

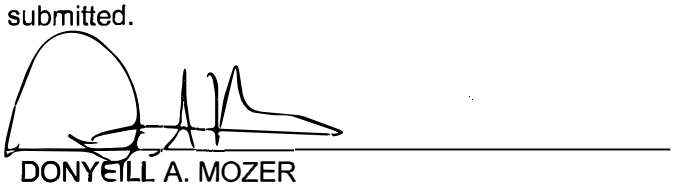
Environmental Consequences: This SEA contains the results of an impact analysis of the Proposed Action and alternatives on the environment. The environmental resources evaluated in this analysis include noise, land use, air quality, geological resources, water resources, biological resources, cultural resources, infrastructure, hazardous materials and wastes, and safety. No significant impacts on the environment have been identified for the Proposed Action and no cumulative impacts are expected. Mitigation measures and best management practices (BMPs) for avoiding or reducing potential impacts are described in the SEA.

Based on the SEA and consideration of the described mitigation measures, and in accordance with the guidelines for determining the significance of proposed federal actions (40 CFR Section 1508.27) and Army criteria for initiating an Environmental Impact Statement (EIS) (32 CFR Section 651.41), WSMR has concluded that the Proposed Action will not result in a significant effect on the environment. Applicable federal, state, and local laws and regulations would be followed. Additionally, mitigation measures would include consulting with the U.S. Fish and Wildlife Service regarding migratory bird and eagle provisions, implementing control measures for the possible dissemination of invasive plant species during ground-disturbing activities, revegetating disturbed areas with native vegetation to further reduce the establishment of invasive species, and implementing erosion control measures to reduce potential impacts, among others detailed in this SEA.

The Army and WSMR have determined that an EIS pursuant to the National Environmental Policy Act is not required, and this Finding of No Significant Impact is hereby submitted. Additionally, because a portion of the proposed 20-MW solar PV array system would occur within the 100-year floodplain, this project under the Proposed Action will require a Finding of No Practicable Alternative (FONPA), which will be prepared separately. Therefore, construction of the 20-MW solar PV array cannot occur without a signed and approved FONPA.

Draft Availability: The document was posted on the White Sands Missile Range website and hard copies were sent upon request. Comments were to be postmarked or received within 30 days of the publication of the draft document. Hardcopies of the document were also provided at the local public libraries.

Conclusion: Based on the SEA and consideration of the described mitigation measures, and in accordance with the guidelines for determining the significance of proposed federal actions (40 CFR Section 1508.27) and Army criteria for initiating an Environmental Impact Statement (EIS) (32 CFR Section 651.41), WSMR has concluded that the Proposed Action will not result in a significant effect on the environment. Applicable federal, state, and local laws and regulations would be followed. The Army and WSMR have determined that an EIS pursuant to the National Environmental Policy Act is not required, and this Finding of No Significant Impact is hereby submitted.



31 Oct 24

DONYELL A. MOZER
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Commanding

Date

U.S. ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-5048
FINAL SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

Title: Final Supplemental Environmental Assessment Addressing Energy Readiness Support at White Sands Missile Range, New Mexico.

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14. ABSTRACT

This Supplemental Environmental Assessment supports a proposal by U.S. Army Garrison-WSMR to (1) expand the existing 6-megawatt (MW) solar photovoltaic (PV) system on the Main Post by adding a 20-MW solar PV system, with a the local utility company providing services (i.e., equipment, installation, operation, and maintenance) through a real estate transaction; (2) install microgrid systems designed to incorporate carports and ground level and roof-top PV panels at the Stallion Range Center, and other locations where appropriate; (3) install Energy Storage Systems and additional generators powered by natural gas, propane, or diesel contributing to the desired goal of having 14 days of backup power capacity for critical facilities at the Main Post and Stallion Range Center cantonment areas; and (4) install electric vehicle charging stations within disturbed areas near existing facilities. These actions would help WSMR address Army Directive 2020-03 to provide critical facilities with 14 days of backup energy supply. The current energy resilience capability at WSMR is zero days.

15. SUBJECT TERMS

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AC/DC	Alternating Current/Direct Current
ACM	asbestos-containing material
AFFF	aqueous film forming foam
AOPI	Area of Potential Interest
APE	area of potential effects
Army	U.S. Army
BCC	Bird of Conservation Concern
bgs	below ground surface
BMP	best management practice
CC	Compliance-Related Cleanup
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	equivalent emissions of CO_2
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dBP	peak sound pressure level
DoD	Department of Defense
DoDI	Department of Defense Instruction
DTRA	Defense Threat Reduction Agency
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ESMC	Endangered Species Management Component
ESS	Energy Storage Systems
EV	electric vehicle
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
HELSTF	High Energy Laser Systems Test Facility
HSR	Human Systems Research, Inc.
INCRMP	Integrated Natural and Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPaC	Information for Planning and Consultation
IPM	Integrated Pest Management
IR	Installation Restoration
kW	kilowatt
kWh	kilowatt hour
LBP	lead-based paint
LID	low impact development
MBTA	Migratory Bird Treaty Act
MGPY	million gallons per year
mph	miles per hour
MR	Munitions Response

MSS	Mission-sensitive Species
MW	megawatt
MWEPA	Mexican Wolf Experimental Population Area
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NMCRIS	New Mexico Cultural Resources Inventory System
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NO_X	nitrogen oxides
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
OSH	occupational safety and health
OSHA	Occupational Safety and Health Act
PA	Preliminary Assessment
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PFAS	per- and polyfluoroalkyl substances
PIF	Partners in Flight
PM_{10}	particulate matter measured less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter measured less than or equal to 2.5 microns in diameter
PPE	personal protective equipment
PSD	Prevention of Significant Deterioration
PV	photovoltaic
RCRA	Resource Conservation and Recovery Act
SANWR	San Andres National Wildlife Refuge
SEA	Supplemental Environmental Assessment
SGCN	Species of Greatest Conservation Need
SI	Site Inspection
SOP	Standard Operating Procedure
SO_X	sulfur oxides
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Place
tpy	tons per year
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USAG	U.S. Army Garrison
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VEC	Valued Environmental Components
VOC	volatile organic compound
WOTUS	Waters of the United States
WSMR	White Sands Missile Range
WSMRR	WSMR Regulation
WSNP	White Sands National Park

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APPENDICES

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1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

This Supplemental Environmental Assessment (SEA) is intended to be an accompaniment to the *Final Environmental Assessment of Alternative Energy Facility Projects for White Sands Missile Range, New Mexico,* which resulted in a signed Finding of No Significant Impact (FONSI) in July 2014 (hereafter referred to as the "2014 Alternative Energy EA"). This SEA is a planning and decision-making tool that will be used to guide White Sands Missile Range (WSMR) in implementing the Proposed Action in a manner that complies with all applicable federal, state, and local environmental laws and regulations and is consistent with U.S. Army (Army) standards for environmental stewardship. This SEA supports a proposal by U.S. Army Garrison (USAG)-WSMR to incorporate the use of various technological approaches to promote energy resiliency for WSMR.

These technical approaches include (1) expanding the existing 6-megawatt (MW) solar photovoltaic (PV) system on the Main Post by adding a 20-MW solar PV system, with a the local utility company providing services (i.e., equipment, installation, operation, and maintenance) through a real estate transaction; (2) installing microgrid systems designed to incorporate carports and ground level and roof-top PV panels at the Stallion Range Center, and other locations where appropriate; (3) installing Energy Storage Systems (ESS) and additional generators powered by natural gas, propane, or diesel contributing to the desired goal of having 14 days of backup power capacity for critical facilities at the Main Post and Stallion Range Center cantonment areas; and (4) installing electric vehicle (EV) charging stations within disturbed areas near existing facilities. All energy readiness projects could include maintenance activities, such as mowing and vegetation removal. These actions would help WSMR address Army Directive 2020-03 to provide critical facilities with 14 days of backup energy supply. The current energy resilience capability at WSMR is zero days.

WSMR has a tri-service installation presence (Army, Air Force, and Navy) and is managed and supported by USAG-WSMR. WSMR encompasses the White Sands Test Center, a Major Range and Test Facility Base, and is used to support research, development, test, and evaluation of military systems and similar high-technology commercial products. WSMR functions as an outdoor laboratory consisting of a large complex of test ranges, launch sites, impact areas, and instrumentation sites required to develop and test tactical and strategic weapons and weapons systems (WSMR 2022).

1.2 PROJECT LOCATION

WSMR is located in south central New Mexico and encompasses approximately 2.2 million acres within a contiguous boundary, extending approximately 118 miles from north to south and 40 miles from east to west (see **Figure 1-1**). The installation spans five counties in New Mexico to include Socorro, Sierra, Doña Ana, Otero, and Lincoln. Topography at WSMR is diverse and elevation across the installation ranges from 3,887 to 8,500 feet above mean sea level.

The terrain at WSMR consists of mountains and canyons, dunes, lava flows, typical Chihuahuan Desert vegetation, large playas, scattered springs, riparian areas, and man-made earthen tanks. Highway 70 crosses the southern portion of the installation, separating it into two regions. WSMR is bordered by mountains to the west, Fort Bliss to the south, and Holloman Air Force Base to the east. The largest populated community to the south of WSMR is El Paso, Texas; to the southwest is Las Cruces, New Mexico; to the northwest is Socorro, New Mexico; and to the east is Alamogordo, New Mexico.

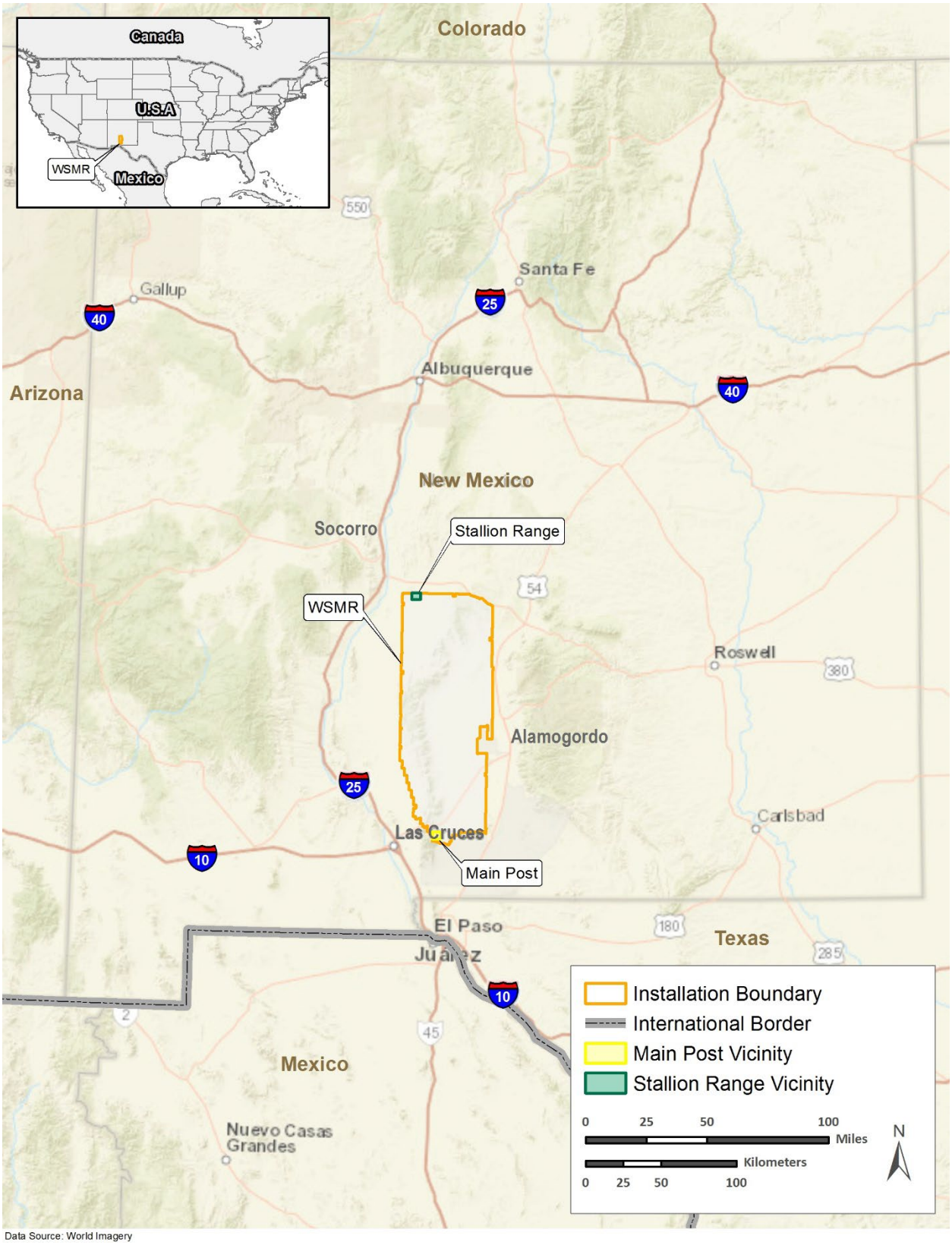

Figure 1-1. WSMR Vicinity Map

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to assist WSMR in meeting energy resilience requirements established in Army Directive 2020-03, *Installation Energy and Water Resilience Policy*, and Department of Defense Instruction (DoDI) 4170.11, *Installation Energy Management*. Army Directive 2020-03 establishes policy to strengthen energy and water resilience to reduce the risk to Army missions resulting from utility disruptions. Additionally, it outlines the plan to sustain energy for critical facilities for a minimum of 14 days. DoDI 4170.11 establishes Department of Defense (DoD) policy to implement the requirements of Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, and EO 13221, *Energy Efficient Standby Power Devices*. It establishes that DoD shall strive to modernize infrastructure, increase utility and energy conservation, enhance demand reduction, and improve energy resilience. Finally, EO 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, also applies to the Proposed Action.

The Proposed Action would contribute to the desired goal of having 14 days of backup power capacity. The current energy resilience capability at WSMR is zero days; therefore, WSMR is currently not in compliance with Army Directive 2020-03. Per the *Army Installation Energy and Water Strategic Plan*, Army installations are not exempt from threats, both man-made and natural, associated with power grids, natural gas pipelines, and water resources. Threats to these systems can jeopardize mission capabilities and the Army must increase installation energy and water resilience to anticipate and withstand future threats. The Army must identify and mitigate vulnerabilities to ensure it can continue critical missions through any disruption of utility services. To maintain the Army's contributions to national security, significant amounts of energy are required at WSMR. Additionally, the Proposed Action would assist WSMR in meeting recommendations outlined in the 2020 Army Installation Energy & Water Strategic Plan to increase renewable energy generation, reduce downtime from power outages, improve energy security, and enhance resilience for the Stallion Range Center (U.S. Army 2020). Implementation of the Proposed Action is vital to ensuring that WSMR energy infrastructure is resilient, efficient, and affordable.

1.4 DECISION TO BE MADE

The SEA evaluates whether the Proposed Action would result in significant impacts on the environment. If significant impacts are identified, WSMR would undertake mitigation to reduce impacts to below the level of significance, undertake the preparation of an Environmental Impact Statement (EIS) addressing the Proposed Action, or abandon the Proposed Action. If significant impacts are not identified, then the SEA would be finalized and the SEA and a FONSI (see **Appendix A**) would be signed. The decision would be made by the approving official and could incorporate the Proposed Action, its alternatives, or any combination of the Proposed Action and alternatives. The SEA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] 4331 et seq.), implemented by the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508) and 32 CFR Part 651, *Environmental Analysis of Army Actions*.

Because this SEA includes the evaluation of an action proposed to occur within a floodplain, if it is determined that a FONSI is appropriate, a Finding of No Practicable Alternative (FONPA) (see **Appendix A**) and approval from Army Headquarters would be required for that portion of the Proposed Action. In accordance with 32 CFR Part 651 and EO 11988, *Floodplain Management,* because construction of a portion of the 20-MW solar PV system would occur within a floodplain, a FONPA would be required for this project under the Proposed Action to discuss why no other practicable alternative exists to avoid impacts. Therefore, construction of the 20-MW solar PV

array cannot occur without a signed and approved FONPA. Impacts from this project would be reduced by the maximum extent practicable through project design and implementation of environmental protection measures. Additionally, appropriate permits would be obtained from applicable regulatory agencies to address impacts and determine potential mitigation measures, if required.

1.5 RELATED ENVIRONMENTAL DOCUMENTATION

Army policy (32 CFR Section 651.12 and 40 CFR Section 1502.21 and 1508.28) allows tiering, or incorporation of existing Environmental Assessments or completed analysis, into other NEPA documents. Tiering allows analysis of actions at a programmatic level for those actions that are similar in nature be used in other analysis efforts in order to keep environmental documents brief (40 CFR Section 1501.11). Tiering eliminates repetitive discussions of the same issues and allows analysis to focus on the key issues at each level of project review. The 2014 Alternative Energy EA has been reviewed and incorporated by reference into this SEA. The 2014 Alternative Energy EA supported a proposal by WSMR to develop, operate, and maintain alternative energy generation facilities across the range to help continuing efforts to meet the "net zero" installation goal (WSMR 2014). The project area analyzed in that EA is proposed for use for the 20-MW solar PV system in this SEA.

1.6 COORDINATION AND CONSULTATION

EO 12372, *Intergovernmental Review of Federal Programs*, as amended by EO 12416, requires federal agencies to provide opportunities for consultation by elected officials of state and local governments that would be directly affected by a federal proposal. In compliance, WSMR will notify relevant stakeholders about the Proposed Action and alternatives. EO 13175, *Consultation and Coordination with Indian Tribal Governments*, directs federal agencies to coordinate and consult with Native American tribal governments whose interests may be directly and substantially affected by activities on federally administered lands. In compliance, WSMR will determine undertakings that require consultation relative to each tribe and will consult when there is an undertaking that could affect a site of religious or cultural significance to a tribe.

The Garrison Environmental Division will coordinate with the State Historic Preservation Office (SHPO), the U.S. Fish and Wildlife Service (USFWS), and/or New Mexico State Fish and Game when appropriate to determine requirements for Section 106 of the National Historic Preservation Act (NHPA) and implementing regulations (36 CFR Part 800), Section 7 of the Endangered Species Act (ESA) and implementing regulations (50 CFR Part 17), and the Migratory Bird Treaty Act (MBTA) (50 CFR Part 21). Avoidance and minimization practices are prescribed as conditions of use.

The Draft FONSI was published in the *El Defensor Chieftain*, *Las Cruces Sun-News*, and *Alamogordo Daily News* announcing the availability of the Draft SEA. Letters were provided to relevant stakeholders informing them that the Draft SEA was available for review. The Draft FONSI was also published on the USAG-WSMR social media sites to include Facebook, Instagram, and X. Publication of the FONSI initiated a 30-day comment period. The Draft SEA, FONSI, and FONPA were made digitally available on the WSMR Garrison Publication website under Environmental Documents at https://home.army.mil/wsmr/index.php/about/garrison/directorate-public-works-dpw/environmental. Hard copies of the Draft SEA, FONSI, and FONPA were made available by request. Additionally, hard copies are available for review at the following libraries:

Alamogordo Public Library
920 Oregon Avenue
Alamogordo NM 88310

Socorro Public Library
401 Park Street
Socorro NM 87801

El Paso Public Library – Armijo Branch
620 E 7th Street
El Paso TX 79901

Thomas Branigan Memorial Library
200 E Picacho Avenue
Las Cruces NM 88001

White Sands Missile Range Post Library
Dyer Street, Building 465, Room 113
White Sands Missile Range NM 88002

At the close of the public review period, applicable comments received from the public and interagency and intergovernmental coordination/consultation were incorporated into the analysis of potential environmental impacts performed as part of the SEA, where applicable, and included in **Appendix B** of this Final SEA.

The following two comments were received during the 30-day comment period, in addition to many positive reactions on social media:

- **New Mexico Environment Department.** The New Mexico Environment Department (NMED) recommended best management practices (BMPs) pertaining to surface water quality, groundwater quality, drinking water, petroleum storage tanks, and air quality. These BMPs were incorporated into this Final SEA where applicable.
- **New Mexico Department of Game and Fish.** The New Mexico Department of Game and Fish (NMDGF) provided recommendations to minimize potential impacts on wildlife. These BMPs were incorporated into this Final SEA where applicable.

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2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

USAG-WSMR proposes to install, operate, and maintain additional energy readiness systems at WSMR, New Mexico. The Proposed Action includes (1) expanding the existing 6-MW solar PV system on the Main Post by adding a 20-MW solar PV system, with a local utility company providing services through a real estate transaction; (2) installing microgrid systems designed to incorporate carports and ground level and roof-top PV panels at the Stallion Range Center and other locations where appropriate; (3) installing ESS and additional generators powered by natural gas, propane, or diesel contributing to the desired goal of having 14 days of backup power capacity for critical facilities at the Main Post and Stallion Range Center cantonment areas; and (4) installing EV charging stations near within disturbed areas near existing facilities. All energy readiness projects could include maintenance activities, such as mowing, vegetation removal, application of pesticides and herbicides, and disposal of replaced/end-of-life solar panels and ESS. Replaced/end-of-life solar panels would be recycled or reused to the greatest extent possible.

2.2 SELECTION CRITERIA

The scope and location of each project and, where suitable, their alternatives will undergo review by internal and external stakeholders. Potential alternatives were evaluated against three selection criteria:

- **Selection Criterion 1:** The alternative(s) must meet the purpose of and need for the Proposed Action (i.e., to assist WSMR in meeting energy resilience requirements established in Army Directive 2020-03) (see **Section 1.2**). The proposed technology would need to be compatible with the mission at WSMR.

- **Selection Criterion 2:** The alternative(s) must comply with all applicable requirements. Factors supporting the use of a renewable energy technology must be sufficient to ensure that implementation would be feasible and sustainable. Factors include costs (i.e., initial capital and operational) and energy source availability.

- **Selection Criterion 3:** The alternative(s) shall not have any direct or indirect adverse impacts on safety, cultural or natural resources, or other environmental constraints such as impacts on an environmental restoration site. Sites must meet anti-terrorism setbacks and other safety criteria (e.g., height restrictions, airfield clear zones, surface danger zones).

2.3 DETAILED DESCRIPTION OF THE ALTERNATIVES

2.3.1 Proposed Action

2.3.1.1 *Solar PV System*

Solar technologies can be classified by the specific method for converting solar energy into useful energy for direct use as a substitute for a conventional energy source. Solar energy is unique in that the sun's energy can be captured to provide electrical energy, heating energy (solar thermal), or a combination of both. There are three major solar PV array subcategories, including flat panel, axis tracking, and integrated solar PV products.

Solar PV cells have a low profile and do not need to be mounted on exceedingly elevated structures and are therefore considered to be compatible with airports and military posts (WSMR 2014). Most solar PV arrays are designed to operate for 20 years or more. Installation of a solar PV system is like other energy development efforts and includes construction equipment mobilization, site preparation, building and connecting the system, and testing and finishing. Routine operation and maintenance of the solar PV system is usually minimal. These systems typically require periodic cleaning of the solar panels and management of vegetation to prevent shading and optimize the electrical production potential. To limit reflection, solar PV panels are constructed of dark, light-absorbing materials and are usually covered with antireflective coating. Today's solar panels reflect as little as 2 percent and are designed for maximum absorption.

The 20-MW ground-mounted solar PV system would be constructed near the existing 6-MW solar PV system on the Main Post (see **Figure 2-1**). The solar panels currently being proposed would provide 20-MW of additional power. However, due to improving technology and the potential use of more efficient solar panels, the provided power could be higher at the time of installation. All 103 acres proposed for this action were previously analyzed in the 2014 Alternative Energy EA. Construction is anticipated to take up to 14 months. Construction staging would be located within pre-existing disturbed areas within proximity to the site and no new ground would be cleared. Pre-construction surveys for vegetation and wildlife would be required. Additionally, construction vehicles would use existing roads, when possible, to minimize impacts. Activities would include excavation for footings, conduit trenches, and power poles. Grading and vegetation removal would occur over the entire area to level and prepare the land for construction.

The solar PV system would consist of enough sub-modules to generate the planned 20 MWs of power. At the center of each sub-module would be a 1-MW inverter pad. Each string would be on either a single-axis or fixed-axis tracking system. The trackers are used to follow the sun across the sky, which increases the amount of energy produced from the solar PV panel. The primary benefit of a tracking system is to collect solar energy for the longest period of the day, and with the most accurate alignment as the sun's position shifts with the seasons.

Panels would be secured and rated to withstand wind gusts of over 100 miles per hour (mph) and sustained winds of 50 mph. A chain link fence would be installed around the solar PV system. Temporary requirements would include construction trailers, storage bins, dumpsters, stored materials, and port-a-potties provided by the contractor. Permanent requirements would include solar panels, inverters, transformers, an access road, and data communications. Maintenance of the facility would be included in the real estate transaction and conducted by the lessee, a local utility company. The 20-MW solar PV system could potentially be connected to the WSMR-owned electrical distribution line that runs north-south along the east side of Owen Road. Grading debris (e.g., bushes, rocks, etc.) would be hauled to an approved off-installation landfill.

2.3.1.2 *Microgrid Systems*

A proposed microgrid system capable of islanding[1] key facilities (eight facilities in total, four of which are critical) would be constructed in the Stallion Range Center (see **Figure 2-2**). The critical facilities currently have backup power provided by older generators, but they only provide enough power to run for a few hours.

[1] A microgrid capable of islanding can connect and disconnect, or island, from a grid to enable it to operate in either grid-connected or island-mode. This enables it to disconnect, or island, from the grid and continue to provide power to key facilities should a disruption in power from the grid occur.

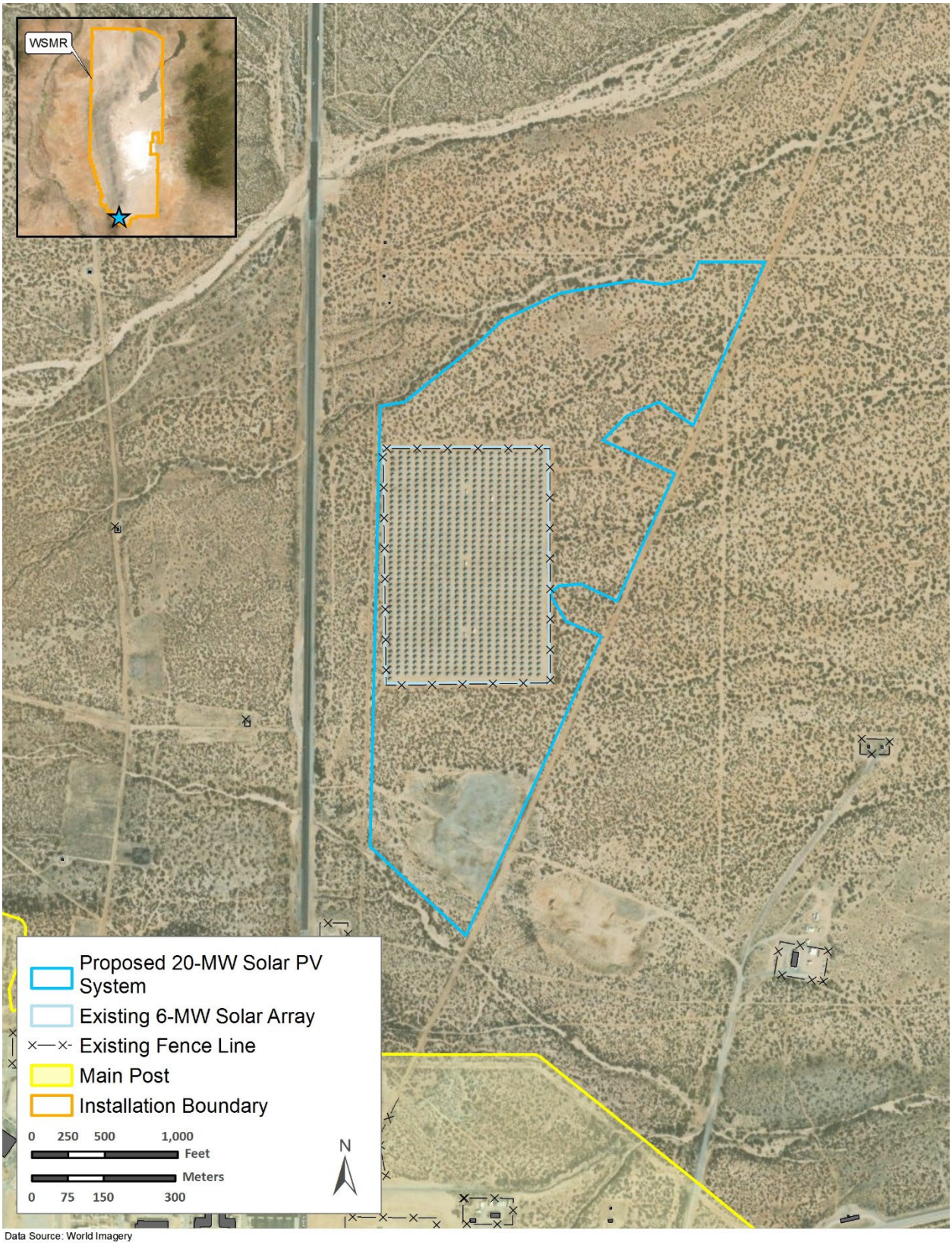

Figure 2-1. Location of Proposed 20-MW Solar PV System

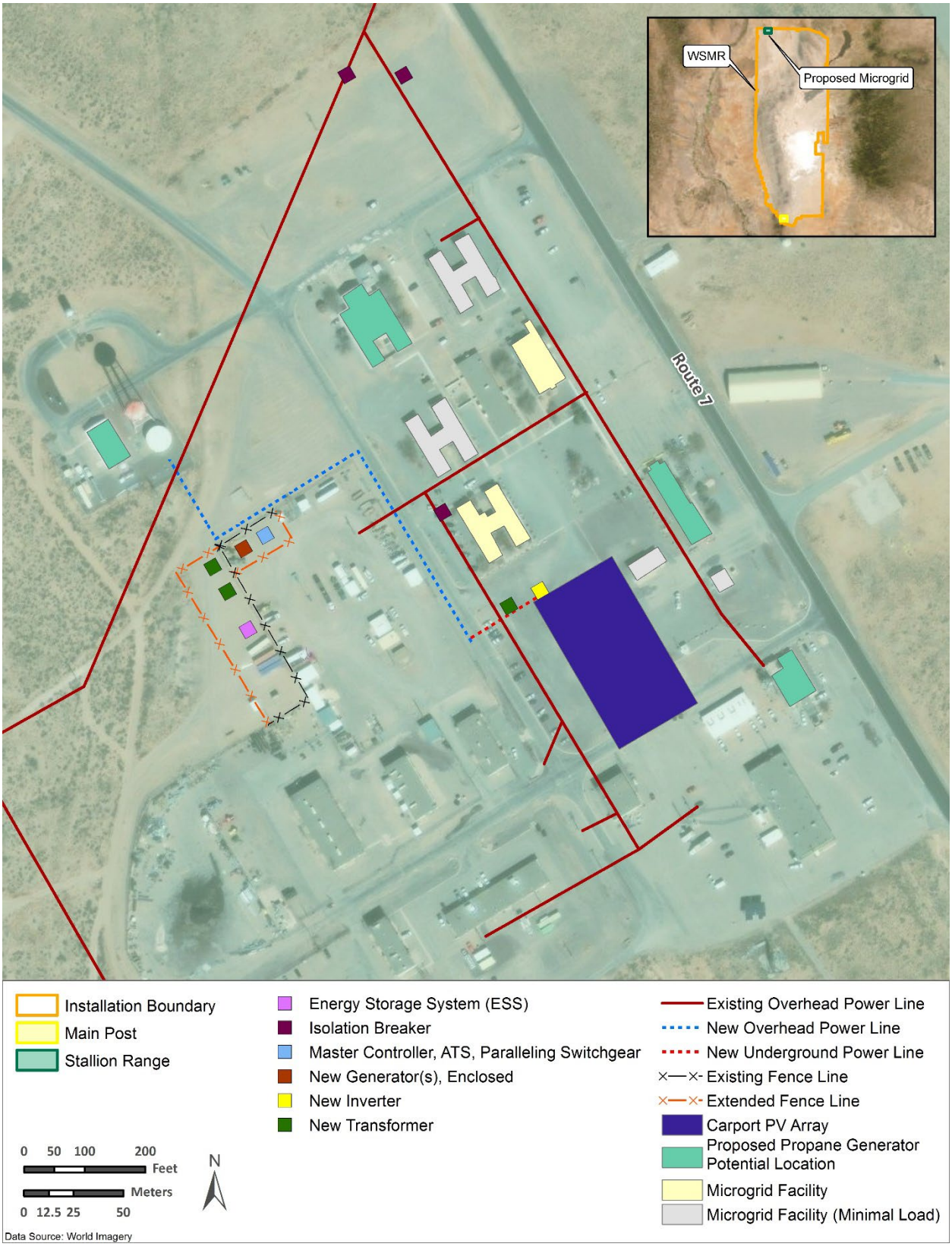

Figure 2-2. Location of Proposed Microgrid System (Notional Design)

The microgrid system would be on a government-owned electrical distribution line, downstream from the 24.9 kilovolt electrical distribution line owned by Socorro Electric Cooperative. The microgrid would include a carport-mounted 600-kilowatt (kW) solar PV system, two 335-kW propane generators, and a 500-kW/2,000-kilowatt hour (kWh) ESS. The microgrid system would provide electric energy for the Stallion Range Center. The 600-kW solar PV system would be in an existing parking area in the center of the cantonment area. It would require new power poles and overhead lines, as well as underground fiber, to tie into the microgrid system that would be located in the northwest corner of an extended Department of Public Works fenced storage area. New power poles and overhead lines would need to follow requirements detailed in the WSMR Avian Raptor Protection Plan and Migratory Bird Protection Considerations. The existing fence would be extended to accommodate and secure the new microgrid equipment.

The microgrid would be managed by a new automated controller. The 600-kW solar PV system would include solar panels, racking system, inverters, distribution lines, transformers, controls and communication, Alternating Current/Direct Current (AC/DC) wiring with conduit, wind breakers/deflectors as necessary, and security measures. It would also have exterior LED lighting attached so the parking area would be illuminated at night. All lighting would be designed in accordance with the New Mexico Night Sky Protection Act (151, Section 2; Section 74-12-11 NMSA 1978). The ESS would include the energy storage unit, inverters, distribution lines, transformers, controls and communication, AC/DC wiring with conduit, and security measures. The isolation breakers would be automated or manual. The project would allow for future installation of EV charging stations near the solar carport, which could be tied to firm and/or battery power. Construction is estimated to begin in October 2025 and take approximately 2 years to complete.

Under the Proposed Action, additional microgrid systems (being as simple as an ESS or as complicated as the Stallion Range system above) could be constructed, granted they comply with the following siting criteria:

- Undergo WSMR's master planning process;
- Undergo WSMR's environmental review process;
    - Under this process, the project proponent submits a project action description to the Environmental Division, Customer Support Branch, who initiates environmental review. A project action description contains sufficient critical details such as who, what, where, and why for review by subject matter experts and internal stakeholders. During the review process, subject matter experts can add conditions of use to prevent environmental impacts or alert the proponent to other environmental requirements. This review process also facilitates coordination among internal stakeholders and the proponent. Following the review and comment period, the Customer Support Branch determines if the proposed action meets the screening criteria for a categorical exclusion, falls within the scope of an existing environmental analysis, or if there are extraordinary circumstances that require a "harder look" with an environmental analysis. WSMR Regulation (WSMRR) 200-2, *Environmental Protection During Military & Non-Military Activities*, requires proponents of military and non-military activities to start environmental review prior to implementation of an activity.
- Avoid impacts on environmentally sensitive areas such as natural and cultural resources and/or environmental restoration areas or there may be further environmental requirements to follow; and
- Be in a level area that does not require significant vegetation clearing.

Additionally, solar carports (i.e., covered parking areas with a canopy made from PV panels) (see **Figure 2-3**) would be installed in various locations within the Stallion Range Center. Currently, 25 acres have been approved for the installation of solar carports (WSMR 2014). Additional locations, yet to be determined, would be required to comply with the siting criteria above as well as the additional criteria listed below:

- Meet anti-terrorism setbacks and other safety criteria (e.g., height restrictions, airfield clear zones, surface danger zones);
- Be easily accessible by vehicles;
- Be centrally located for multiple users;
- Be co-located near an existing utility pole or source of power (any newly installed utility poles or charging devices would need to follow the WSMR Avian Raptor Protection Plan and Migratory Bird Protection Considerations); and
- Be co-located within an existing parking lot.

The solar carports would include ESS to help resolve any power quality issues. The ESS would include an energy storage unit, inverters, distribution lines, transformers, controls and communication, AC/DC wiring with conduit, and security measures. Most of the equipment would be housed within a storage shelter.

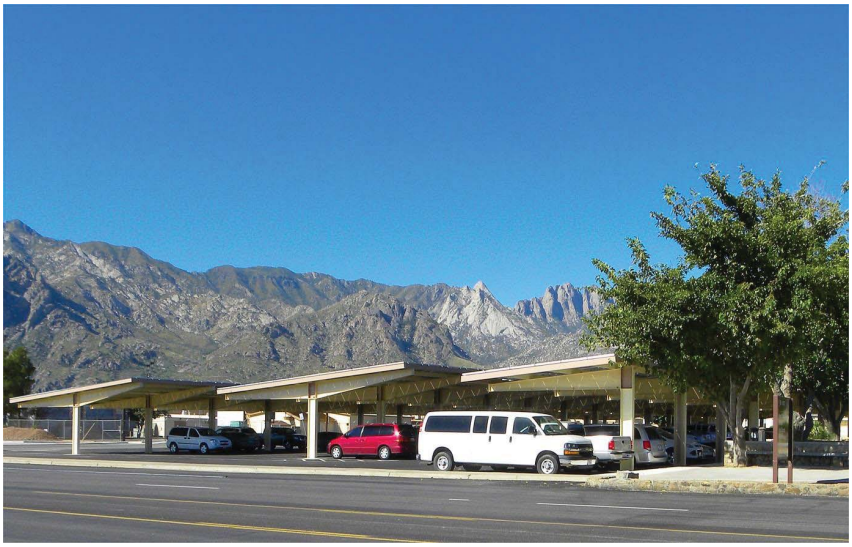

Figure 2-3. Example of a Solar Carport in the Main Cantonment Area

2.3.1.3 *EV Charging Stations*

EV charging stations would be constructed in phases at designated locations within disturbed areas near existing facilities. Such stations would also be required to comply with the siting criteria listed in **Section 2.3.1.2**. There is a potential for maintenance to be conducted by a third party, instead of by WSMR. Ten locations are currently being proposed for government-owned vehicles to include Main Post (multiple stations), Stallion Range Center, Defense Threat Reduction Agency (DTRA) Facility Administrative Building, and 901 Complex (see **Figure 2-4**). Additional locations could be identified, and if these locations do not meet the screening criteria for a categorical exclusion, then additional analysis may be required. Other locations currently being considered include near the High Energy Laser Systems Test Facility (HELSTF), Survivability Vulnerability Directorate Facilities Test Facility, Rhodes Canyon, and Tula Gate.

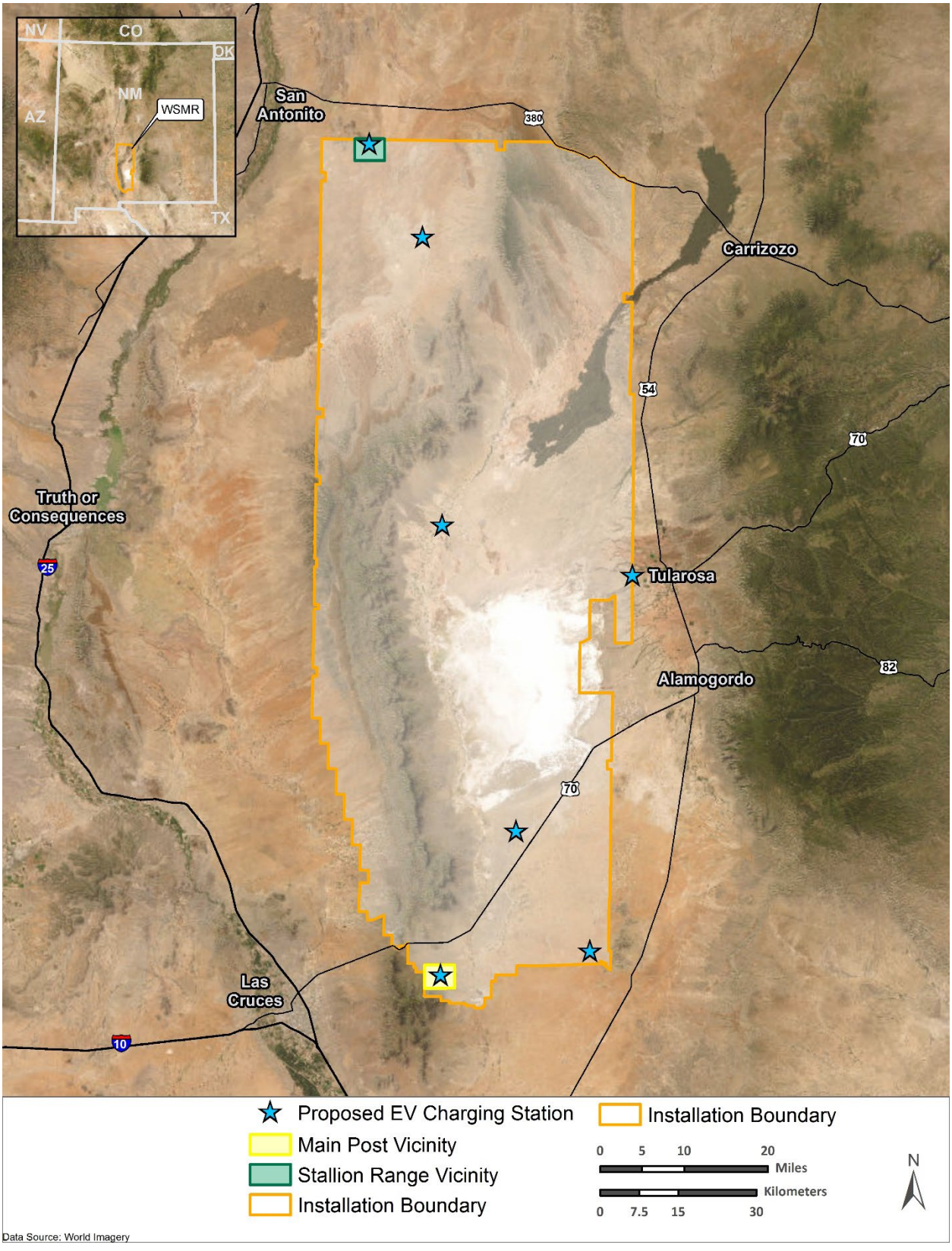

Figure 2-4. Location of Proposed EV Charging Stations

Initial EV station models would be CPF-50-L18-PEDMNT-CMK-Dual; however, models and brands might change as the technology improves over time. Different types of stations would be installed, including solar and/or hard wired, and level 2 and/or level 3. The smallest unit, level 2, would be 10 kW. All stations would be suitable for outdoor use and rated for ambient temperatures of 22 below to 122 degrees Fahrenheit (°F). They would be able to withstand high elevations ranging from 3,300 to 10,000 feet. Power would come from the nearest power distribution pole or solar panels. If needed, and in accordance with the National Electrical Code, transformers that include applicable raptor safety protections would be installed. A breaker panel would also be required. In places requiring trenching, base coarse for parking lots would be backfilled and patched.

Solar chargers consist of a parking stall measuring approximately 9 by 18 feet with a heavy counterbalance plate at the base and an arm that supports a solar panel. There are one or two integrated charger ports per charger (see **Figure 2-5**).

Figure 2-5. Example of a Solar EV Charging Station

Level 3 chargers include a transformer (480 volts), meter, panel/switchgear, power cabinet, and dispenser (see **Figure 2-6**). A power cabinet is not required for a level 2 charger but includes all other components. The dispenser would be a pedestal with a cord that connects to the vehicle. Initially, there would be five solar chargers with the capability of charging up to 10 vehicles. There is a desire to increase the number of level 2 chargers to approximately 110 locations. The schedule to deploy is anticipated to begin in 2023 or 2024. Chargers are typically spaced out with approximately 9 feet between parking stalls. The electrical equipment is generally spaced close together, but there would be approximately 2 feet of separation between most of the equipment.

Activities required for charger installation typically include (1) excavation for the placement of a concrete pad and trenching for conduit (typically 3 feet wide or less); (2) minor demolition of existing asphalt/concrete, if necessary; (3) pouring concrete foundations; (4) conductor and equipment installation; (5) backfill of trenching and excavation (typically with native material); and (6) final surface preparation to match existing.

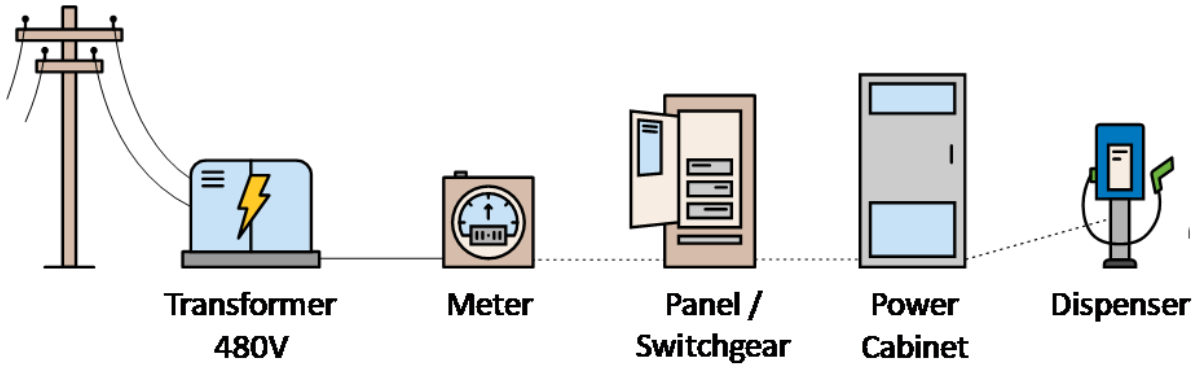

Figure 2-6. Power Generation for a Level 3 EV Charging Station

2.3.1.4 *Backup Power Generators*

Backup power generators for critical facilities on the Main Post and Stallion Range Center would be installed to contribute to the desired goal of having 14 days of backup power capacity (see **Figure 2-7**). The power source for the generators on the Main Post would include natural gas, propane, or diesel while the power source for the generators in the Stallion Range Center would be propane. Other fuels for Stallion Range Center were considered but ruled out — there is no access to natural gas and emissions from diesel are undesirable in this area.

2.3.2 No Action Alternative

Under the No Action Alternative, WSMR would not install the 20-MW solar PV system, microgrids, solar carports, ESS, EV charging stations, or backup power generators. The No Action Alternative would maintain the current inadequate state of the installation's energy supply. The No Action Alternative would not meet the purpose of or need for the Proposed Action as described in **Sections 1.2** and **1.3**.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

The following alternatives were eliminated from further consideration based on the selection criteria outlined in **Section 2.2** and other reasons as explained below.

2.4.1 Geothermal Energy

Geothermal energy sources were previously considered in the 2014 Alternative Energy EA. However, this energy source was ultimately dismissed due to the lack of available information to provide an understanding of potential impacts on groundwater under the gypsum dune field (and thus a potential impact on the White Sands National Park [WSNP]), gypsum dust during windstorms, and climate change factors on groundwater. Therefore, this alternative was eliminated from detailed analysis. This alternative would not meet Selection Criterion 2.

2.4.2 Wind Energy

Wind driven energy sources were considered; however, because they pose a conflict with mission activities they were eliminated from detailed analysis. This alternative would not meet Selection Criterion 1.

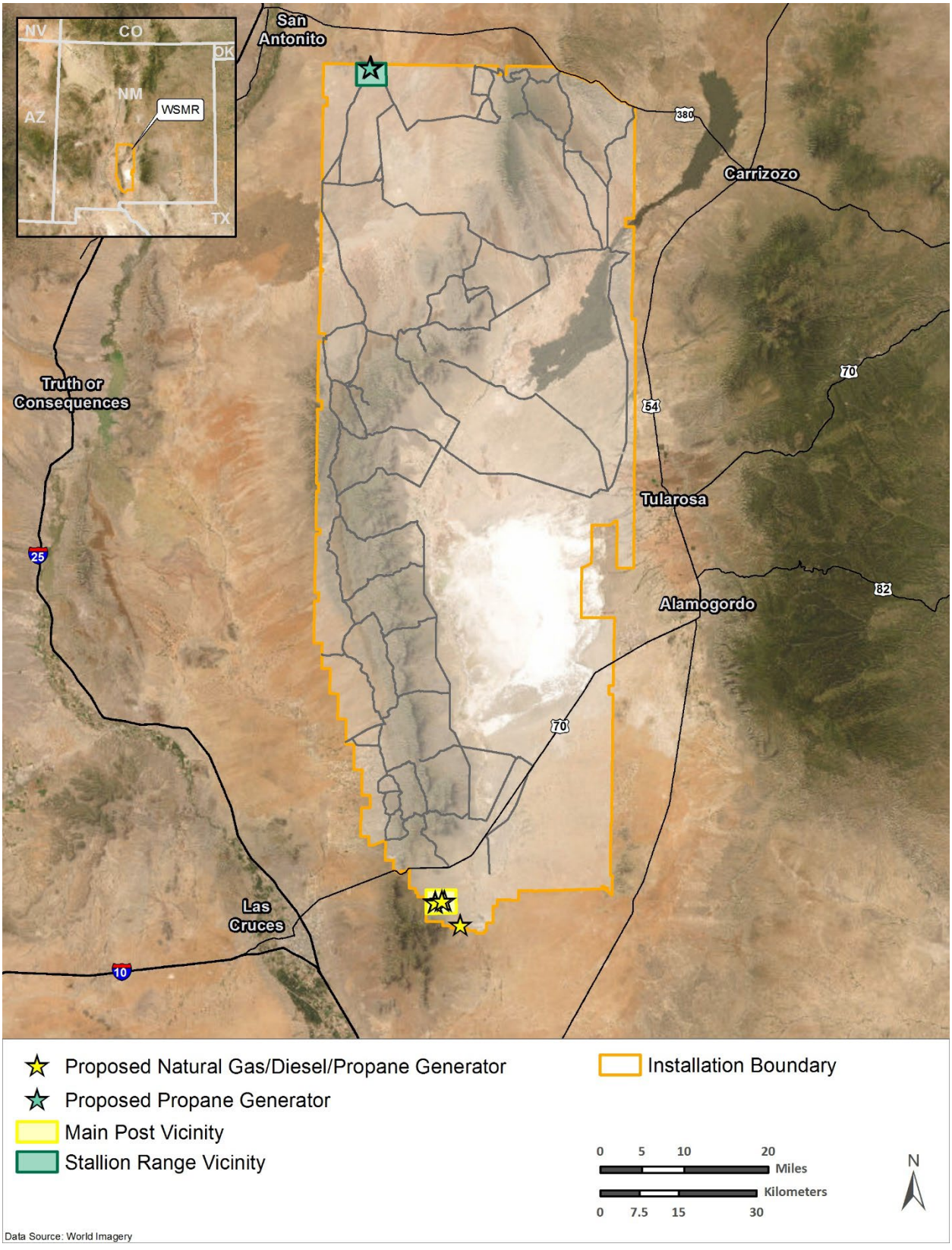

Figure 2-7. Location of Proposed Generators

2.4.3 Waste Energy

Waste to energy sources were considered but eliminated from detailed analysis due to the lack of available material combined with concerns over potential legal considerations with environmental regulations. This alternative would not meet Selection Criterion 2.

2.4.4 Parabolic Solar Lenses

Concentrated solar energy generation using parabolic solar lenses was considered as a potential type of solar energy but was eliminated from detailed analysis due to its high-water demand and greater issues with reflectivity. This alternative would not meet Selection Criterion 1.

2.4.5 Alternative Solar PV System Location 1

An alternative location for the 20-MW solar PV system was considered just north of the current proposed location. This alternative location was eliminated from detailed analysis not only because the proposed area was already approved under the 2014 Alternative Energy EA, but because of anti-terrorism concerns. The proposed new location of the Las Cruces Gate is near the alternative solar PV system location. At the alternative location, if a vehicle with explosives was parked near the new gate and then detonated, some of the panels would be within the explosive safety quantity distance arc. This alternative would not meet Selection Criterion 3.

2.4.6 Alternative Solar PV System Location 2

A second alternative location for the 20-MW solar PV system was considered on the eastern boundary of WSMR near the Athena Measurement Radar substation but was eliminated because of the need to upgrade the Las Cruces substation and the distribution powerline that parallels the proposed project area. If the Proposed Action were not to take place in the current proposed location, connecting to the existing solar PV system and associated infrastructure would not be possible. The area near the Athena Measurement Radar substation is also within an active range, limiting access for service and maintenance by a third-party company. This alternative would not meet Selection Criterion 1, 2, or 3.

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 VALUED ENVIRONMENTAL COMPONENT

A Valued Environmental Component (VEC) analysis was conducted to identify environmental resource areas potentially impacted by the Proposed Action. This analysis considered natural and human environmental resources which are applicable to WSMR and can be impacted by combinations of past, present, and reasonably foreseeable future actions. Potentially useful federal NEPA documents prepared for WSMR were identified and analyzed to establish regional issues, impacts, and their sources. In addition to actions and impacts, useful references and potential mitigation measures were identified for possible inclusion.

Based on this approach, the relationships between agency actions and their impacts on regionally important VECs were identified. The regionally important VECs at WSMR as characterized from the NEPA documents were ranked as to the likelihood of impact from the Proposed Action. Each of the VEC categories described in the Army NEPA Guidance Manual were assigned one of five impact potential categories:

- None – Impacts are not expected.
- Negligible – Impacts that are perceptible but are at the lower level of detection.
- Minor – Impacts that are slight, but detectable.
- Moderate – Impacts that are readily apparent.
- Major – Impacts that are severely adverse or exceptionally beneficial.

Table 3-1 provides a summary of the discussions had during the VEC analysis conducted by the Environmental Division for this Proposed Action. This VEC analysis was conducted in accordance with the 2007 U.S. Army Environmental Command NEPA Analysis Guidance Manual. The summary does not list all impacts, only those discussed during the VEC analysis. For a comprehensive discussion of all potential impacts, please see **Sections 3.3** through **3.14** of this SEA.

Table 3-1. VEC Assessment

VEC	Anticipated Potential Impact	Comments
Airspace Management	None	A 2014 glare study determined there would be no impact on airspace management. This resource area has been eliminated from detailed analysis.
Socioeconomics	None	The Proposed Action would result in beneficial impact of WSMR not pulling energy resources from local communities. No adverse impacts to the local population or associated housing or schools would be expected. This resource area has been eliminated from detailed analysis.
Environmental Justice	None	No disproportionate effect on minority or low-income populations. This resource area has been eliminated from detailed analysis.
Noise	Negligible to Minor	There would be negligible to minor noise impacts on wildlife from generator usage. Noise generated from pile driving during construction of the 20-MW solar PV system has the potential to impact sensitive receptors at the nearby museum.

VEC	Anticipated Potential Impact	Comments
Land Use	Negligible to Minor	The Bataan Memorial Death March takes place every year. The expansion of the area with the proposed 20-MW solar PV system could impact the visual aesthetics of the area to participants. There are no hunting zones in the project areas.
Air Quality	Negligible to Minor	The Proposed Action would temporarily increase fugitive dust emissions due to clearing and grading from construction activities. Impacts from new generators would be analyzed.
Geological Resources	Minor to Moderate	BMPs for erosion control would be included.
Water Resources	Negligible to Minor	Consider the arroyo in analysis. The Proposed Action could have impacts on the floodplain.
Biological Resources	Minor to Moderate	BMPs for migratory birds would be included. Consider the installation of new power poles and outdoor lighting/task lighting.
Cultural Resources	Negligible to Minor	All cultural resources, including historic and prehistoric sites would be flagged and avoided during construction activities. Program personnel would be briefed and instructed prior to construction to avoid these areas and to not disturb prehistoric or historic artifacts. Cultural surveys have been conducted at WSMR.
Infrastructure	Minor to Moderate	The Proposed Action could include the need for new power poles.
Hazardous Materials and Wastes	Minor to Moderate	ESS may contain hazardous materials which should be appropriately handled/disposed of at end of life, what those materials are depends on the ESS technology chosen. Also address disposal of solar panels.
Safety	Negligible to Minor	EV charging stations may have task or security lighting, would need to consider impacts.

3.2 SCOPE OF THE ANALYSIS

3.2.1 Resources Analyzed

Resources in the project area that were analyzed include noise, land use, air quality, geological resources, water resources, biological resources, cultural resources, infrastructure, hazardous materials and wastes, and safety. The following sections provide a characterization of the affected environment and an analysis of the potential direct and indirect impacts each alternative would have on the affected environment. Each alternative was evaluated for its potential to affect physical, biological, and socioeconomic resources. Cumulative and other impacts are discussed in **Section 4.0**. All potentially relevant resource areas were considered in this SEA. The following discussion elaborates on the characteristics that might relate to impacts on resources:

- ***Short-term or long-term*.** These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity, for a finite period, or only during the time required for construction or installation activities. Long-term impacts are those that are more likely to be persistent and chronic.
- ***Direct or indirect.*** A direct impact is caused by and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include

sediment-laden waters near the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.

- ***Negligible, minor, moderate, or major.*** These relative terms are used to characterize the magnitude or intensity of an impact. Negligible impacts are generally those that might be perceptible but are at a lower level of detection. A minor impact is slight but detectable. A moderate impact is readily apparent. A major impact is one that is severely adverse or exceptionally beneficial.
- ***Adverse or beneficial*.** An adverse impact is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single act might result in adverse impacts on one environmental resource and beneficial impacts on another resource.
- ***Significance.*** Significant impacts are those that, in their context and due to their intensity (severity), meet the thresholds for significance set forth in CEQ regulations (40 CFR Section 1508.27).
- ***Context.*** The context of an impact can be localized or more widespread (i.e., regional).
- ***Intensity.*** The intensity of an impact is determined through consideration of several factors, including whether an alternative might have an adverse impact on the unique characteristics of an area (e.g., historical resources or ecologically critical areas), public health or safety, or endangered or threatened species or designated critical habitat. Intensity of impacts are also considered in terms of their potential for violation of federal, state, or local environmental laws; their controversial nature; the degree of uncertainty or unknown impacts, or unique or unknown risks; if there are precedent-setting impacts; and their cumulative impacts (see **Section 4.0**).

In accordance with NEPA, CEQ regulations, and 32 CFR Part 651, the following evaluation of environmental impacts focuses on those resources and conditions potentially subject to impacts.

3.2.2 Resources Considered but Eliminated from Detailed Analysis

Based on the scope of the Proposed Action, resources with very few to no impacts were identified and removed from detailed analysis in this SEA. Additionally, resources below were adequately assessed in previous, related environmental documents including the 2009 *Environmental Impact Statement for Development and Implementation of Range-Wide Mission and Major Capabilities at White Sands Missile Range, New Mexico* (hereafter referred to as the 2009 Range-Wide EIS) and the 2014 Alternative Energy EA. The following describes those resource areas that were considered but eliminated from detailed analysis in this SEA and why they were eliminated:

- **Airspace Management.** Under the Proposed Action, no changes to current airspace types, flight activities, or training would occur. Similarly, the No Action Alternative would not change any current flight patterns for aircraft in the area. WSMR anticipates no short- or long-term impacts on airspace management; therefore, airspace management has been eliminated from detailed analysis in this SEA.
- **Socioeconomics.** Under the Proposed Action, no adverse impacts on socioeconomics would be expected. However, the Proposed Action would be anticipated to result in short-term, negligible, beneficial impacts on socioeconomics due to increased payroll tax revenue, purchase of construction materials from the surrounding area, and increased

energy resources for WSMR allowing for less energy to be pulled from the local communities. All this would be expected to result in a beneficial impact on local communities. Construction activities would only require a small number of personnel over the staggered construction periods. The temporary increase in personnel at WSMR would represent a small increase in the total number of persons working on the installation, but no additional facilities (e.g., housing, schools) would be necessary to accommodate the workforce.

The potential for an islanding effect to occur in the event of an emergency was considered; however, the potential is negligible and not expected to adversely impact local communities. Therefore, socioeconomics has been eliminated from detailed analysis in this SEA.

- **Environmental Justice.** EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, require that federal agencies address the potential effects of policies on minorities, low-income populations, and children. Because of the distance of the project areas from off-installation populated areas, no off-installation minority, low income, or youth populations would be adversely impacted by the Proposed Action; thus, they would not experience disproportionately high and adverse impacts. Therefore, environmental justice has been eliminated from detailed analysis in this SEA.

3.3 NOISE

Noise is defined as undesirable sound that interfered with communication, is intense enough to damage hearing, or is otherwise intrusive. Sound intensity is quantified using a measure of sound pressure level called decibels (dB). The A-weighted decibel (dBA) is a measurement in which "A-weighting" is applied to the dB to approximate a frequency response expressing the perception of sound by the human ear and deemphasizes the higher and lower frequencies that the human ear does not perceive. Peak sound pressure level (dBP) is the true peak of a sound pressure wave, or the maximum value reached by the sound pressure, and is used to capture the instantaneous sound pressure of impulsive sounds. The range of audible sound levels for humans is considered to be 1 to 130 dBA, and the threshold of audibility is generally within the range of 5 to 25 dBA (USEPA 1981a, USEPA 1981b).

The Noise Control Act of 1972 established a national policy to promote an environment free from noise that jeopardizes human health and welfare. It directs federal agencies to comply with applicable federal, state, and local noise control regulations. As identified in Army Regulation 200-1, *Environmental Protection and Enhancement*, sensitive noise receptors could include housing areas, schools, and medical facilities. According to the Federal Aviation Administration and the U.S. Department of Housing and Urban Development, residential units and other noise-sensitive land uses are "clearly unacceptable" in areas where noise exposure exceeds 75 dBA, and "normally acceptable" in areas where noise exposure is 65 dBA or less (24 CFR Part 51). As such, for the purposes of this SEA, 65 dBA can be used as a guideline to assess whether noise is acceptable for residential and other noise-sensitive land uses. Main Post is in unincorporated Doña Ana County, which permits sound levels at or below 50 dB in residential areas, 60 dB in commercial areas, and 70 dB in industrial areas during nighttime hours (i.e., 10:00 pm to 6:00 am) (Doña Ana County Code Section 261-11). There are no other local or county ordinances or regulations that would apply to WSMR.

Noise impacts from a proposed action would be considered significant if the action were to result in the violation of applicable federal, state, or local noise regulations; create appreciable areas of incompatible land use; or result in noise that would negatively affect the health of the community within the region of influence.

3.3.1 Affected Environment

The ambient noise environment at WSMR includes noise from high- and low-level noise sources. Sources of high-level noise include rocket and missile testing, weapons firing, low-level aircraft over-flights, aircraft gunnery and bombing, sonic booms from aircraft, and high-explosive testing activities. These activities produce impulse noise that quickly dissipates. Noise hazard zones associated with high-level noise were established to delineate where potentially harmful noise may occur and are identified in the WSMR *Installation Compatible Use Zone Study* (APHC 2019). Low-level noise sources at WSMR include vehicle movement on local streets, equipment transport, construction and development activities, maintenance, recreation, and truck delivery on Main Post and Stallion Range Center, and ground maneuvers, off-road vehicle use, construction, and maintenance on ranges and training areas.

Construction and installation of energy readiness systems would occur at Main Post, Stallion Range Center, and at various other locations throughout WSMR. All areas are within the WSMR boundary and isolated from urban centers and non-military residential areas by more than 5 miles. The southern half of Main Post is within Noize Zone II associated with Small Arms Range 19008, which is south of Main Post. Noise from small arms weapons firing can reach levels between 87 and 104 dBP within this zone. Noise from range and training activities in the northern portion of WSMR can reach levels from 115 to 130 dBP at Stallion Range Center. Some locations proposed for EV charging stations at Stallion Range Center and throughout WSMR also are within the 115 to 130 dBP noise zones for range and training activities. These activities generate distinct acoustical events where a receptor is briefly and intermittently exposed to high levels of noise, extended exposure to these levels does not occur. Individuals conducting activities on areas within a noise hazard zone are required to use proper personal hearing protection to limit exposure to high noise levels. The areas proposed for the solar PV system and other energy readiness systems within the northern portion of Main Post are not within delineated noise hazard zones (APHC 2019).

Noise sensitive receptors at Main Post include housing areas, medical clinic, elementary and middle school, youth center, hotel, and museum. The closest noise sensitive receptor to the project areas is the WSMR Museum, which is approximately 0.3 miles (1,584 feet) south of the proposed solar PV system and 0.2 mile (1,056 feet) north of a proposed EV charging station. All other noise sensitive receptors at Main Post are more than 0.4 mile (2,112 feet) away from areas proposed for energy readiness systems. There are no noise sensitive receptors at Stallion Range Center or near the other project areas throughout the rest of WSMR. Most noise-generating activities, including aircraft training from nearby installations, occur either far enough from the interior of WSMR and away from noise-sensitive land uses, or at high enough altitudes that noise impacts are negligible; however, singular low-altitude aircraft overflights near the boundary of WSMR can generate noise levels that some individuals may find disruptive (APHC 2019). In general, unacceptable noise levels do not cross the installation boundary or into areas of unacceptable land use.

Construction can cause an increase in sound that is well above ambient levels. The Occupational Safety and Health Administration (OSHA) sets legal limits on noise exposure levels. The minimum requirement states that exposure for workers must not exceed 90 dBA over an 8-hour period. The

highest allowable sound level to which workers can be constantly exposed is 115 dBA, and exposure to this level must not exceed 15 minutes within an 8-hour period (29 CFR Section 1910.95).

3.3.2 Environmental Consequences

3.3.2.1 *Proposed Action*

Noise from construction and installation of the solar PV system at Main Post, microgrid systems and solar carports at Stallion Range Center, EV charging stations throughout WSMR, and backup power generators at Main Post and Stallion Range Center would result in short-term, minor, adverse impacts on the ambient noise environment. The use of heavy construction equipment would generate intermittent, temporary increases in ambient noise levels during the construction period. Noise from construction would vary depending on the type of equipment being used, the area in which the activity would occur, and the distance of the receptor to the noise source; however, noise levels generated by construction equipment typically exceed ambient levels by 20 to 30 dBA. Noise levels associated with common types of construction equipment are listed in **Table 3-2**. Construction noise would occur for the duration of the construction period and would be confined to normal workdays and working hours (i.e., 7 a.m. to 5 p.m.), which would be in compliance with the Doña Ana County noise ordinance. Noise beyond ambient levels would cease following the construction period. All applicable noise laws and guidelines would be followed to reduce the effects of noise from construction.

Table 3-2. Average Noise Levels for Common Construction Equipment

Construction Category and Equipment	Predicted Noise Level at 50 feet (dBA)	Predicted Noise Level at 250 feet (dBA)	Predicted Noise Level at 500 feet (dBA)	Predicted Noise Level at 1,000 feet (dBA)
Clearing and Grading				
Grader	80 to 93	66 to 79	60 to 73	54 to 67
Truck	83 to 94	69 to 80	63 to 74	57 to 68
Backhoe	72 to 93	58 to 79	52 to 73	46 to 67
Construction				
Crane	63 to 88	49 to 74	43 to 68	37 to 62
Paver	86 to 88	72 to 74	66 to 88	60 to 62
Pile Driver[1]	95 to 105	81 to 91	75 to 85	69 to 79
Dozer/Tractor	60 to 89	46 to 75	40 to 69	34 to 63
Front Loader	70 to 90	56 to 76	50 to 70	44 to 64
Compressor	63 to 84	49 to 70	43 to 64	37 to 58

Sources: USEPA 1971, TRS Audio 2023, FHWA 2007
Note: [1] Noise levels for pile driving equipment is shown in dBP.

Individual pieces of equipment would produce noise levels between 60 and 94 dBA at a distance of 50 feet. Construction typically requires several pieces of equipment to be used simultaneously. In general, the addition of a piece of equipment with identical noise levels to another piece of equipment would increase the overall noise environment by 3 dB (USEPA 1971). Therefore, additive noise associated with multiple pieces of construction equipment operating simultaneously would increase the overall noise environment by a few dB over the noisiest equipment. Construction noise levels would mostly be limited to the immediate vicinity of the construction area where the primary receptors would be construction workers. Pile driving for the solar PV system foundation poles would produce the highest noise levels. Pile driving activities would be temporary and would occur only during a small subset of the overall construction period. Any noise generated would decrease with increasing distance from the construction activities and

these noise levels would noticeably attenuate to below 65 dBA between approximately 500 and 1,500 feet from the source. It is recommended that construction contractors adhere to appropriate OSHA standards (29 CFR Section 1910.95) to protect the workforce from excessive noise. In addition, workers are recommended to use proper personal hearing protection to limit exposure to high noise levels.

Ambient noise sources within the construction and installation areas include vehicle movement within the installation, traffic moving through the Las Cruces Gate, equipment transport, construction and development activities, recreation, and maintenance. Negligible noise increases would occur from construction and truck traffic because these are common sources of ambient noise within the construction and installation areas. Construction equipment would remain at a project area during the construction period; therefore, increased noise levels from truck traffic would occur only when construction vehicles are required to enter and exit the project area. Construction areas at Main Post would be more than 0.2 mile (1,056 feet) away from the WSMR Museum and more than 0.4 mile (2,112 feet) away from other noise sensitive receptors. Noise levels from construction activities at 1,000 feet from a receptor could exceed 65 dBA for short periods. To reduce noise effects on the museum, heavy construction equipment would include noise abatement components such as exhaust mufflers, engine enclosures, engine vibration isolators, or other noise dampening supplements that could reduce the sound level by up to 10 dBA (USEPA 1971). Noise levels from construction activities at more than 1,500 feet would be well below 65 dBA, which is compatible with noise sensitive land uses.

Long-term, negligible, adverse impacts on the ambient noise environment would occur from operation of new energy readiness systems, including generators, and routine maintenance. The new solar PV array would be next to an existing solar PV array where routine maintenance is currently conducted. Operation and maintenance of the new microgrid systems, EV charging stations, and backup power generators would be consistent with ongoing operation and maintenance activities currently conducted at WSMR; therefore, no new sources of noise would be introduced.

3.3.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Noise conditions would remain as described in **Section 3.3.1.** No new impacts on noise would be expected to result from the No Action Alternative.

3.4 LAND USE

The term “land use” refers to the relationship between people and the land, specifically, how the physical world is adapted, modified, or used for human purposes (ILG 2010). In many cases, land use descriptions are codified in local zoning laws. Convention/uniform terminology for describing land use categories was established in the 2009 Range-Wide EIS.

In appropriate cases, the location and extent of a proposed action needs to be evaluated for its potential effects on a project site and adjacent land uses. The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations. Other relevant factors include matters such as existing land use at the project site, the type of land uses on adjacent properties and their proximity to a proposed action or potential to be affected by the proposed action, the duration of a proposed activity, and its permanence.

3.4.1 Affected Environment

Military Land Use. WSMR developed a Land Use Classification system to assist in planning range use. The classifications primarily reflect the administrative status of land areas and overlying airspace and the associated limitations on use. The Land Use Classification system lists 17 discrete classifications involving combinations of land status and airspace designation at WSMR (WSMR 2009). The project areas associated with the Proposed Action fall under Land Use Classification B, Range Centers, and Built-Up Areas, which allows for future development projects to support increased personnel and activities on the installation. All proposed activities would be consistent with WSMR's Land Use and Airspace Strategy Plan (WSMR 2009).

Land Use Classification B supports a wide variety of activities, including on-road vehicle use, off-road vehicle use (lightweight), dismounted operations, field operations, airborne weapons release (no evacuation), directed energy systems, instrumentation and communication systems, surface danger zones, airspace danger zones, and air vehicle operations. Land Use Classification B includes areas in Main Post and Stallion, Rhodes Canyon, Oscura, North Oscura Range Centers and Orogrande Base Camp.

Recreational Land Use. Hunting on WSMR is conducted for recreation and wildlife population management. Since the 1950s, WSMR and NMDGF have cooperated in conducting hunts for big- and small-game species on WSMR. WSMR is closed to fishing and sport trapping as well as hunting for black bear, Barbary sheep, and turkey. The collection and/or killing of reptiles and amphibians is prohibited (WSMR 2023).

Public tours of the Trinity Site are offered biannually. The Trinity Site, which was the site of the first atomic bomb detonation in 1945, is a National Historic Landmark (NHL). Several races are run per year and include duathlons and triathlons. The annual Bataan Memorial Death March, first held in 1989, consists of a 26.2-mile trek through rugged terrain on WSMR. This event can host thousands of participants (WSMR 2009). However, only a small portion of the route overlaps with the Proposed Action (see **Figure 3-1**).

3.4.2 Environmental Consequences

Actions that would lead to significant land impacts include those that would (1) be inconsistent or in non-compliance with applicable use plans or policies; (2) preclude the viability of an existing use activity; (3) preclude continued use or occupation of an area; (4) be incompatible with adjacent or vicinity use to the extent that public health or safety is threatened; or (5) conflict with range planning criteria established to ensure the safety and protection of human life and property.

3.4.2.1 *Proposed Action*

Military Land Use. No impacts on military land use would occur. The project areas associated with the Proposed Action would fall under Land Use Classification B, Range Centers and Built-Up Areas, and all proposed activities would be consistent with WSMR's Land Use and Airspace Strategy Plan. Therefore, the Proposed Action is consistent with the existing land use classifications, would not conflict with range planning criteria, and changes required for the Proposed Action would have no impact on applicable use plans or policies.

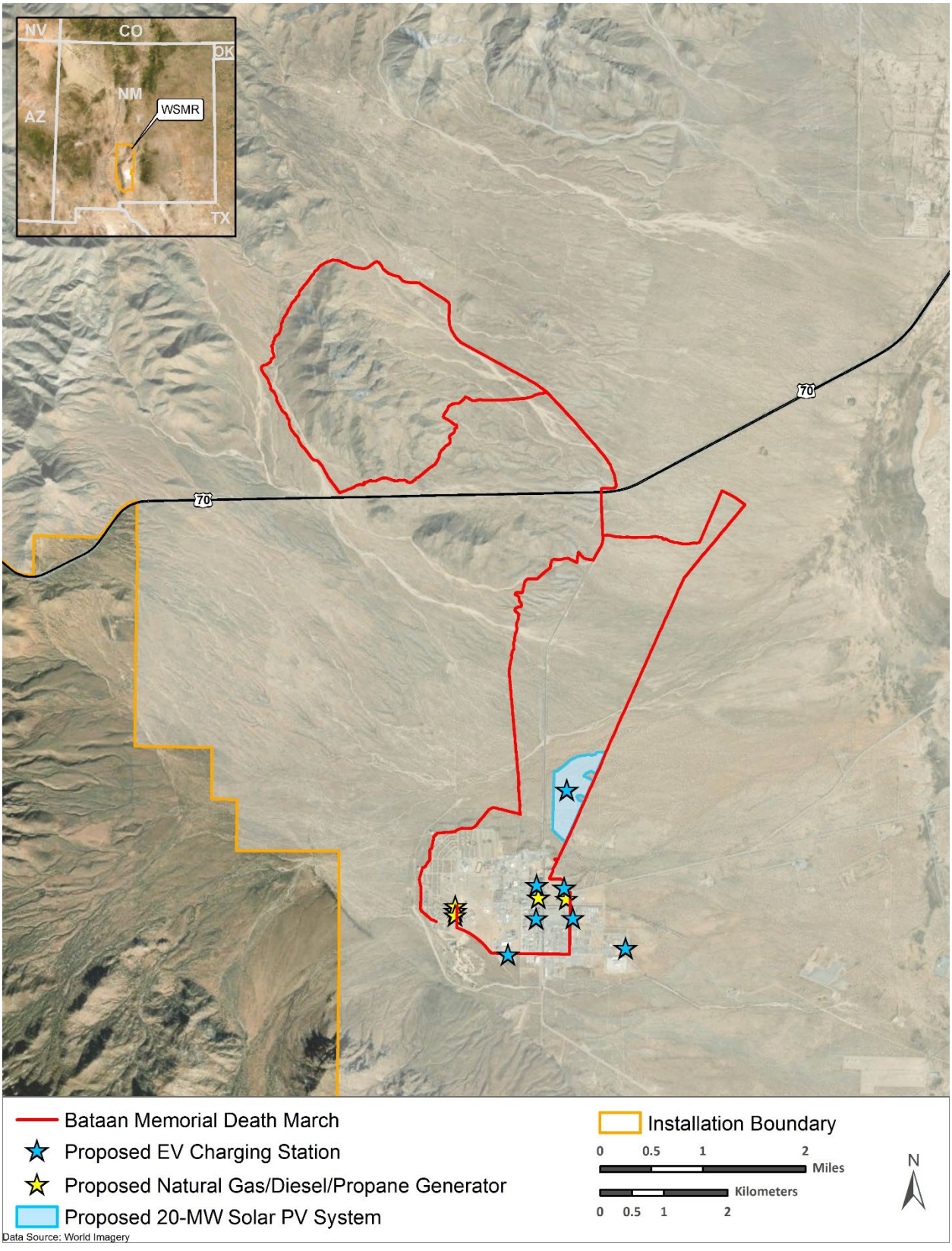

Figure 3-1. Bataan Death March Route

Recreational Land Use. Long-term, negligible to minor, adverse impacts on visual aesthetics would occur. During implementation of the Proposed Action, recreational hunting could be suspended within the project area during construction. The expanded solar PV system would change the visual aesthetics of the area, which may affect recreators, tourists, and personnel who travel past the solar array. However, there is a vast amount of undeveloped land north of the facility, and impacts on visual aesthetics, and associated land use, would be minimal.

3.4.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Land use conditions would remain as described in **Section 3.4.1**. No new impacts on land use would be expected to result from the No Action Alternative.

3.5 AIR QUALITY

Under the Clean Air Act, the six pollutants defining air quality, called, "criteria pollutants," are carbon monoxide (CO), sulfur dioxide, nitrogen dioxide, ozone (O_3), suspended particulate matter (measured less than or equal to 10 microns in diameter [PM_{10}] and less than or equal to 2.5 microns in diameter [$PM_{2.5}$]), and lead. The U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) for the criteria pollutants to protect against adverse health and welfare effects. Areas that are and have historically been in compliance with the NAAQS or have not been evaluated for NAAQS compliance are designated as attainment areas. The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas. A general conformity determination is required when the total direct and indirect emissions of nonattainment or maintenance criteria pollutants exceed the *de minimis* level for the pollutant. Effects on air quality are evaluated by comparing the annual net change in emissions for each criteria pollutant against the General Conformity Rule *de minimis* thresholds for nonattainment and maintenance pollutants. For attainment pollutants, emissions are compared against the 250 tons per year (tpy) Prevention of Significant Deterioration (PSD) major source threshold, as defined by USEPA, for all criteria pollutants except for lead. The PSD major source threshold for lead is 25 tpy. For actual operations and regulatory purposes, the PSD major source thresholds only apply to stationary sources; however, they are applied in this analysis to both stationary and mobile sources as a surrogate indicator of significance in an attainment area. If a proposed action's emissions are below these threshold levels, the proposed action's impacts on air quality are presumed to be less than significant.

Climate Change and Greenhouse Gases (GHGs). Global climate change refers to long-term fluctuations in temperature, precipitation, wind, sea level, and other elements of Earth's climate system. Of particular interest, GHGs are gaseous emissions that trap heat in the atmosphere and include water vapor, carbon dioxide (CO_2), methane, nitrous oxide, O_3, and several fluorinated and chlorinated gaseous compounds. To estimate global warming potential, all GHGs are expressed relative to a reference gas, CO_2, which is assigned a global warming potential equal to one (1). All GHGs are multiplied by their global warming potential, and the results are added to calculate the total equivalent emissions of CO_2 (CO_2e). The dominant GHG emitted is CO_2, accounting for 79 percent of all U.S. GHG emissions as of 2020, the most recent year for which data are available (USEPA 2022a).

EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, signed January 20, 2021, reinstated the *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change*

in National Environmental Policy Act Reviews, issued on August 5, 2016, by CEQ that required federal agencies to consider GHG emissions and the effects of climate change in NEPA reviews (CEQ 2016). The CEQ *National Environmental Policy Act Interim Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*, issued on January 9, 2023, recommends determining the social cost of GHG emissions from a proposed action where feasible as a means of comparing the GHG impacts of the alternatives. The "social cost of carbon" is an estimate of the monetized damages associated with incremental increases in GHG emissions (CEQ 2023). The interim social cost of carbon established by the Interagency Working Group for the year 2025 is estimated at 56 dollars per metric ton of CO_2 (in 2020 dollars; IWG-SCGHG 2021). Per the 2023 CEQ Interim Guidance, the social cost of carbon was calculated for the estimated total emissions of CO_2e during the construction period and the foreseeable annual CO_2e emissions from operational activities under the Proposed Action. It also examines potential future climate scenarios to determine whether elements of the Proposed Action would be affected by climate change. This analysis does not attempt to measure the actual incremental impacts of GHG emissions from the Proposed Action, as there is a lack of consensus on how to measure such impacts. Global and regional climate models have substantial variation in output and do not have the ability to measure the actual incremental impacts of a project on the environment.

EO 14008, *Tackling the Climate Crisis at Home and Abroad*, further strengthens EO 13990 by implementing objectives, including requiring federal agencies to develop and implement climate action plans, to reduce GHG emissions and bolster resilience to the impacts of climate change. USEPA implements the GHG Reporting Program, requiring certain facilities to report GHG emissions from stationary sources, if such emissions exceed 25,000 metric tons of CO_2e per year (40 CFR Part 98). Major source permitting requirements for GHGs are triggered when a facility exceeds the major threshold of 100,000 tpy for CO_2e emissions.

3.5.1 Affected Environment

WSMR covers five counties in New Mexico: Doña Ana, Otero, Socorro, Sierra, and Lincoln. The USEPA has designated portions of Doña Ana County as marginal nonattainment for the 2015 8-hour O_3 NAAQS and moderate nonattainment for the 1987 PM_{10} NAAQS. WSMR is not within these nonattainment areas. The rest of Doña Ana County and the entirety of the other four counties that contain WSMR have been designated as in attainment for all criteria pollutants (USEPA 2023a). As such, the General Conformity Rule is not applicable to emissions of criteria pollutants within WSMR.

Even though WSMR is in an attainment area, there are temporary periods with high levels of particulate matter, generally occurring from natural sources, such as dust storms or high winds, which commonly occur from late winter through early spring. Prevailing winds during these events are from the west and southwest. A plan to address high airborne particulate concentrations during these episodic, natural events was developed by the NMED Air Quality Bureau in conjunction with stakeholders (NMED 2011). However, military installations are exempt from dust control regulations (20.2.23.108.B(4) New Mexico Administrative Code).

WSMR is a major source under Title V and PSD regulations. The installation has a Title V Operating Air Permit (Permit no. P085R1), renewed in 2017, which specifies allowable emissions of criteria pollutants and hazardous air pollutants from stationary sources. Stationary sources of emissions covered by the permit include aggregate processing, concrete production, natural gas boilers, fuel dispensing, internal combustion engines (e.g., generators), fuel storage, surface coating, and woodworking. Existing stationary emissions sources near the project areas include

emergency generators. Emissions of criteria pollutants also occur from vehicle exhaust and dust generated on dirt and gravel roads.

Climate Change and GHGs. GHG emissions near the project areas can be attributed to passenger and military vehicle traffic, operation of maintenance equipment, and the burning of fossil fuels for electricity. WSMR experiences an average high temperature of 95°F from June through August with an average low temperature of 26°F from December through February. The average annual precipitation is 10 inches with the majority of rainfall occurring July through September (NPS 2019). Ongoing climate change in southern New Mexico has contributed to rising temperatures, decreased water availability, extreme heat, and increased severity, frequency, and extent of wildfires, which expand deserts and change landscapes. High air temperatures can affect agriculture and cause adverse health effects such as heat stroke and dehydration, especially in vulnerable populations (i.e., children, elderly, sick, and low-income populations). In addition, warmer air can increase the formation of ground-level O_3, which has a variety of health effects including aggravation of lung diseases and increased risk of death from heart and lung disease (USEPA 2016). In 2020, New Mexico produced 45.2 million metric tons of CO_2 emissions, and was ranked the 37th highest producer of CO_2 in the United States (USEIA 2022).

As directed by EO 14008, the Army implements the *Army Climate Strategy*, which aims to address the threats posed by climate change and identifies three main goals: achieve 50 percent reduction in Army GHG pollution by 2030; attain net-zero Army GHG emissions by 2050; and consider the security implications of climate change in strategy, planning, acquisition, supply chain, and programming documents and processes. Strategies to achieve these goals include enhancing resilience and sustainability at installations by adapting infrastructure and mitigating GHG emissions (U.S. Army 2022). *The Long-term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050* sets target benchmarks to achieve net-zero GHG emissions by no later than 2050 through emission-reducing investments such as carbon-free power generation, zero-emission vehicles, energy-efficient buildings, and expansion and protection of forest areas (DOS and EOP 2021).

3.5.2 Environmental Consequences

3.5.2.1 *Proposed Action*

This air quality analysis estimates the effects on air quality and climate change that would result from the Proposed Action. Because WSMR is in attainment, the General Conformity Rule is not applicable to emissions of criteria pollutants from the Proposed Action. Therefore, effects on air quality were evaluated by comparing the annual net change in emissions from the Proposed Action against the 250 tpy PSD threshold (25 tpy for lead). **Table 3-3** provides the estimated annual net change in emissions that would result from construction under the Proposed Action. For the purposes of this analysis, it was assumed each component of the Proposed Action would be constructed over a 2-year period (i.e., October 2026 through September 2028). Detailed emissions calculations are included in **Appendix C**.

Table 3-3. Estimated Net Annual Air Emissions from Construction

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Lead (tpy)	CO_2e (tpy)
2026	0.574	3.767	3.720	0.011	134.356	0.129	<0.001	1,344.7
2027	1.334	7.620	9.715	0.027	109.087	0.255	<0.001	2,847.7
2028	0.847	4.716	6.311	0.016	0.167	0.167	<0.001	1,591.2
PSD threshold	**250**	**250**	**250**	**250**	**250**	**250**	**25**	**N/A**
Exceeds threshold?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**N/A**

Key: N/A = not applicable; SO_X = sulfur oxides; VOC = volatile organic compound; NO_X = nitrogen oxides

Short-term, minor, adverse impacts on air quality would result from construction and installation of the solar PV system, microgrid systems, and EV charging stations. Emissions of criteria pollutants and GHGs would be directly produced from activities such as operation of heavy equipment; operation of construction generator sets, heavy duty diesel vehicles hauling construction materials and debris to and from the project areas, workers commuting daily to and from the project areas in their personal vehicles, and ground disturbance. All such emissions would be temporary in nature and produced only when construction activities are occurring.

The air pollutant with the highest emissions during construction would be particulate matter, such as fugitive dust, which is generated from ground disturbing activities (e.g., site grading and excavation) and combustion of fuels in construction equipment (see **Table 3-3**). The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of activity. Fugitive dust emissions would be greatest during initial site preparation and site grading activities, mainly for grading the 103-acre site proposed for the 20-MW solar PV system. Fugitive dust emissions would vary from day to day depending on the work phase, level of activity, and prevailing weather conditions. To reduce particulate matter emissions, dust suppression techniques would be used during construction and earth moving activities. These techniques could include application of water, soil stabilizers, or vegetation; use of wind break enclosures; use of covers on soil stockpiles and dump truck loads; use of silt fences; and suspension of earth-movement activities during high-wind conditions. In addition, construction contractors would keep work vehicles in good condition and use diesel particulate filters where feasible to reduce emissions of criteria pollutants. These BMPs and environmental control measures could reduce particulate matter emissions from a construction site by approximately 50 percent. Annual emissions of all criteria pollutants would not exceed the PSD threshold of 250 tpy (25 tpy for lead); therefore, the Proposed Action would not result in short-term, significant impacts on air quality.

Long-term, negligible, adverse impacts on air quality would occur from operation of the six new backup power generators that would contribute to the desired goal of having 14 days of backup power capacity. Two propane generators would be installed at the Stallion Range Center and four diesel, propane, or natural gas generators would be installed at Main Post. In accordance with WSMR requirements, all new emergency generators would be certified to meet USEPA's New Source Performance Standards, with a USEPA Certificate of Conformity before operation. Installation and operation of new generators would be coordinated with the Environmental Division. Operational air emissions were calculated using two propane generators and four diesel generators for 14 days (336 hours) of continuous use to represent a worse-case scenario and are shown in **Table 3-4**. Operational emissions at this capacity would not exceed the PSD thresholds. It is assumed generator operations at the 14-day capacity would occur infrequently; therefore, emissions from generator operations would likely be less than what is shown in **Table 3-4**.

Therefore, the Proposed Action would not be expected to result in long-term, significant impacts on air quality. In addition, the clean energy generated from the 20-MW solar PV system and solar carports could reduce the criteria pollutant emissions from energy generation in New Mexico.

Table 3-4. Estimated Air Emissions from Backup Power Generators

Year	VOC (tpy)	NO_X (tpy)	CO (tpy)	SO_X (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Lead (tpy)	CO_2e (tpy)
Annual Emissions	0.793	19.641	6.094	0.010	0.544	0.544	<0.001	1,202.9
PSD threshold	**250**	**250**	**250**	**250**	**250**	**250**	**25**	**N/A**
Exceeds threshold?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**N/A**

Climate Change and GHGs. As shown in **Table 3-3**, a total of approximately 5,784 tons (5,247 metric tons) of CO_2e would be produced during the construction period. Detailed CO_2e calculations are included in **Appendix C**. In accordance with the 2023 CEQ Interim Guidance, comparisons were calculated to equate GHG emissions in familiar terms using the USEPA GHG equivalencies calculator. By comparison, 5,247 metric tons of CO_2e is the GHG footprint of 1,168 passenger vehicles driven for 1 year or 661 homes' energy use for 1 year (USEPA 2023b). Over the construction period, the social cost of carbon would equal $293,832 (5,247 metric tons CO_2e x $56 per metric ton CO_2e = $293,832).

In 2020, New Mexico produced 45.2 million metric tons of CO_2 (USEIA 2022). Emissions from construction during the highest CO_2e emission year (i.e., 2027) would represent less than 0.006 percent of the CO_2 emissions in the state. As such, the Proposed Action would not considerably increase the total CO_2e emissions produced by the state during the construction years and would not meaningfully contribute to the potential effects of global climate change. Therefore, GHG emissions during construction would result in short-term, negligible, adverse impacts on air quality.

CO_2e emissions from operation of backup power generators, if operated for 14 days per year, would have the potential to produce approximately 1,203 tons (1,091 metric tons) of CO_2e annually. By comparison, 1,091 metric tons of CO_2e is the GHG footprint of 243 passenger vehicles driven for 1 year or 138 homes' energy use for 1 year (USEPA 2023b). The potential annual social cost of carbon from generator operation would be $61,096 per year (1,091 metric tons CO_2e x $56 per metric ton CO_2e = $61,096). Total annual operational CO_2e emissions would represent less than 0.003 percent of the total CO_2e emissions in New Mexico. It is unlikely the emergency generators would run for the full 14 days annually and actual emissions of CO_2e from generator use would likely be less than what is shown in **Table 3-4**. As such, operation of the emergency generators at full backup power capacity would not meaningfully contribute to the potential effects of global climate change and would not considerably increase the total CO_2e emissions produced by the state. Potential annual emissions from the new generators would not exceed the USEPA's annual 25,000 metric tpy reporting threshold when combined with existing annual CO_2e emissions; therefore, WSMR would not be required to report annual GHG emissions.

According to the Lawrence Berkeley National Laboratory, utility-scale solar power produces 394-MW hours per acre per year for axis tracking systems (Bolinger and Bolinger 2022). In 2021, the CO_2 total output emissions rate for all nonrenewable fuels in New Mexico was 1,134.31 pounds per MW hour (USEPA 2023c). Thus, an acre of solar panels producing zero-emissions electricity in New Mexico would save approximately 446,918 pounds, or 223 tons, of CO_2 per year. When applying this factor to the Proposed Action, the 103-acre solar PV array would reduce CO_2

emissions in New Mexico by 22,969 tons (20,837 metric tons) per year, which is equal to a social cost of $1,166,872 per year (20,837 metric tons CO_2 x $56 per metric ton CO_2 = $1,166,872). Additionally, the solar carports (approximately 0.8 acres) could reduce CO_2 emissions by an additional 179 tons (162 metric tons) per year, equal to a social cost of $9,072 per year. The total annual CO_2 savings from the Proposed Action (20,999 metric tons) would be equal to the GHG footprint of 4,673passenger vehicles driven for 1 year or 2,647 homes' energy use for 1 year (USEPA 2023b). This savings would reduce the annual CO_2 emissions in New Mexico by approximately 0.05 percent. The reduction in CO_2 emissions from the solar PV system and solar carports could offset the estimated CO_2e emissions produced during the construction period and from operation of the backup power generators when compared to the state's CO_2e emissions. The annual CO_2 savings from solar power generation would continue into the future for at least 20 years. Further, the Proposed Action would be in alignment with the *Army Climate Strategy* and *The Long-term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050* reach net-zero GHG emissions by 2050. Therefore, the Proposed Action would result in long-term, moderate, beneficial impacts on climate change and GHGs.

Ongoing changes to climate patterns in southern New Mexico are described in **Section 3.5.1**. The net annual reduction of CO_2 emissions from solar power generation at WSMR would negligibly contribute to slowing the rate of climate change. Ongoing climate changes are unlikely to affect the Army's ability to implement the Proposed Action. The Proposed Action would not adversely contribute to the occurrence of rising temperatures, extreme heat, decreased water availability, increased extent of wildfires, and other results from ongoing climate change would not affect the Proposed Action, nor would the Proposed Action adversely contribute to the occurrence of such events.

3.5.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Air quality conditions would remain as described in **Section 3.5.1**. No change in criteria pollutant or GHG emissions, and no impact on air quality would be expected to result from the No Action Alternative.

3.6 GEOLOGICAL RESOURCES

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of topography and physiography, geology, soils, and, where applicable, geologic hazards and paleontology. Topography and physiography pertain to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features. Geology is the study of the Earth's composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their ability to support vegetation communities and construction applications or types of land use.

3.6.1 Affected Environment

Regional Geography and Geology. The project areas for the Proposed Action are within the Basin and Range physiographic region of New Mexico, specifically within WSMR. This region is characterized by the Tularosa Basin that is surrounded by the San Andres Mountains to the west and the Sacramento Mountains to the east. There are three different geologic units within the project areas. The characteristics of these units are listed below in **Table 3-5** (USGS 2023).

Table 3-5. Geologic Characteristics

Proposed Action	Identifier	Map Unit	Geological Unit Name	Characteristics
Currently Proposed EV Charging Stations	EVS21244 (Main Post 1)	Qp	Piedmont alluvial deposits	Unconsolidated, undifferentiated stream alluvium; includes deposits of higher gradient tributaries bordering major stream valleys
	EVS01530 (Main Post 2)			
	EVS01400 (Main Post 3)			
	EVS21080 (Main Post 4)			
	EVS00300 (Main Post 5)			
	EVS01866 (Main Post 6)			
	EVS00102 (Main Post 7)			
	EVS34230 (Stallion Range)	QTs	Upper Santa Fe Group	Sedimentary clastic, unconsolidated, and undifferentiated deposits
	EVS90121 (901 Complex)			
	EVS34761 (DTRA Facility Administrative Building)	Qpl	Lacustrine and playa-lake deposits	Unconsolidated, undifferentiated; includes associated alluvial and eolian deposits of major lake basins
20-MW Solar PV System	N/A	Qp	Piedmont alluvial deposits	Unconsolidated, undifferentiated stream alluvium; includes deposits of higher gradient tributaries bordering major stream valleys
Solar Carports & Microgrids	N/A	QTs	Upper Santa Fe Group	Sedimentary clastic, unconsolidated, and undifferentiated deposits

Source: USGS 2023

Topography. The topography of the project areas exhibits a range of topographic relief depending on the specific project area. Elevation ranges from approximately 4,200 (Main Post) to 4,900 (Stallion Range Center) feet above mean sea level (Google Earth 2023).

Soils. Six different soil types are present within the project areas (see **Appendix D**). The characteristics of these soils are provided in **Table 3-6**. Overall, soil associations found within the project areas consist of moderately deep soils with depths ranging from 60 to 80 inches below ground surface (bgs) to subsoil and are loamy to sandy in texture. There are no designated important farmland soils in the project area (USDA 2023).

Table 3-6. Soil Characteristics

Proposed Action	Facility Number	Map Unit	Soil Name	Depth (inches)	Farmland Designation	Soil Characteristics	Approx. acreage
Currently Proposed EV Charging Stations	EVS21244 (Main Post 1)	54	Mcnew-Copia complex, 1 to 15 percent slopes	0 – 80	None specified	Sandy to loamy fine sand; excessively drained	0.13
	EVS01530 (Main Post 2)	59	Pajarito sandy loam, 0 to 9 percent slopes	0 – 65	None specified	Loamy fine sand to fine sandy loam; well drained	0.19
	EVS01400 (Main Post 3)	59	Pajarito sandy loam, 0 to 9 percent slopes	0 – 65	None specified	Loamy fine sand to fine sandy loam; well drained	0.31
	EVS21080 (Main Post 4)	66	Queencreek-Agustin-Stagecoach complex, 0 to 14 percent slopes	0 – 63	None specified	Very to extremely gravelly sand; excessively drained	0.50
	EVS00300 (Main Post 5)	66	Queencreek-Agustin-Stagecoach complex, 0 to 14 percent slopes	0 – 63	None specified	Very to extremely gravelly sand; excessively drained	0.69
	EVS01866 (Main Post 6)	66	Queencreek-Agustin-Stagecoach complex, 0 to 14 percent slopes	0 – 63	None specified	Very to extremely gravelly sand; excessively drained	0.70
	EVS00102 (Main Post 7)	59	Pajarito sandy loam, 0 to 9 percent slopes	0 – 65	None specified	Loamy fine sand to fine sandy loam; well drained	0.14
	EVS34230 (Stallion Range)	16	Brazito-Noum complex, 0 to 9 percent slopes	0 – 60	None specified	Loamy sand to sand; excessively drained	0.13
	EVS90121 (901 Complex)	61	Pajarito-Mcnew complex, 1 to 8 percent slopes	0 – 65	None specified	Loamy fine sand; well drained	0.39
	EVS34761 (DTRA Facility Administrative Building)	91	Yesum gypsiferous sandy loam, 0 to 9 percent slopes	0 – 60	Not prime farmland	Gypsiferous sandy loam to very fine loam; well drained	0.97
	Total approximate acreage						**4.15**

Proposed Action	Facility Number	Map Unit	Soil Name	Depth (inches)	Farmland Designation	Soil Characteristics	Approx. acreage
20-MW Solar PV System	N/A	59	Pajarito sandy loam, 0 to 9 percent slopes	0 – 65	None specified	Loamy fine sand to fine sandy loam; well drained	1.67
		66	Queencreek-Agustin-Stagecoach complex, 0 to 14 percent slopes	0 – 63	None specified	Very to extremely gravelly sand; excessively drained	100.92
		Total approximate acreage					**102.59**
Solar Carports & Microgrids	N/A	16	Brazito-Noum complex, 0 to 9 percent slopes	0 – 60	None specified	Loamy sand to sand; excessively drained	40.58
		Total approximate acreage					**40.58**

Source: USDA 2023; N/A - not applicable

Geologic Hazards. Rockfalls, sinkholes, and minor earthquakes are common in New Mexico. Exposed rock outcrops are subject to these gravity-driven geologic hazards. Sinkholes are common from the dissolution of minerals at depth. In all parts of New Mexico, carbonate strata and interbedded salts are dissolved over time, which can lead to sinkholes. There are sinkholes on the eastern portion of WSMR adjacent to Holloman Air Force Base. Earthquakes can happen when rock strata on either side of a geologic fault move relative to one another. While earthquakes are common in New Mexico, they are generally minor and do not cause structural damage to buildings (NMBGMR 2023).

3.6.2 Environmental Consequences

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential impacts of a proposed action on geological resources. Generally, adverse impacts can be avoided or minimized if proper techniques, erosion-control measures, and structural engineering designs are incorporated into project development.

Impacts on geology and soils would be adverse if they would alter the lithology (i.e., the character of a rock formation), stratigraphy (i.e., the layering of sedimentary rocks), and geological structures that dictate groundwater systems; change the soil composition, structure, or function within the environment; or increase the risk of geological hazards. Additionally, scarification of soils and the removal of vegetation can take up to 15 to 30 years for recovery. As climate patterns shift, the rate of recovery may take longer. Geological resources may become more vulnerable as soil humidity declines and followed by a high wind or heavy rainstorm.

3.6.2.1 *Proposed Action*

Regional Geology. Short-term, negligible, adverse impacts on geology would be expected. Impacts on bedrock would occur from pile driving to establish the solar array and contact with heavy equipment during clearing and grading for the proposed 20-MV solar PV system; however, impacts would be negligible and superficial. No other activities associated with the proposed construction, maintenance, and operation of the Proposed Action would impact geology. No activities would alter lithology, stratigraphy, or the geological structures that control the distribution of aquifers and confining beds.

Topography. Long-term, minor to moderate, adverse impacts on topography would be expected from earthmoving and grading activities on approximately 103 acres to prepare the area of the 20-MW solar PV system (excluding the approximately 42 acres for the existing 6-MW solar PV system). The remaining project areas have been previously disturbed; however, topography may be mildly altered to provide flat surfaces for the proposed installations. Earthmoving and grading would not be required for maintenance and operations; therefore, no impacts on topography would be expected from these activities post-construction.

Soils. Short and long-term, minor to moderate, adverse impacts on soils would result from temporary disturbance of ground surfaces, earthmoving activities, and grading within the project areas during construction. Approximately 103 acres would be used to expand the solar PV system; impacts on soils from other components of the Proposed Action (approximately 45 acres for the microgrid system, EV charging stations, and back-up power generators) is confined to previously disturbed areas. Potential future installations would be placed within disturbed areas.

Within areas of new disturbance around the solar PV system, the use of trucks and construction equipment would result in soil compaction, which could also lead to increased rates of erosion

and alter soil structure. Specific construction limitations and considerations regarding subsurface composition would be incorporated into project design.

In general, accelerated erosion of soils would be temporary, during construction activities, and minimized by appropriately siting and designing facilities taking into consideration soil limitations, employing construction and stabilization techniques appropriate for the soil and climate, and implementing BMPs and erosion control measures. Construction contractors would adhere to soil erosion BMPs from both the USEPA and U.S. Forest Service. Such BMPs would include the installation of silt fencing and sediment traps, application of water to disturbed soil to reduce dust, and revegetation of disturbed areas as soon as possible following ground disturbance, as appropriate. Preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) would be recommended to mitigate erosion during construction and maintenance.

Long-term, minor, adverse impacts from the addition of up to approximately 4 acres of impervious surfaces (resulting from the installation of the EV charging stations) would also be expected. Reduced soil infiltration and soil productivity and increased runoff from additional impervious surfaces would occur; however, permanent runoff control measures as outlined in the SWPPP would be implemented to prevent erosion and flooding in surrounding areas. The SWPPP, combined with construction BMPs, would reduce potential impacts from an increase in impervious surfaces at the site.

Geologic Hazards. Short-term, negligible, adverse impacts could occur due to geological hazards. While earthquakes are common in New Mexico, they are generally minor and do not cause structural damage to buildings (NMBGMR 2023). The proposed facilities would meet all building requirements outlined in applicable state and local building codes to minimize potential impacts from earthquakes.

Implementation of BMPs and erosion control measures, as well as other appropriate preventative measures identified by federal, state, and local agencies, would be implemented where applicable to minimize potential impacts from rockfalls. These preventative measures could include regular drain and culvert maintenance, drainage ditch and channel maintenance, vegetation maintenance, and implementation of roadside stabilization measures. Given these factors, the Proposed Action would have no effects on geologic hazards.

3.6.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Geological conditions would remain as described in **Section 3.6.1**. No new impacts on geological resources would be expected to result from the No Action Alternative.

3.7 WATER RESOURCES

Water resources are natural and man-made sources of water that are available for use by, and for the benefit of, humans and the environment. Water resources relevant to WSMR in New Mexico include groundwater, surface water, wetlands, and floodplains.

Groundwater. Groundwater is water that exists in the saturated zone beneath the Earth's surface that collects and flows through aquifers and is used for drinking, irrigation, and industrial purposes. Groundwater typically can be described in terms of depth from the surface, aquifer or well capacity, water quality, and recharge rates.

Surface Water. Surface water includes natural, modified, and man-made water confinement and conveyance features above groundwater that may or may not have a defined channel and

discernable water flow. Stormwater is an important component of surface water systems because of its potential to introduce sediments and other contaminants that could degrade surface waters, such as lakes, rivers, or streams. The Energy Independence and Security Act Section 438 (42 U.S.C. Section 17094) establishes into law stormwater design requirements for federal development projects that disturb a footprint of greater than 5,000 square feet. Under these requirements, pre-development site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow.

The Clean Water Act (CWA) establishes federal limits for regulating point and non-point discharges of pollutants into Waters of the United States (WOTUS) and quality standards for surface waters. WOTUS has a broad meaning under the CWA and incorporates deep water aquatic habitats and special aquatic habitats (including wetlands and playas). EO 11990, *Protection of Wetlands*, requires federal agencies to determine whether a proposed action would occur within a wetland and to avoid new construction in wetlands wherever there is a practicable alternative.

Wetlands. Wetlands are considered WOTUS if they are determined to be jurisdictional by USACE. USFWS maintains the National Wetland Inventory (NWI) for public use, which provides maps of current status, extent, characteristics, and functions of wetland, riparian and deepwater habitats. A ruling instituted by USACE revised the definition of WOTUS protected under the CWA. The ruling came into effect on March 20, 2023. Under the 2023 Rule, WOTUS include: (1) traditional navigable waters, the territorial seas, and interstate waters; (2) impoundments of qualifying waters; (3) tributaries to qualifying waters; (4) wetlands adjacent to qualifying waters; and (5) certain intrastate lakes and ponds, streams, and wetlands.

Floodplains. Floodplains are areas of low, level ground present along rivers, stream channels, or coastal waters that are subject to periodic or infrequent inundation because of rain or melting snow. EO 11988, *Floodplain Management*, requires federal agencies to determine whether a proposed action would occur within a floodplain and to avoid floodplains to the maximum extent possible wherever there is a practicable alternative. EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, requires agencies to prepare for and protect federally funded buildings and projects from flood risks. More specifically, it requires agencies to determine specific federal building or project dimensions (i.e., how high, wide, and expansive a building or project should be) in order to manage and mitigate any current or potential flood risks. Additionally, Directive-type Memorandum 22-003, *Flood Hazard Area Management for DoD Installations*, directs the DoD to avoid development within a flood hazard area to the maximum extent practicable. It is USAG policy to avoid construction of new facilities within the floodplain, if possible, per EO 11988. A FONPA must be prepared and approved by Army Headquarters for all projects impacting floodplain areas.

3.7.1 Affected Environment

Groundwater. Most of the water used at WSMR is used on Main Post. Water is supplied to Main Post via 15 groundwater wells. Data indicates average groundwater usage per year at WSMR between 2007 and 2014 was 446 million gallons per year (MGPY). However, average water usage has decreased since 2013 with water conservation efforts. A hydrogeological and groundwater assessment determined the groundwater aquifers used by the Main Post water supply system have a safe long-term yield of 645 MGPY (Lewis 2016). Water usage peaks in the summer months.

Groundwater recharge rates in the region are highly variable due to climate cycles and precipitation rates. Precipitation in the Organ Mountains recharge the aquifer through infiltration. Precipitation on Main Post does not recharge the aquifer. The sub-basin (Sotol Creek), which feeds the WSMR supply wells receives approximately 14 inches of precipitation annually, of which only 4 to 5 percent is estimated to become groundwater. 143,000 cubic meters per day of recharge is estimated to enter the basin-fill aquifer from subbasins that rim the Tularosa Basin (Huff 2005).

Well and test hole observations on Main Post and adjacent areas of WSMR determined a continuous decline of the water table has occurred since production began in 1949 (Kelly 1973).

Surface Water. One perennial stream, Salt Creek, is located in the northern portion of WSMR. The water source for Salt Creek is snow melt and precipitation runoff originating from the Organ Mountain range located in the western portion of WSMR. Apart from Salt Creek, there are riparian areas, malpaís, and mound springs that provide surface water and have some elements of a wetland. However, surface water resources within WSMR are limited due to the arid region, high evaporation rates, and well drained soils. None of these surface waters are present within the project areas.

Wetlands. The NWI indicates no mapped wetlands or WOTUS within the proposed project areas; however, two separate riverine habitats that function as ephemeral arroyos border the project area to the north and south of the 20-MW solar PV system (see **Figure 3-2**) (NWI 2023).

Floodplains. Approximately 6 acres of the project area for the 20-MW solar PV system falls within the floodplain (see **Figure 3-2**) (U.S. Army ERDC 2018).

3.7.2 Environmental Consequences

3.7.2.1 *Proposed Action*

Groundwater. Short- and long-term, indirect, negligible to minor, adverse impacts on groundwater resources would be expected. Groundwater drawdown from the aquifer is not expected to increase due to the construction and operation of the new infrastructure. Potentially contaminated runoff into the aquifer used for potable water on WSMR is possible from construction, as runoff from the Main Post partially supplies the aquifer. BMPs would be utilized to decrease or eliminate potential adverse impacts on groundwater resources.

Additionally, there are no regulated public groundwater system sources within 200 feet of the project areas or regulated public surface water system intakes within 10 miles downgradient; therefore, the Proposed Action is unlikely to have a significant negative impact on any regulated public water system.

Surface Water. Short-term, negligible, adverse impacts on surface waters would be expected during construction of the 20-MW solar PV system which could transport sediment and other material into the adjacent riverine habitats. Other than ephemeral arroyos, Salt Creek, which is over 40 miles north of the proposed 20-MW solar PV system, is the closest surface waters to the proposed project. The riverine system (i.e., internment stream bed with gravel intermixed with finer sediment) adjacent to the 20-MW solar PV system project area does not connect to any White Sands pupfish (*Cyprinodon tularosa*) habitat or perennial body of water, even if there was a 1,000-year flood event. Changes to the drainage from construction and operation of the 20-MW solar PV system could impact unimproved roads in the vicinity. WSMR's master planning and environmental review process would be followed to ensure that habitat or surface waters would not be significantly impacted.

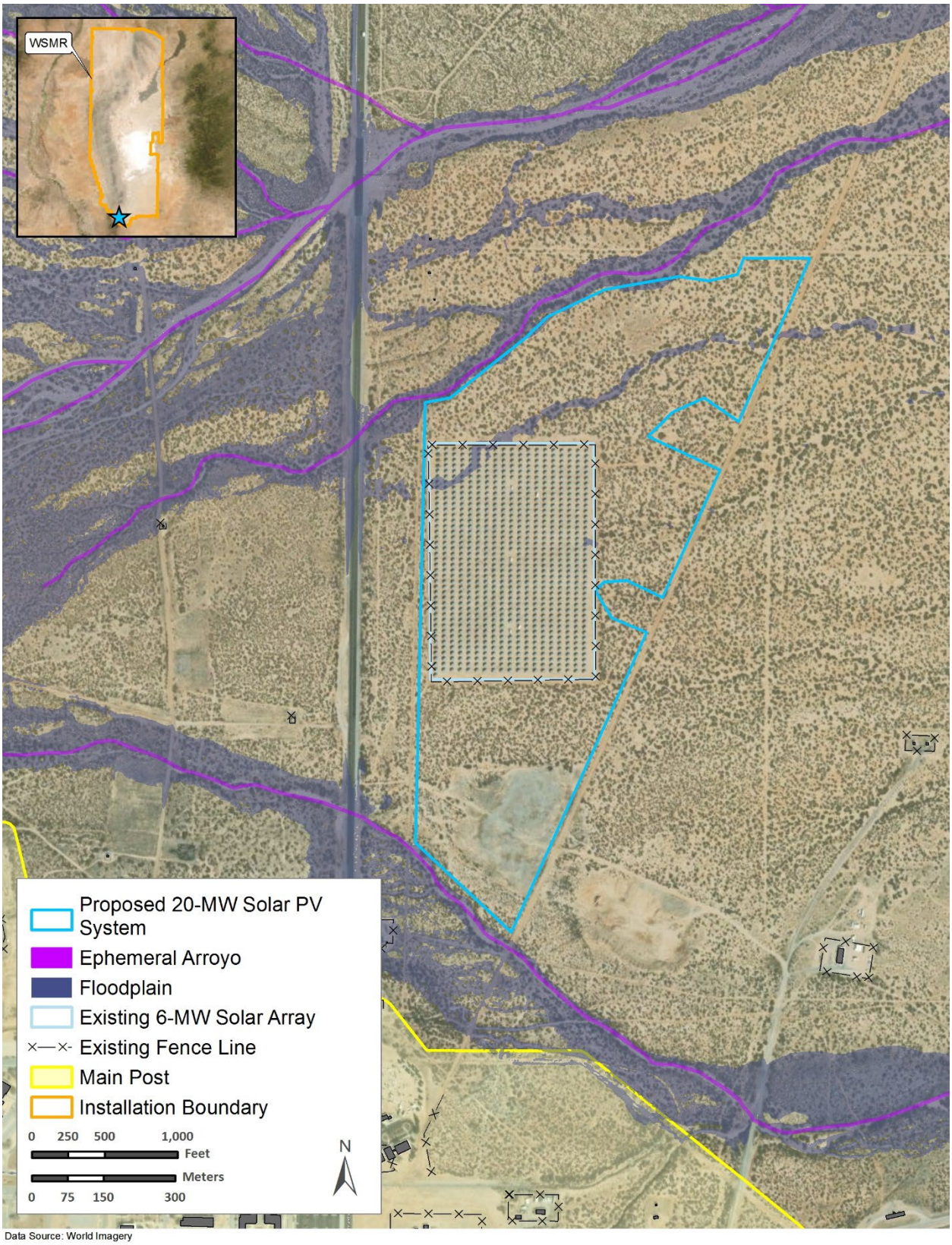

Figure 3-2. Water Features in the Vicinity of the 20-MW Solar PV System

Stormwater has the potential to transport sediment and hazardous materials to drainage ditches that connect to various surface water bodies throughout the installation. WSMR would obtain a Discharge Permit from NMED if it is deemed necessary to release discharge into the impoundments on the installation. Additionally, implementation of standard stormwater protection BMPs and spill prevention and management plans would reduce or eliminate permanent, adverse impacts on the quality of surface waters. Neither drinking water nor surface waters would be significantly impacted.

Wetlands. Given that the ephemeral arroyos bordering the project area do not connect to jurisdictional waters, the Proposed Action is not expected to impact water bodies outside of the installation.

Floodplains. Short-term, minor, and long-term, negligible, adverse impacts on the floodplain would occur as a result of the Proposed Action. Construction of a portion of the 20-MW solar PV system would occur within the floodplain and directly increase obstructions within the floodplain; however, implementation of appropriate BMPs during construction would limit short-term impacts, such as sediment and surface runoff. Long-term adverse impacts would occur from operation of the 20-MW solar PV system because of the increase of obstructions within the floodplain. WSMR implements low impact development (LID) and runoff controls in accordance with Section 438 of the Energy Independence and Security Act of 2007. This ensures that new development outside the floodplain improves and preserves stream quality, as well as managing runoff quantity. The following BMPs and LID measures would be implemented to decrease or eliminate potential adverse impacts on the floodplain:

- Construction staging areas would be located within pre-existing disturbed areas within proximity to the site and no new ground would be cleared.
- Construction vehicles would use existing roads to the fullest extent possible.
- Removal of native vegetation would be avoided to the extent practicable for erosion and invasive weed control. Invasive weed control would follow guidelines established in the WSMR Integrated Pest Management Plan.
- Disturbed areas would be restored to the fullest extent feasible and native vegetation would be allowed to reseed naturally as approved by the Environmental Division.
- BMPs and erosion control measures would be implemented to reduce the potential for runoff or erosion and sedimentation during construction.
- Catastrophic Flood Prevention control measures would also include the installation of retention ponds that would have long-term beneficial impacts on surface water and floodplains as runoff would be managed.
- The extension and fortification of the levee system and use of bioretention ponds is being considered in a separate NEPA process.
- WSMRR 200-2 requires personnel to participate in Environmental Awareness Training prior to beginning work on projects.
- All spills would be immediately reported to NMED by the Environmental Division as required by New Mexico Water Quality Control Commission regulations.
- Fuel, oil, hydraulic fluid, lubricants, and other petrochemicals would have a secondary containment system to prevent spills and would be stored outside of the flood-prone zone.

- Appropriate spill clean-up materials, such as absorbent pads, would be available on-site at all times during ground-disturbing and construction activities to address potential spills.
- Heavy equipment would be pressure washed and/or steam cleaned before entering the project areas and inspected daily for leaks.

3.7.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Water resources would remain as described in **Section 3.7.1**. No impacts on water resources would be expected to result from the No Action Alternative.

3.8 BIOLOGICAL RESOURCES

Biological resources include native or naturalized plants and animals and the habitats in which they occur, and native or introduced species found in landscaped or disturbed areas. Protected species are defined as those listed as threatened, endangered, or proposed or candidate for listing by the USFWS or NMDGF. Federal species of concern and candidate species are not protected by the ESA; however, these species could become listed, and therefore are given consideration when addressing impacts on biological resource.

Section 7 of the ESA of 1973 requires all federal agencies to use their authorities to conserve endangered and threatened species in consultation with USFWS. The ESA gives the Secretary of the Interior the responsibility of deciding whether a species' survival has been so jeopardized that it warrants conservation actions. Authority for administering the ESA has been delegated to USFWS. Under the ESA, when a species is formally "listed" (i.e., added to the Federal List of Endangered and Threatened Wildlife and Plants) federal agencies are directed to use their legal authorities to carry out conservation programs to support continued survival of the species (USFWS 1999). The New Mexico Wildlife Conservation Act [17-2-40.1 New Mexico Statutes Annotated 1978] has similar provisions and covers species that are native to New Mexico.

Sensitive habitats include those areas designated by the USFWS as critical habitat under the ESA and sensitive ecological areas as designated by state or federal rulings. Sensitive habitats also include wetlands/playas, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer/winter habitats). Further, the Army is responsible for the protection of migratory birds under the MBTA and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

WSMR's Integrated Natural Resource Management Plan (INRMP) provides interdisciplinary strategic guidance for natural resource management on the installation for a period of 5 years. Implementation of the INRMP ensures that the installation continues to support present and future mission requirements while preserving, improving, and enhancing ecosystem integrity (WSMR 2023). The 2023 INRMP was used as a baseline to develop an understanding of the resources in the project areas.

3.8.1 Affected Environment

WSMR encompasses one of the largest expanses of relatively undeveloped land remaining in the southwestern United States, extending into parts of five New Mexico counties and encompassing the majority of two major mountain ranges, the San Andres and Oscura Mountains. WSNP and the San Andres National Wildlife Refuge (SANWR) are located entirely within WSMR's boundaries.

3.8.1.1 *Ecoregion*

WSMR lies within the Chihuahuan Desert Ecoregion, which consists of a series of basins and mountain ranges, with a central highland that extends from Socorro southward into Mexico. Landforms include plains with low mountains consisting of gentle slopes and local relief of 1,000 to 3,000 feet, plains with high hills and local relief of 1,000 to 3,000 feet, open high hills with relief of 500 to 1,000 feet, and tablelands with moderate relief averaging from 100 to 300 feet (Bailey 1995).

Climate in this ecoregion is characterized by abundant sunshine, low humidity, modest rainfall, and about 250 frost-free days a year at lower elevations. Fall, winter, and spring are typically mild, and summer is hot. Strong westerly winds are most dominant in the spring and most precipitation occurs during thunderstorms in late summer. Daily and annual temperature and precipitation vary considerably, and weather patterns can be dynamic and difficult to predict (Bailey 1995).

WSMR maintains an extensive surface meteorological data-collection system, referred to as the Surface Atmosphere Measuring System, administered by the Army Research Laboratory. The average annual precipitation at WSMR's Southern Basin Climate Station since 1962 is 10.1 inches. According to the climate station records, 2020 was the fifth driest year on record. Four of the five driest years on record have all occurred in the last 2 decades. Average annual precipitation in WSMR's arid desert basins is less than 10 inches, in semiarid foothills 10 to 16 inches, and highest mountain elevations are almost temperate (WSMR 2023).

Average annual temperature has increased in the southern basin of WSMR from 1962 to 2020. Every year since 2011, temperatures at WSMR have been above average. The average low temperature in January is 29ºF and in July, the average high is 95ºF. Temperature extremes range from 112ºF (recorded at Orogrande in June 1994) to -25ºF (recorded at WSNP in January 1962) (WSMR 2023).

3.8.1.2 *Vegetation*

Several species of thorny shrubs are typical of the Chihuahuan Desert. They frequently grow in open stands, but sometimes form low thickets. They can also be associated with short grasses, such as grama (*Bouteloua sp.*). Extensive arid grasslands cover most of the high plains of the ecoregion. On deep soils, honey mesquite (*Prosopis glandulosa*) is often the dominant plant. Cacti are also abundant, particularly prickly pears (*Opuntia phaeacantha*). The desert is characterized by yuccas (*Yucca elata*) and Creosote bush (*Larrea tridentata*), the most abundant plant of the ecoregion, which is especially common on gravel fans. Species like agave (*Agave americana*) and common sotol (*Dasylirion wheeleri*) are also abundant. On rocky slopes, the ocotillo (*Fouquieria splendens*) can frequently be found.

The USFWS Information for Planning and Consultation (IPaC) tool identified seven federally listed plant species as potentially occurring at WSMR, including the Kuenzler hedgehog cactus (*Echinocereus fendleri var. kuenzleri*), Pecos sunflower (*Helianthus paradoxus*), Sacramento Mountains thistle (*Cirsium vinaceum*), Sacramento prickly poppy (*Argemone pleiacantha ssp. Pinnatisecta*), Sneed pincushion cactus (*Coryphantha sneedii var. sneedii*), Todsen's pennyroyal (*Hedeoma todsenii*), and Wright's marsh thistle (*Cirsium wrightii*) (USFWS 2023). Only one of these species has been documented at WSMR, the Todsen's pennyroyal.

Todsen's pennyroyal occurs in the San Andres Mountains and on the western slope of the Sacramento Mountains at elevations of 6,200 to 7,400 feet. There are 15 known populations of Todsen's pennyroyal at WSMR (see **Figure 3-3**). The smallest population covers 0.1 acres and the largest covers 1.22 acres.

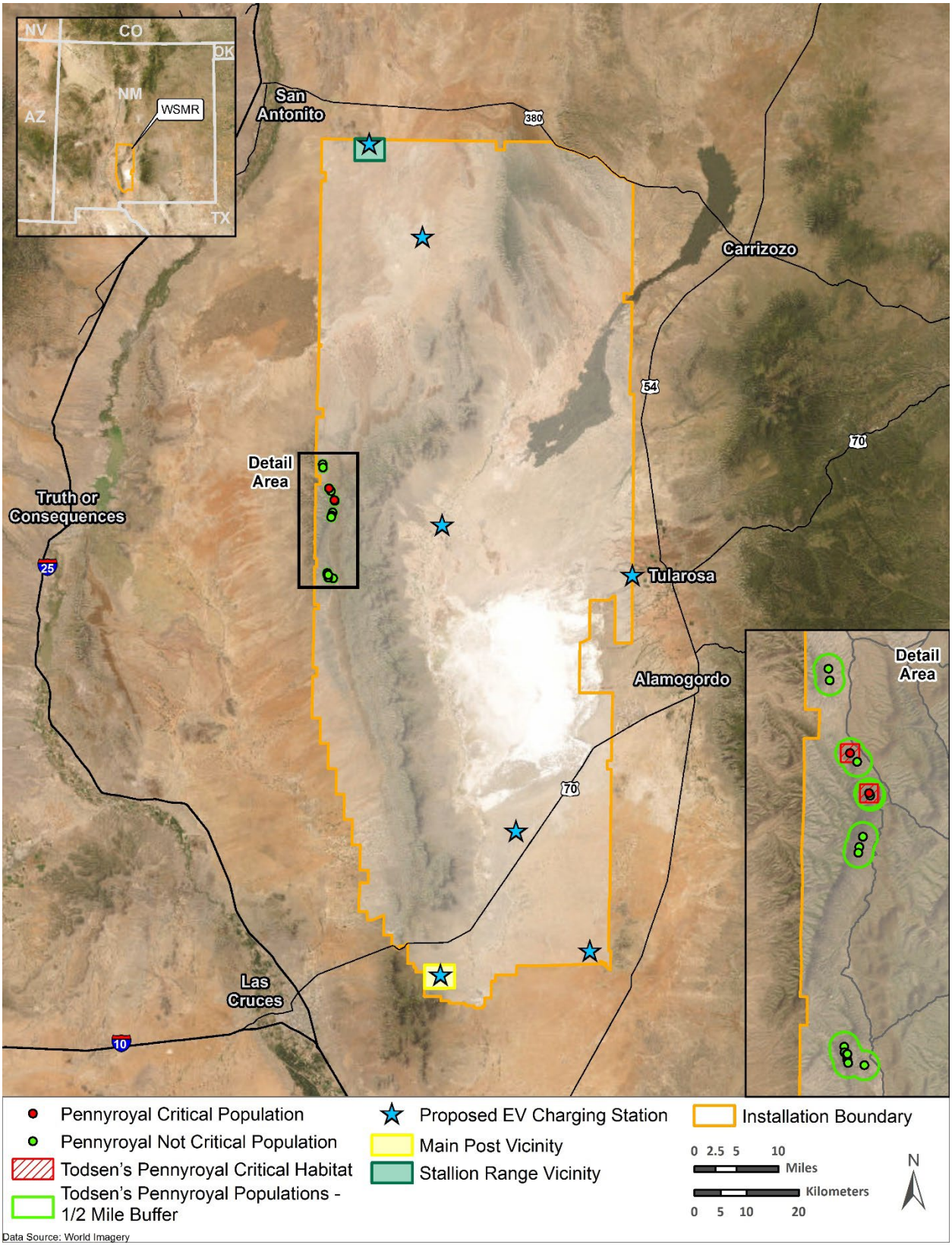

Figure 3-3. Todsen's Pennyroyal Populations and Protected Areas

Todsen's pennyroyal was originally listed as endangered, with critical habitat for two known populations, on January 19, 1981. New Mexico has also listed Todsen's pennyroyal as endangered. The Todsen's Pennyroyal Endangered Species Management Component (ESMC) was developed by WSMR to facilitate protection of this endangered species (WSMR 2023). The ESMC defines conservation goals and management objectives, and prescribes management actions for populations of Todsen's pennyroyal at WSMR.

Additionally, four NMDGF listed plant species documented at WSMR include the Mescalero milkwort (*Polygala rimulicola var. Escalerorum*), Night-blooming cereus (*Peniocereus greggii var.greggi*), Organ Mountain pincushion cactus (*Escobaria sneedii organensis*), and Todsen's pennyroyal (WSMR 2023).

3.8.1.3 *Wildlife*

The borderlands region of New Mexico is a center of biodiversity for mammals, birds, amphibians, reptiles, fishes, and insects. The diversity of species at WSMR is high, but few warm-blooded vertebrates are centered in or limited in their distribution to the Chihuahuan Desert (Brown 1994).

Mammals. New Mexico has one of the most diverse mammal communities in the world, with 179 total mammal species documented (WSMR 2023). Seventy-five of these species have been recorded at WSMR. The USFWS IPaC tool identified three federally listed mammal species as potentially occurring at WSMR, including the Mexican gray wolf *(Canis lupus baileyi*), New Mexico meadow jumping mouse (*Zapus hudsonius luteus*), and Peñasco Least chipmunk (*Tamias minimus atristriatus*) (USFWS 2023). Only the Mexican gray wolf, a federal and state endangered listed species, has been documented at WSMR (WSMR 2023). Populations of the species have improved and continue to expand their range throughout the Mexican Wolf Experimental Population Area (MWEPA) (USFWS 2022).

The Mexican gray wolf is the rarest subspecies of gray wolf in North America and was listed as endangered in 1976 (USFWS 2015). The USFWS began reintroducing Mexican gray wolves back into the wild within the MWEPA in Arizona and New Mexico in 1998. WSMR is a federal cooperating agency for the introduction of the Mexican gray wolf under the 2015 10(j) rule, revision to the regulations for the nonessential experimental population (USFWS 2022, 80 FR 2512, January 16, 2015). WSMR is within management Zone 2 of the MWEPA (87 FR39348, USFWS 2022) and one Mexican wolf has been spotted in the northern area of WSMR. Management Zone 2 is where Mexican wolves will be allowed to naturally disperse into and occupy and where Mexican wolves may be translocated.

There are three NMDGF threatened mammal species that have been documented at WSMR, including the Organ Mountains Colorado chipmunk (*Neotamias quadrivittatus organensis*), Oscura Mountains Colorado chipmunk (*Neotamias quadrivittatus oscuraensis*), and spotted bat (*Euderma maculatum*). A single mammal, the Townsend's big-eared bat (*Corynorhinus townsendii*), is listed by NMDGF as a Species of Greatest Conservation Need (SGCN) and has been documented at WSMR (WSMR 2023). One mammal on the Army Priority List of At-Risk Species (the Oscura Mountains Colorado chipmunk) has been documented at WSMR (U.S. Army 2010).

Birds. Due to its wide diversity of habitats, New Mexico has recorded the second highest number of bird species of any non-coastal state in the United States (NMACP 2016). WSMR itself has documented 313 bird species (WSMR 2023). The USFWS IPaC tool identified five federally listed bird species as potentially occurring at WSMR, including the Mexican spotted owl (*Strix*

occidentalis lucida), northern aplomado falcon (*Falco femoralis septentrionalis*), piping plover (*Charadrius melodus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and yellow-billed cuckoo (*Coccyzus americanus*) (USFWS 2023a). Additionally, on August 17, 2023, it was announced that the piñon jay (*Gymnorhinus cyanocephalus*) is under review for listing with the USFWS (USFWS 2023b).

Similarly, WSMR has documented 10 species with NMDGF listed status, including the northern aplomado falcon, southwestern willow flycatcher, bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), broad-billed hummingbird (*Cynanthus latirostris*), Costa's hummingbird (*Calypte costae*), Bell's vireo (*Vireo bellii*), gray vireo (*Vireo vicinior*), Baird's sparrow (*Centronyx bairdii*), and varied bunting (*Passerina versicolor*) (WSMR 2023). Thirteen bird species listed by NMDGF as SGCN have been documented at WSMR, including the Bendire's thrasher (*Toxostoma bendirei*), Black-chinned sparrow (*Spizella atrogularis*), burrowing owl (*Athene cunicularia*), Chestnut-collared longspur (*Calcarius ornatus*), flammulated owl (*Psiloscops flammeolus*), Loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius americanus*), Olive-sided flycatcher (*Contopus cooperi*), piñon jay, snowy plover (*Charadrius nivosus*), Virginia's warbler (*Leiothlypis virginiae*), yellow-billed cuckoo (WSMR 2023).

The 1988 amendment to the Fish and Wildlife Conservation Act mandates the USFWS to identify species, subspecies, and populations of all migratory nongame birds that without additional conservation action are likely to become candidates for listing under ESA. The Birds of Conservation Concern (BCC) distinction identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities of USFWS (USFWS 2021). WSMR is located within USFWS Bird Conservation Region 35, which lists 30 bird species as BCC (USFWS 2021). Of these 30 species, 27 species may be present at WSMR at sometime during their lifecycle.

DoD Partners in Flight (PIF) has identified, through a detailed technical analysis, 15 bird species occurring on DoD lands that may be at risk of becoming listed under the federal ESA (DoD PIF 2021). DoD PIF designated these as "Mission-sensitive Species" (MSS) due to their high potential to impact the military mission should ESA listing be warranted (DoD PIF 2021). There are two bird species that occur at WSMR that are considered MSSs, the burrowing owl and piñon jay (DoD PIF 2021).

In addition to the MSS list, DoD PIF also categorized an additional 37 species as "Tier 2" species (DoD PIF 2021). Most of these species are experiencing long-term declines and have some potential relevance to future mission impacts if federally listed, but they are not considered highest priority based on DoD PIF's current review criteria. There are 14 Tier 2 species that occur at WSMR, the long-billed curlew, flammulated owl, golden eagle (*Aquila chrysaetos*), greater yellowlegs (*Tringa melanoleuca*), black-chinned sparrow, Kentucky warbler (*Geothlypis formosa*), olive-sided flycatcher, Sprague's pipit (*Anthus spragueii*), Virginia's warbler, loggerhead shrike, Lewis's woodpecker (*Melanerpes lewis*), gray vireo, chestnut collared longspur (*Calcarius ornatus*), and Baird's sparrow (DoD PIF 2021).

Amphibians and Reptiles. WSMR contains habitat that supports a diverse array of herpetofauna, including 7 species of amphibians and 48 species of reptiles. Possible species that may never be documented due to their secretive nature and scarcity include the New Mexico milk snake (*Lampropeltis gentilis*) and many-lined skink (*Plestiodon multivirgatus*). The nonnative Mediterranean gecko (*Hemidactylus turcicus*) was detected on Main Post in 2013 (WSMR 2023). The USFWS IPaC tool identified one federally listed amphibian species as potentially occurring at WSMR, the Chiricahua leopard frog (*Rana chiricahuensis*). However, this species has not been

documented at WSMR. Additionally, NMDGF lists both the Banded Rock Rattlesnake (*Crotalus lepidus*) and Western Massasauga Rattlesnake (*Sistrurus catenatus*) as SGCN (BISON-M 2023). Three reptiles on the Army Priority List of At-Risk Species (the little white whiptail lizard [*Aspidoscelis gypsi]*, White Sands prairie lizard [*Sceloporus undulatus cowlesi]*, and Desert tortoise [*Gopherus agassizii*]) have been documented at WSMR (U.S. Army 2010).

Fishes. Field surveys at WSMR have documented nonnative fish in ponds and springs, including the Largemouth bass (*Micropterus salmoides*), goldfish (*Carrasius auratus*), and mosquitofish (*Gambusia affinis*) at Guilez and Barrel Springs. A population of bluegill (*Lepomis macrochirus*) was discovered in Martin Ranch Pond (WSMR 2023). Nonnative fish have since been eradicated at all locations at WSMR.

The USFWS IPaC tool identified two federally listed fish species as potentially occurring at WSMR, including the Rio Grande Cutthroat Trout (*Oncorhynchus clarkii virginalis*) and Rio Grande Silvery Minnow (*Hybognathus amarus*) (USFWS 2023). However, neither of these species have been documented at WSMR.

New Mexico state threatened White Sands pupfish were first recorded as occurring in Salt Creek as early as 1911. The first fish collected at WSMR were of White Sands pupfish from the headspring of Malpais Spring in 1927 and from Salt Creek in 1947 (WSMR 2023). Pupfish have been translocated to three locations at WSMR (South Mound Spring, North Mound Spring, and Main Mound Spring) as well as one location on Holloman Air Force Base (Lost River). The White Sands pupfish is also listed on the Army Priority List of At-Risk Species (U.S. Army 2010).

Snails. The USFWS IPaC tool identified two federally listed endangered snail species as potentially occurring at WSMR, including the Chupadera Springsnail (*Pyrgulopsis chupaderae*) and Socorro Springsnail (*Pyrgulopsis neomexicana*) (USFWS 2023). However, neither of these species have been documented at WSMR.

Insects. Insect surveys have been conducted in several different habitats throughout WSMR. Butterfly surveys and incidental encounters at WSMR have detected more than 100 butterfly species (WSMR 2023). Although there are no federal or state listed species of insects at WSMR, USFWS has determined that listing the monarch butterfly (*Danaus plexippus*) under the ESA is warranted but precluded at this time by higher priority listing actions (USFWS 2020). With this finding, the monarch becomes a candidate for listing. The monarch has been documented throughout WSMR. Investigators recommend further monitoring of the monarch and Poling's hairstreak (*Satyrium polingi*), which has a rare endemic subspecies (*S. p. organensis*) occurring at WSMR. The probable range of *S. p. organensis* appears to be restricted to a narrow montane corridor that starts in the Organ Mountains, extending along the San Andres Mountains and possibly the Oscura Mountains up to U.S. 380. At WSMR, this subspecies has only been recorded at two sites. As of January 2022, USFWS has proposed endangered listing for the Sacramento Mountain Checkerspot (*Euphydryas anicia cloudcrofti*). Surveys for this endemic subspecies had previously been conducted in 2005 (WSMR 2023). While the Sacramento Mountain Checkerspot was not found at that time, the survey effort did find host and food plants for that species at several sites; consequently, Environmental Division personnel have proposed follow-up surveys to confirm presence/absence of this potential endangered species (WSMR 2023).

Table 3-7 summarizes the species identified as federal and/or state listed as well as species of concern occurring at WSMR. For additional information regarding the status of the species listed below, consult WSMR's 2023–2027 INRMP (WSMR 2023).

3.8.2 Environmental Consequences

3.8.2.1 *Proposed Action*

Vegetation. Short- and long-term, direct and indirect, minor, adverse impacts on vegetation would occur. Direct impacts on vegetation from removal and crushing and indirect impacts from soil compaction and the potential for establishment of invasive species would occur. However, long-term, negligible, beneficial impacts would result from revegetation or landscaping of disturbed sites with native species supporting the native plant community on the installation.

Crushing and soil compaction would occur when vehicles and equipment access, park, and maneuver around the project areas during construction, operation, and maintenance activities. Additionally, ground disturbance and transportation of equipment could increase the potential for the establishment of invasive plant species. Adverse impacts on vegetation would be minimized with the use of appropriate BMPs, such as cleaning equipment prior to entering the project areas. In accordance with EO 13112, *Invasive Species*, active measures would be implemented to help prevent and control dissemination of invasive plant species during ground-disturbing activities. Revegetation of disturbed areas with native vegetation would further reduce the establishment of invasive species.

Wildlife Species and Habitat. Short- and long-term, minor, adverse impacts on wildlife species and their habitats would occur. Construction, operation, and maintenance activities would result in both permanent (i.e., new construction footprint) and temporary (i.e., disruption from construction and maintenance activities), minor degradation of habitat. To help mitigate these impacts, WSMR would conduct surveys for listed species prior to any construction and have a monitor onsite during construction. An updated species list from USFWS would be required to be obtained within 90 days of starting any disturbance activities.

Temporary and permanent displacement of mobile wildlife from noise, lighting, and other disturbances would occur from construction, operation, and maintenance activities. High-impact activities that require heavy equipment could cause more-mobile mammals, reptiles, and birds, including breeding migratory birds, to temporarily or permanently relocate to nearby similar habitat. This disturbance is expected to be minor, and it is assumed that displaced wildlife would return soon after activities conclude. However, to avoid nest abandonment and other adverse impacts, surveys would be conducted prior to the start of potentially disturbing activities. These impacts would be expected to be short-term and BMPs would be implemented to minimize any adverse impacts.

Table 3-7. Federal and State Listed Species and Species of Concern Potentially Occurring at WSMR

Species	Federal Status	State Status*	DoD Status	Occurrences at WSMR
Mammals				
Mexican Gray Wolf *(Canis lupus baileyi)*	E; Experimental Population, Non-Essential	E	-	None.
New Mexico Meadow Jumping Mouse *(Zapus hudsonius luteus)*	E	-	-	None.
Organ Mountains Colorado Chipmunk *(Tamias quadrivittatus)*	-	T	-	A small area of habitat within WSMR occurs in portions of Texas and Ash Canyons in the Organ Mountains.
Oscura Mountains Colorado Chipmunk *(Neotamias quadrivittatus oscuraensis)*	-	T	-	Stable populations occur within piñon/juniper habitats in the Oscura Mountains.
Peñasco Least Chipmunk *(Tamias minimus atristriatus)*	PE	-	-	None.
Spotted Bat *(Euderma maculatum)*	-	T	-	Few specimens documented at WSMR, apparently uncommon to rare.
Townsend's Big-eared Bat *(Corynorhinus townsendii)*	-	SGCN	-	Significant roost site at Victorio Peak and Fairview Mining District. Captured at 5 of 16 sites at WSMR during 2014.
Birds				
Baird's Sparrow *(Ammodramus bairdii)*	BCC	T	DoD PIF Tier 2 Species	Infrequently encountered in Stallion Basin grasslands.
Bald Eagle *(Haliaeetus leucocephalus)*	BGEPA	T	-	Occasional during migration or winter months.
Bell's Vireo *(Vireo bellii)*	-	T	-	Rarely encountered.
Bendire's Thrasher *(Toxostoma bendirei)*	BCC	SGCN	DoD PIF MSS	No confirmed sightings at WSMR and unlikely to occur east of the Rio Grande.
Black-chinned Sparrow *(Spizella atrogularis)*	BCC	SGCN	DoD PIF Tier 2 Species	Uncommon and local in chaparral and similar arid hillsides with brushy vegetation.
Broad-billed Hummingbird *(Cynanthus latirostris)*	-	T	-	Rare migrant.
Burrowing Owl *(Athene cunicularia)*	BCC	SGCN	DoD PIF MSS	Uncommon and local in open grasslands.

Species	Federal Status	State Status*	DoD Status	Occurrences at WSMR
Birds (continued)				
Chestnut-collared Longspur *(Calcarius ornatus)*	BCC	SGCN	DoD PIF Tier 2 Species	Common locally to uncommon in grasslands.
Costa's Hummingbird *(Calypte costae)*	BCC	T	-	Rarely encountered at WSMR. No breeding documented.
Flammulated Owl *(Psiloscops flammeolus)*	BCC	SGCN	DoD PIF Tier 2 Species	Uncommon in oak and pine woodlands.
Golden Eagle *(Aquila chrysaetos)*	BGEPA	-	DoD PIF Tier 2 Species	Rare in grasslands, deserts, and other open country, usually in mountainous areas. The WSMR breeding population appears to be stable over the last 10 years, with most breeding territories filled by adult breeding pairs.
Gray Vireo *(Vireo vicinior)*	-	T	DoD PIF Tier 2 Species	Breeds at WSMR. Common in canyons of the San Andres Mountains and piñon/juniper woodlands of Oscura Mountains.
Loggerhead Shrike *(Lanius ludovicianus)*	-	SGCN	DoD PIF Tier 2 Species	Common throughout WSMR.
Long-billed Curlew *(Numenius americanus)*	BCC	SGCN	DoD PIF Tier 2 Species	Uncommon in open grasslands.
Mexican Spotted Owl *(Strix occidentalis lucida)*	T	-	-	None.
Northern Aplomado Falcon *(Falco femoralis septentrionalis)*	Experimental Population, Non-Essential	E	-	Rare year-round resident possibly extirpated. Last confirmation at WSMR - 8/15/2015.
Olive-sided Flycatcher *(Contopus cooperi)*	BCC	SGCN	DoD PIF Tier 2 Species	Uncommon. Uses riparian corridors.
Peregrine Falcon *(Falco peregrinus)*	Delisted	T	-	Nest in nearby Organ Mountains. Occasionally observed at WSMR. May nest in the Oscura Mountains.
Piñon Jay *(Gymnorhinus cyanocephalus)*	Under Review for Listing	SGCN	DoD PIF MSS	Declining in juniper and piñon/juniper habitats at WSMR.
Piping Plover *(Charadrius melodus)*	T	-	-	None.
Snowy Plover *(Charadrius nivosus)*	BCC	SGCN	DoD PIF Tier 2 Species	Rare migrant.

Species	Federal Status	State Status*	DoD Status	Occurrences at WSMR
Birds (continued)				
Southwestern Willow Flycatcher *(Empidonax traillii extimus)*	E	E	-	Willow Flycatchers pass through during migration, but WSMR lacks adequate breeding habitat for the Southwestern subspecies, which has not been documented at WSMR.
Sprague's Pipit *(Anthus spragueii)*	BCC	SGCN	DoD PIF Tier 2 Species	Uncommon and local in grasslands.
Varied Bunting *(Passerina versicolor)*	BCC	T	-	Infrequently encountered.
Virginia's Warbler *(Leiothlypis virginiae)*	BCC	SGCN	DoD PIF Tier 2 Species	Uncommon. Uses piñon/juniper woodlands and riparian areas.
Yellow-billed Cuckoo *(Coccyzus americanus)*	T	SGCN	-	A rare migrant confirmed sporadically. No breeding cuckoos have been documented, and breeding habitat does not occur at WSMR.
Amphibians and Reptiles				
Banded Rock Rattlesnake *(Crotalus lepidus)*	-	SGCN	-	Found in Oscura, Mockingbird, and San Andres Mountains.
Chiricahua Leopard Frog *(Rana chiricahuensis)*	T	-	-	None.
Western Massasauga Rattlesnake *(Sistrurus catenatus)*	-	SGCN	-	Found in the northern Jornada Basin.
Fishes				
Rio Grande Cutthroat Trout *(Oncorhynchus clarkii virginalis)*	C	-	-	None.
Rio Grande Silvery Minnow *(Hybognathus amarus)*	E	-	-	None.
White Sands Pupfish (*Cyprinodon tularosa*)	Under Review for Listing	T	-	Found in Tularosa Basin, Mound Spring, Salt Creek, Malpais Spring, and Lost River.

Species	Federal Status	State Status*	DoD Status	Occurrences at WSMR
Snails				
Chupadera Springsnail *(Pyrgulopsis chupaderae)*	E	-	-	None.
Socorro Springsnail *(Pyrgulopsis neomexicana)*	E	-	-	None.
Insects				
Monarch Butterfly *(Danaus plexippus)*	C	-	-	Found throughout WSMR.
Sacramento Mountain Checkerspot *(Euphydryas anicia cloudcrofti)*	PE	-	-	None found during surveys; however, survey effort did find host and food plants for the species at several sites.
Plants				
Alamo Beardtongue (*Penstemon alamosensis*)	-	S3	-	Single occurrence located in the mouth of Bear Canyon.
Castetter's Milkvetch (*Astragalus castetteri*)	-	S3	-	Collected from the San Andres Mountains.
Kuenzler Hedgehog Cactus *(Echinocereus fendleri var. kuenzleri)*	T	-	-	None.
La Jolla Prairie Clover *(Dalea scariosa)*	-	S3	-	Found in Bosque Canyon in the San Andres Mountains.
Mescalero Milkwort *(Polygala rimulicola var. Escalerorum)*	-	E	-	Two small populations are known—both at elevations of 5,700–6,300 feet at WSMR.
Mosquito Plant *(Agastache cana)*	-	S3	-	Lower canyons and slopes of Organ Mountains.
New Mexico Beardtongue *(Penstemon neomexicanus)*	-	S4	-	Occurs in Oscura Mountains.
New Mexico Rockdaisy *(Perityle staurophylla var.staurophylla)*	-	S3	-	Occurs in San Andres Mountains.
Night-blooming Cereus *(Peniocereus greggii var.greggi)*	-	E	-	Occurs in San Andres Mountains.
Organ Mountain Pincushion Cactus *(Escobaria sneedii organensis)*	-	E	-	Occurs in Texas Canyon and is likely to occur in Organ Mountains.
Organ Mountains Evening Primrose (*Oenothera organensis*)	-	S2	-	Documented in the Organ and San Andres Mountains.
Pecos Sunflower *(Helianthus paradoxus)*	T	-	-	None.

Species	Federal Status	State Status*	DoD Status	Occurrences at WSMR
Plants (continued)				
Plank's Catchfly or Campion *(Silene plankii)*	-	S2	-	Found on Salinas Peak and at Mockingbird Gap.
Sacramento Mountains Thistle *(Cirsium vinaceum)*	T	-	-	None.
Sacramento Prickly Poppy *(Argemone pleiacantha ssp. Pinnatisecta)*	E	-	-	None.
San Andres Rockdaisy (*Perityle staurophylla var.homoflora)*	-	S2	-	Occurs in the San Andres Mountains.
Sandberg's Pincushion Cactus *(Escobaria sandbergii)*	-	S2	-	Occurs in the southern San Andres Mountains.
Silver Mock Orange (*Philadelphus microphllus)*	-	S3	-	Occurs in the San Andres Mountains, Chalk Hills.
Sivinskis Scorpionweed *(Phacelia sivinskii)*	-	S3	-	Occurs in the San Andres Mountains and Chupadera Hills.
Sneed Pincushion Cactus *(Coryphantha sneedii var. sneedii)*	E	-	-	None.
Todsen's Pennyroyal *(Hedeoma todsenii)*	E	E	-	Occurs in the San Andres and Sacramento Mountains.
Vasey's Bitterweed (*Hymenoxys vaseyi*)	-	S2	-	Occurs in the southern San Andres and Organ Mountains.
Warner's Dodder (*Cuscuta warneri*)	-	S1	-	Anecdotal evidence shows this plant occurs in Sierra County.
Wright's Marsh Thistle *(Cirsium wrightii)*	PT	-	-	None.

Source: WSMR 2023, USFWS 2023b

*New Mexico State Status (Natural Heritage): S1 = Critically Imperiled Species, S2 = Imperiled Species, S3 = Vulnerable Species, S4 = Apparently Secure

BCC	Bird of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
C	Candidate
DoD MSS	Department of Defense Mission-Sensitive Species
DoD PIF	Department of Defense Partners in Flight
E	Endangered
PE	Proposed Endangered
PT	Proposed Threatened
SGCN	Species of Greatest Conservation Need
T	Threatened

Individuals of smaller, less-mobile species could be inadvertently killed or injured during ground-disturbing activities or transportation of equipment and personnel. Burrowing animals, such as rodents and reptiles, could be impacted. However, vehicles associated with disturbance activities would be used primarily on the established roads, which limits the potential for impacts on burrowing species.

BMPs that could be implemented include employing seasonal avoidance measures during construction and training activities as well as non-disturbance buffer zones around occupied nests during the nesting period. Preconstruction surveys would be conducted during the breeding season, and if found, one of the following mitigation activities would be conducted (1) seasonal avoidance measures would be implemented until birds have vacated the affected nests (i.e., construction activities would not occur during the breeding season of March 1 to September 30; (2) spatial buffers of at least 0.25 mile from construction activities would be implemented; or (3) relocation activities would be implemented using USFWS-recommended relocators. Additionally, WSMRR 200-2 requires personnel to participate in Environmental Awareness Training prior to beginning activities at WSMR.

Maintenance activities would result in temporary, minor degradation of wildlife habitat, while construction and operation of the new infrastructure would result in permanent, minor degradation of habitat. Adherence to BMPs would minimize unnecessary disturbances to habitat.

Threatened and Endangered Species. Short- and long-term, negligible to minor, adverse impacts on federally listed threatened and endangered, or candidate species, would be expected to occur from the Proposed Action. Only one federally listed species, the Todsen's pennyroyal, and one candidate species, the monarch butterfly, have been documented at WSMR. Todsen's pennyroyal has only been documented in the San Andres and Sacramento Mountains, neither of which fall within any of the proposed project areas. Critical habitat has also been designated for the species within the San Andres Mountains within the boundaries of WSMR (see **Figure 3-3**). However, no proposed project areas are located near the designated critical habitat; therefore, no impacts on Todsen's pennyroyal populations are expected to occur.

The monarch butterfly has been documented throughout WSMR. However, with the implementation of BMPs, adverse impacts on the species would be expected to be negligible to minor. Construction, operation, and maintenance activities have the potential to result in both temporary and permanent loss of habitat for the species and temporary displacement of individuals from noise, lighting, and other disturbances. However, construction activities are not planned to occur within any known habitat. Additionally, WSMR would conduct surveys prior to any construction and have a monitor onsite during construction when necessary.

State-listed species potentially occurring at WSMR include the Organ Mountains Colorado chipmunk, Oscura Mountains Colorado chipmunk, spotted bat, Baird’s sparrow, bald eagle, Bell’s vireo, broad-billed hummingbird, Costa’s hummingbird, gray vireo, northern aplomado falcon, peregrine falcon, varied bunting, White Sands pupfish, Mescalero milkwort, night-blooming cereus, and Organ Mountain pincushion cactus. Most of the species listed above rarely occur at WSMR, and none of the species have been documented in areas that overlap with any of the proposed project areas. Therefore, no impacts on state-listed species would be expected to occur from the Proposed Action.

BMPs and Mitigation Measures. As previously stated, WSMR has the responsibility of ensuring that BMPs and mitigation measures are implemented. In addition to those listed above, the

following BMPs and mitigation measures would be applied to minimize impacts on biological resources:

- Support vehicles would use existing roads to the fullest extent possible.
- Off-road travel would be limited, and when necessary, use a single path in and out.
- Surveys for migratory birds, to include burrowing owls, would be conducted 7 days before construction activities occur during nesting season. Survey personnel would be required to meet the standards and qualifications of the Environmental Division Conservation Program.
- All openings, inside and outside of buildings and structures that allow wildlife (e.g., rodents, birds, snakes, etc.) entry would be blocked.
- Workers would be instructed to not harass, collect, possess, harm, disturb, or destroy wildlife or their parts to include, but not limited to, snakes, bats, birds, nests, eggs, or nestlings.
- Workers would be made aware of local wildlife species that have potential for negative interactions and instructed not to feed wildlife, water wildlife, or leave food or trash in areas that may attract wildlife.
- Workers would be instructed to report to the Environmental Division any injured or dead birds or active nests with eggs or nestlings discovered at the project sites.
- Removal or modification of vegetation would be conducted outside bird nesting season (March through September).
    - When vegetation removal or modification must be conducted during bird nesting season, surveys would be conducted by qualified biologists and coordinated with the Environmental Division.
    - The Environmental Division would be contacted regarding any issues regarding migratory birds, raptors, lizards, snakes, or other wildlife species of concern.
- Disturbed areas would be restored to the fullest extent feasible and native vegetation would be allowed to reseed naturally as approved by the Environmental Division.
- If bird nests are found during surveys, the Environmental Division would be consulted to determine actions to be taken.
- The Environmental Division would consult with the USFWS regarding MBTA and ESA issues.
- Eagle biologists (via the Environmental Division) would monitor the eagle nests at or adjacent to each project area to determine which nests are active during a given breeding season.
- Human and vehicle activity would remain outside of the 0.5-mile buffer area for any active eagle nest throughout the nesting season of mid-January through July.
- WSMRR 200-2 requires personnel to participate in Environmental Awareness Training prior to beginning work.
- New or retrofitted, aboveground electrical transmission and distribution lines, substations, and transformer equipment would be constructed in conformance with the Avian Power Line Interaction Committee's *Suggested Practices for Avian Protection on Power Lines* (2006) and *Reducing Avian Collisions with Power Lines* (2012).

- All power poles would be eagle-safe in accordance with the WSMR Avian Protection Plan.
- LED lighting would be installed in accordance with UFC 3-530-01, including fully shielded luminaires and lights pointing down (at 0-degree tilt) straight at the ground (DoD 2023).
- Grading and/or blading within the proposed project areas would be minimized as much as practicable to help retain wildlife habitat features and preserve existing vegetation and soil structure.
- The design of the fence would minimize impacts on wildlife as much as practicable while also satisfying security requirements.

3.8.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Biological conditions would remain as described in **Section 3.8.1**. No new impacts on biological resources would be expected to result from the No Action Alternative.

3.9 CULTURAL RESOURCES

Cultural resources are historic sites, buildings, structures, objects, or districts considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural or engineering resources, and traditional cultural resources. Federal laws and EOs that pertain to cultural resources management include the NHPA (1966), the Archeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990). The installation's Integrated Natural and Cultural Resources Management Plan (INCRMP) is the guidance document for cultural resources for planning and proposed activities at WSMR.

Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (e.g., projectile points and bottles), but standing structures do not remain. Architectural resources include standing buildings, bridges, dams, other structures, and designed landscapes of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to warrant consideration for the National Register of Historic Places (NRHP). More recent structures might warrant protection if they are of exceptional importance or if they have the potential to gain significance in the future. Resources of traditional, religious, and cultural importance can include archaeological resources, sacred sites, structures, neighborhoods, prominent topographic features, habitat, plants, animals, or minerals considered essential for the preservation of traditional culture.

The NHPA defines historic properties as buildings, structures, sites, districts, or objects listed in or eligible for listing in the NRHP. Resources found significant under NRHP criteria are considered eligible for listing in the NRHP. Historic properties are generally 50 years of age or older, are historically significant, and retain sufficient integrity to convey their historic significance. Such resources might provide insight into the cultural practices of previous civilizations, or they might retain cultural and religious significance to modern groups. Cultural resources listed as NHLs are historic properties of exceptional national significance.

Under Section 106 of the NHPA, federal agencies must take into consideration the effect of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Under this process, the federal agency evaluates the NRHP eligibility of resources within the proposed undertaking's area of potential effects (APE) and

assesses the possible effects of the proposed undertaking on historic properties in consultation with the SHPO and other consulting or interested parties, including the public.

The APE is defined as the geographic area or areas within which an undertaking (project) may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The APE for the Proposed Action is defined as the combined project areas of the 20-MW solar PV system, microgrid systems, EV charging stations, and backup power generators.

3.9.1 Affected Environment

The cultural heritage at WSMR includes prehistoric evidence from occupation as early as the Paleoindian period and as late as the Cold War and modern military occupation. Over 8,000 archaeological sites, buildings, and structures have been identified on WSMR and it is estimated that as many as 50,000 prehistoric sites exist on the installation (WSMR 2009). A review was conducted of the New Mexico Cultural Resources Inventory System (NMCRIS) database as well as the WSMR cultural resource database to identify all historic properties within the APEs.

Consultations to comply with Section 106 of the NHPA are currently underway. Previous consultations with the Mescalero Apache and the Ysleta del Sur Pueblo (Tigua) tribes have not identified any Traditional Cultural Places (TCPs) within the APE. WSMR will continue to consult with the tribes regarding their concerns. WSMR will consult with the Mescalero Apache Tribe and the Ysleta del Sur Pueblo (Tigua) regarding their concerns about properties of traditional cultural and religious importance that may be present.

Solar PV System. The southern one-third of the proposed area was covered by a cultural resources survey completed by Human Systems Research, Inc. (HSR) in 1985 (Kirkpatrick 1986). The 1985 survey by HSR covered 7,520 acres of WSMR at 25-meter intervals and recorded 57 archaeological sites. Survey of the northern two-thirds of the proposed area was completed by Lone Mountain Archaeological Services in 2004 (Walker and Mollard 2005). This survey covered 4,324 acres using survey transects spaced at 15-meter intervals and recorded 33 new archaeological sites. Combined survey coverage from the two surveys encompasses the entire solar PV system area.

The proposed boundaries of the solar PV system do not intersect with any recorded archaeological sites. Adjacent archaeological sites LA 51222, LA 58861, LA 116548, LA 147139, LA 147140, LA 147141, and LA 147142 are avoided through design. Of these, three sites have been recommended eligible for listing on the NRHP. The remaining have been determined ineligible or have not been evaluated. Five additional sites are within a 500-meter radius of the proposed project boundaries. No historic buildings are within the solar PV system area.

Microgrid Systems. A proposed microgrid system would be constructed in the Stallion Range Center. The system would require new power poles and overhead lines, as well as underground fiber to tie into the microgrid system. The proposed microgrid area was also surveyed by HSR in 1985 (Kirkpatrick 1986). The survey covered 7,520 acres of WSMR at 25-meter intervals and recorded 57 archaeological sites. Another survey completed by HSR in 1991 overlaps a small portion of the proposed project area. Transects were walked at 15-meter intervals (Browning 1991). No resources were recorded within the proposed microgrid system area.

The area was also partially surveyed by Harris Environmental in 2018 (Norred 2019). This survey covered 300 acres at standard survey intervals of 15 meters. No cultural resources were recorded within the proposed microgrid system area.

Additionally, solar carports would be installed in various locations within the Stallion Range Center. The location of all solar carports has yet to be determined.

Though not recorded yet, the Stallion Range Center will become a historic district encompassing Cold War-era buildings. The microgrid system is within the proposed future historic district.

EV Charging Stations. EV charging stations would be constructed at designated locations near existing facilities and within existing disturbed areas. Ten locations are currently being considered. These include the Main Post, Stallion Range Center, DTRA Facility Administrative Building, and 901 Complex. Multiple EV charging stations would be placed on the Main Post and Stallion Range Center. Activities required for charger installation typically include excavation for the placement of a concrete pad and trenching for conduit.

Backup Power Generators. Backup power generators would be installed on the Main Post and Stallion Range Center. A search of the NMCRIS database identified 93 historic buildings, 7 historic structures, and 4 historic objects recorded in the Historic Cultural Properties Inventory within the Army Navy Cantonment Historic District. Though the individual built resources are largely unevaluated for listing on the NRHP, the Army Navy Cantonment Historic District has been determined eligible. Twenty archaeological sites have also been recorded within the Main Post. Nine of these sites have been determined or recommended eligible for the NRHP under Criterion D for their potential to provide information relevant to the history or prehistory of the area. Additionally, seven sites have been recommended eligible for the NRHP under Criteria A and C.

As mentioned above, the Stallion Range Center will be recorded as a historic district encompassing the Cold War era buildings.

3.9.2 Environmental Consequences

Impacts resulting from the proposed actions would be considered significant if they were to:

- Adversely affect known cultural resources considered eligible for inclusion into the NRHP.
- Adversely affect the significance and the integrity of a historic district.
- Damage or impact previously unknown and recorded archaeological and historical resources.
- Cause substantial unauthorized artifact collection by personnel.
- Adversely affect known TCPs on WSMR.

3.9.2.1 *Proposed Action*

Solar PV System. Short-term, direct, negligible, adverse impacts on cultural resources would result from the solar PV system. Activities under the solar PV system would include excavation for footings, conduit trenches, and power poles. Grading and vegetation removal would occur over the entire area to level and prepare the land for construction. The proposed locations have been fully surveyed for cultural resources. All adjacent identified cultural resources have been avoided through design. Identified cultural resources would be flagged and avoided during construction activities. Direct effects from the solar PV system would be negligible.

In addition to avoidance efforts, in accordance with WSMRR 200-2, construction workers would be provided Environmental Awareness Training and receive briefings prior to construction. Briefings would include identifying restricted areas, restrictions on artifact collection, and protocols

to be followed in the event of inadvertent discoveries of cultural resources, including human remains. Should accidental or inadvertent discoveries of cultural resources occur, program personnel would implement the appropriate procedures from the installation's INCRMP pertaining to inadvertent discoveries. Any ground-disturbing activity would cease and USAG-WSMR archaeologists would be notified immediately. With these measures in place, any direct or indirect impacts would be minor.

Microgrid System. Visual effects to the pending Stallion Range Center historic district would need to be assessed. Long-term, direct and indirect effects on the district caused by the microgrid system are anticipated to be minor. Installation of the solar carports, locations yet to be determined, would be required to comply with the siting criteria outlined in **Section 2.3.1.2**, including avoiding impacts on cultural resources.

EV Charging Stations. The installation of EV charging stations would occur within previously disturbed areas. Siting of the EV charging stations would also comply with criteria outlined in **Section 2.3.1.2**, including avoiding impacts on cultural resources. Long-term, visible impacts on any historic building in the vicinity of charging stations would be negligible due to the small scale of the stations and siting within existing parking areas.

Backup Power Generators. Backup power generators would be installed on the Main Post and Stallion Range Center. Installation would require no ground disturbance and would occur at designated locations near facilities and within disturbed areas. Therefore, installation would have no direct effects on cultural resources. Long-term, visible impacts on the Army Navy Cantonment Historic District and the pending Stallion Range Historic District would be minor.

3.9.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Cultural resources would remain as described in **Section 3.9.1**. No new impacts to cultural resources would be expected to result from the No Action Alternative.

3.10 INFRASTRUCTURE

Infrastructure consists of the man-made systems and physical structures that enable a population in a specified area to function. Infrastructure components to be discussed in this section include the temporary facilities on the Main Post, NOP buildings, designated training areas, transportation elements, and utilities. Utilities generally include electrical supply, water supply, natural gas/propane supply, sanitary sewer and wastewater, stormwater drainage, and solid waste management. However, most of these utilities, along with transportation elements, are currently present at the proposed project areas and would not be expected to be added under the Proposed Action. Solid waste management primarily relates to the availability of landfills to support a population's residential, commercial, and industrial needs.

3.10.1 Affected Environment

Transportation/Road Network. Access to all parts of WSMR is provided by an extensive network of roads and highways. Interstate highways I-10 and I-25, and other major highways U.S. 380, 70 and 54 provide access to WSMR. U.S. 70 crosses the southern portion of WSMR with an exit 5 miles north of the Main Post (WSMR 2015).

A large network of limited access range roads has been developed and maintained by WSMR including 1,338 miles of major range roads, 596 miles of secondary roads, 1,490 miles of bladed

trails, and an undetermined length of remote two-track, four-wheeled-vehicle trails. WSMR has approximately 700 miles of roads to maneuver throughout designated off-road training areas. Major range roads are two-lane paved or graded surfaces, while all secondary roads are unpaved. WSMR has 15,840 square yards of tank trails located south of the U.S. 70 (WSMR 2009).

Electrical System. Electricity is generated off-site and supplied to WSMR by local commercial utilities. Electricity is distributed across WSMR through approximately four circuit miles of 115 kilovolt overhead transmission lines, 153 circuit miles of overhead power distribution lines, 11 circuit miles of underground lines, and 12 circuit miles of overhead/underground street lighting circuits. Semi-permanent, portable generators are available and provide electrical power to remote test sites at WSMR (WSMR 2015).

Natural Gas System. Main Post has natural gas supplied from El Paso, Texas by the Public Service Company of New Mexico for heating and other industrial and residential uses. Tank-fed propane gas is used for heating and other purposes at all other WSMR facilities (WSMR 2015).

Water Supply Systems. WSMR's potable water supply is provided fully by groundwater sources. Water is drawn from six well fields to supply five state-permitted water systems. As of 2015, there are 16 active drinking water supply wells and several water storage tanks throughout the installation.

Sanitary Sewer and Wastewater System. There are multiple wastewater treatment facilities at WSMR, the main facility being on the Main Post. Water quality is monitored and meets both NMED and USEPA standards (WSMR 2009).

Stormwater Discharge/Collection System. WSMR lies mostly within the Tularosa Basin, which has an average of 10 inches of rainfall per year. Main Post is most affected by runoff due to the large areas of impervious surface. In 1968, a levee was built along the western edge of the Main Post to divert stormwater drainage north and south of the Main Post. Storm pipes, inlets, and culverts provide drainage assistance in sections of the northern housing area and the administrative area between Headquarters Avenue and Dryer Street. Stormwater runoff control measures are covered under the Environmental Protection section of the general specifications for contracts supporting military construction projects assigned to USACE at WSMR (WSMR 2009).

Solid Waste Management. There are five landfills located at WSMR, two of which are closed (Main Post Municipal Landfill and Main Post Asbestos Landfill). The three other landfills are the Stallion Range Center Landfill, Permanent High-Explosive Testing Site Construction and Demolition Landfill, and Main Post Construction and Demolition Landfill. Municipal waste generated from the Main Post housing area and municipal solid waste generated from the industrial and administrative areas of WSMR are disposed of at off-site landfill locations (WSMR 2021a).

3.10.2 Environmental Consequences

3.10.2.1 *Proposed Action*

Transportation/Road Network. Short-term, negligible to minor, adverse impacts on the existing road network at WSMR would occur. Construction operations associated with the Proposed Action may result in temporary impacts on the transportation system from the closure of roads and increased contractor vehicle presence in the project areas. Closures and traffic changes during construction would be communicated on- and off-installation. The addition of few access

roads in the project areas would result in negligible impacts on the transportation system as they would be mainly used by contractors to access the constructed facilities and not frequented by or impede the flow of traffic.

Electrical System. Short- and long-term, moderate, adverse impacts on the electrical system at WSMR would occur. Under the Proposed Action, an increase in electricity would be necessary to support and maintain the new construction and installation of an additional 20-MW solar PV system, microgrid systems, solar carports, ESS, and EV charging stations. Installation of new electrical lines, overhead or underground, may be required to connect the newly constructed infrastructure to the electrical grid and allow for the influx of electrical consumption. Interruptions to the electrical system may occur during construction and installation, but impacts are anticipated to be negligible to minor. BMPs would be implemented, to include adherence to the WSMR dig permit process to ensure underground utilities are not disturbed. The net change in total electricity consumption at the installation is expected to result in long-term, negligible to minor, beneficial impacts as the new solar PV systems would assist in offsetting the consumption of electricity from the current power grid.

Natural Gas System. Long-term, negligible, adverse impacts on the natural gas supply system at WSMR would occur. Under the Proposed Action, natural gas could be used to supply power to the backup generators installed on the Main Post. Interruptions to the natural gas system may occur during construction but impacts are anticipated to be negligible. The net change in total natural gas consumption at the installation due to being the power source for the backup generators is expected to be negligible as the generators would only be utilized when necessary.

Water Supply System. Short-term, negligible, adverse impacts on the water supply system at WSMR would occur. During construction, an increase in water consumption from on-site wells may occur from the use of water for dust suppression and the cleaning of equipment, but impacts are anticipated to be negligible. Due to the location of main and service water lines in the project areas, disturbance during construction could occur but is not anticipated to occur.

Sanitary Sewer and Wastewater System. The Proposed Action is not anticipated to result in any changes to the installation's wastewater collection system as no new facilities are being constructed that would integrate with the current sanitary sewer and wastewater systems.

Stormwater Discharge/Collection System. The Proposed Action would not be expected to result in significant impacts on the stormwater handling system as construction activities would be temporary and BMPs and erosion control measures would be implemented to reduce the potential for runoff or erosion and sedimentation during construction.

Solid Waste Management. Short-term, minor, adverse impacts on solid waste management would occur. Construction activities would result in temporary increases in the generation of solid waste. Waste disposal would be conducted in accordance with the installation's Integrated Solid Waste Management Plan and all federal, state, and local laws and regulations. Construction debris generated would consist primarily of recyclable and reusable building materials, such as concrete, metals (e.g., conduit, piping, and wiring), and removed vegetation and trees. The remaining solid waste would be added to the waste already collected by a contractor and transported off-site. The construction would increase the overall amount of solid waste generated at the installation but would not significantly alter the existing solid waste management system as materials that could be recycled or reused would be diverted from landfills to the greatest extent possible. All construction debris generated from the Proposed Action would be disposed of in

coordination with Compliance, Solid Waste Management. Solid waste would be diverted from the landfill and recycled to the greatest extent possible.

3.10.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Infrastructure would remain as described in **Section 3.10.1**. The No Action Alternative would maintain the current inadequate state of the installation's energy supply. No new impacts on infrastructure would be expected to result from the No Action Alternative.

3.11 HAZARDOUS MATERIALS AND WASTES

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Hazardous materials are defined by 49 CFR Section 171.8 as hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR Section 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR Part 173. Petroleum products include crude oil or any derivative thereof, such as gasoline, diesel, or propane. They are considered hazardous materials because they present health hazards to users in the event of incidental releases or extended exposure to their vapors.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) at 42 U.S.C. Section 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating, reversible illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." Certain types of hazardous wastes are subject to special management provisions intended to ease management burden and facilitate the recycling of such materials. These materials are called universal wastes and requirements for managing them are established in 40 CFR Part 273, *Standards for Universal Waste Management*. Wastes covered under the universal waste regulations include batteries, pesticides, mercury-containing equipment, lamps, and aerosol cans.

Evaluation of hazardous materials and wastes focuses on the storage, transportation, handling, and use of hazardous materials, as well as the generation, storage, transportation, handling, and disposal of hazardous wastes. In addition to being a threat to humans, the improper release or storage of hazardous materials, hazardous wastes, and petroleum products can threaten the health and well-being of wildlife species, habitats, soil systems, and water resources.

Toxic Substances. Toxic substances are substances that might pose a risk to human health and are addressed separately from hazardous materials and hazardous wastes. Toxic substances include asbestos-containing materials (ACMs), lead-based paint (LBP), and polychlorinated biphenyls (PCBs), all of which are typically found in buildings and utilities infrastructure.

Asbestos is regulated by the USEPA under the Clean Air Act; Toxic Substances Control Act; and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The USEPA has established that any material containing more than 1 percent asbestos by weight is considered an ACM. ACMs are commonly found in building materials such as floor tiles, mastic, roofing materials, pipe wrap, and wall plaster. The USEPA has implemented several bans on various ACMs between 1973 and 1990, so ACMs are most likely to be found in older buildings

(i.e., constructed before 1990). LBP was commonly used prior to its ban in 1978; therefore, buildings constructed prior to 1978 may contain LBP. PCBs are man-made chemicals that persist in the environment and were widely used in building materials (e.g., caulk) and electrical products prior to 1979. Structures constructed prior to 1979 potentially include PCB-containing building materials.

Environmental Contamination. CERCLA governs response or cleanup actions to address releases of hazardous substances, pollutants, and contaminants into the environment. The Defense Environmental Restoration Program was formally established by Congress in 1986 to provide for the cleanup of DoD property at active installations, Base Realignment and Closure installations, and formerly used defense sites throughout the United States and its territories. The two significant program areas under the Defense Environmental Restoration Program are the Installation Restoration (IR) Program and the Military Munitions Response (MR) Program. The IR Program addresses contaminated sites, while the Military MR Program addresses nonoperational military ranges and other sites suspected or known to contain unexploded ordinances, discarded military munitions, or munitions constituents. Each site is investigated, and appropriate remedial actions are taken under the supervision of applicable federal and state regulatory programs. When no further remedial action is necessary for a given site, the site is closed, and it no longer represents a threat to human health.

Per- and polyfluoroalkyl Substances (PFAS). PFAS refers to an entire class of substances that includes perfluorooctane sulfonate and perfluorooctanoic acid. PFAS are found in everyday consumer items, as well as industrial products including certain firefighting foams known as aqueous film forming foam (AFFF). The DoD began using AFFF containing PFAS in the 1970s and is one of many users of AFFF. Other major users of AFFF include commercial airports, the oil and gas industry, and local fire departments.

Radon. Radon is a naturally occurring odorless and colorless radioactive gas found in soils and rocks that can lead to the development of lung cancer. Radon tends to accumulate in enclosed spaces, usually those that are below ground and poorly ventilated. USEPA established a guidance radon level of 4 picocuries per liter (pCi/L) in indoor air for residences, and radon levels above this amount are considered a health risk to occupants.

3.11.1 Affected Environment

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Hazardous materials are used throughout WSMR for various functions, including research, development, testing, and evaluation support; vehicle, equipment, and facility maintenance; and fabrication shop and photographic operations. Hazardous materials and petroleum products used in these functions include solvents, acids, fuels, lubricating oils, antifreeze, paints and thinners, and pesticides and herbicides. WSMRR 200-1, *Environmental Hazardous Waste/Material Management*, is applicable to all organizations, tenants, and contractors on the installation using hazardous materials or generating hazardous wastes (WSMR 2006). WSMRR 200-2 provides necessary guidance to all personnel, guests, and visitors who conduct or observe activities on WSMR to protect the environment (WSMR 2013). Procedures and responsibilities for responding to a hazardous material or petroleum spill or other incident are outlined in the Spill Response and Reporting Standard Operating Procedure (SOP) (WSMR 2022). Pesticides and herbicides used on WSMR must be listed on the Armed Forces Pest Management Board Standard Pesticide List and approved by the WSMR Integrated Pest Management (IPM) Coordinator. Additionally, before pesticides are used, nonchemical control efforts should be used to the maximum extent possible.

Application of pesticides and herbicides are conducted by certified applicators, either contractor or WSMR personnel, in accordance with the installation's IPM Plan (WSMR 2021b).

Hazardous wastes commonly generated at WSMR include waste paint, solvent waste, solder waste, used fuel filters, rags and absorbents, and laboratory wastes. WSMR is a RCRA Large Quantity Generator (USEPA identification number NM2750211235). RCRA Large Quantity Generators generate more than 1,000 kilograms of non-acute hazardous waste or more than 1 kilogram of acute hazardous waste per calendar month. Hazardous waste generating activities on WSMR include research, development, testing, and evaluation support; vehicle, equipment, and facility maintenance; fabrication shop and photographic operations; and environmental restoration activities. Additionally, WSMR is a large quantity handler of universal waste. A large quantity handler of universal waste accumulates 5,000 kilograms or more total of universal waste at any time. Universal wastes generated at WSMR include used batteries, mercury-containing equipment, and spent fluorescent bulbs. WSMR has implemented specific procedures to manage and track hazardous waste on the installation. These procedures ensure that hazardous waste is properly managed and tracked from the time it is generated until it leaves the Hazardous Waste Storage Facility for disposal (WSMR 2006).

Toxic Substances. Toxic substances such as ACMs, LBP, and PCBs may be found in buildings and utility infrastructure on the installation. Once it is determined which buildings on the installation have the potential to require wired connections to the proposed energy readiness systems, they would undergo WSMR's master planning and environmental review processes to determine whether there is a potential to encounter toxic substances.

Environmental Contamination. WSMR has 74 active IR sites that include known or suspected soil and groundwater contamination associated with landfills, petroleum storage areas, oil/water separators, drainage areas, septic systems, fire training areas, and spill areas. Additionally, the installation has 4 active MR sites, and 9 active Compliance-Related Cleanup (CC) sites (USAEC 2022). There are no active IR, MR, or CC sites within or adjacent to the proposed energy readiness systems; therefore, environmental contamination will not be discussed further.

Polyfluoroalkyl Substances. Areas of Potential Interest (AOPIs) were identified on WSMR for the potential use, storage, or disposal of AFFF or PFAS-containing materials. Samples were collected for a Preliminary Assessment (PA)/Site Inspection (SI) in July and November 2020. Sixteen AOPIs were identified during the PA that were associated with fire training areas, fire stations, storage areas, maintenance shops, photo processing facilities, landfills, and sanitary sewers and SI sampling was conducted at all 16 AOPIs to evaluate the presence or absence of PFAS. Six of the AOPIs had detection levels in the soil that exceeded the Office of the Secretary of Defense risk screen levels for PFAS. No groundwater samples exceeded current screening levels. Based on the results, the six AOPIs that had detection level exceedances for PFAS in the soil were recommended for further study in the Remedial Investigation phase (USAEC 2022). None of the proposed energy readiness systems are within or adjacent to the AOPIs being investigated for PFAS; therefore, polyfluoroalkyl substances will not be discussed further.

Radon. USEPA rates Socorro, Sierra, Doña Ana, Otero, and Lincoln counties in New Mexico as radon zone 2. Counties in radon zone 2 have a moderate potential with predicted average indoor radon levels between 2 and 4 pCi/L (USEPA 2023d). All housing units and operational facilities on WSMR with basements or subsurface structures have been surveyed and none of the facilities on the installation exceeded USEPA regulatory levels of 4 pCi/L and no remediation was required (WSMR 2006). Therefore, radon will not be discussed further.

3.11.2 Environmental Consequences

3.11.2.1 *Proposed Action*

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Short- and long-term, negligible to minor, adverse impacts would occur from the use of hazardous materials and petroleum products and the generation of hazardous wastes during construction and maintenance of the proposed energy readiness systems. Hazardous materials that could be used include concrete, asphalt, paints, solvents, preservatives, and sealants. Petroleum products such as hydraulic fluid, oils, lubricants, diesel fuel, and gasoline would be used in vehicles and equipment supporting construction. Implementation of BMPs and environmental protection measures would reduce the potential for an accidental release of these materials. All construction equipment would be maintained according to manufacturer's specifications, and drip mats would be placed under parked equipment as needed. Additionally, all hazardous materials; petroleum products; and hazardous, universal, and petroleum wastes used or generated during construction and maintenance would be contained, stored, and managed in accordance with WSMRR 200-1 and 200-2, as applicable; the Spill Response and Reporting SOP; and federal, state, and Army-applicable regulations to minimize the potential for releases (e.g., secondary containment, inspections, spill kits).

Maintenance of the proposed energy readiness systems would include the use of pesticides and herbicides. All pesticides and herbicides used would be on the Armed Forces Pest Management Board Standard Pesticide List and approved by the WSMR IPM Coordinator. Application of pesticides and herbicides would be conducted by certified applicators, either contractor or WSMR personnel, in accordance with the installation's IPM Plan and all federal, state, and local regulations. Should a pesticide spill occur, the applicator would clean up the spill in accordance with the WSMR Spill Response and Reporting SOP. If applied by a contractor, the contractor would not store pesticides on the installation and all pesticides would be mixed prior to arrival. The contractor would dispose of excess pesticides, pesticide containers, pesticide residue, pesticide rinse water, or any pesticide contaminated article according to federal, state, and local regulations at an authorized off-installation disposal area.

PV solar panels have an estimated lifespan of 25 to 35 years. The three options for the disposal of solar panels that have reached their end of life are landfilling, recycling, or secondary use. Federal solid and hazardous waste regulations under RCRA apply to solar panels if they are determined to be hazardous. Heavy metals such as lead and cadmium would be an issue if detected. With variations in design and components, some panels may contain hazardous components while others do not (USEPA 2022b). Should it be determined to landfill end-of-life solar panels, disposal would be handled in accordance with WSMRR 200-1 and 200-2; the installation's Integrated Solid Waste Management Plan; and federal, state, and local regulations.

Some states have enacted end-of-life solar panel policies; however, New Mexico has not. Although New Mexico has not enacted end-of-life solar panel policies, it has adopted the 2015 and 2018 Definition of Solid Waste Rule and hazardous waste solar panels can be recycled using the transfer-based exclusion at 42 CFR Section 261.4(a)(24). Many components of solar panels can be recycled to include glass, aluminum, copper wire, and plastic. While the solar panel recycling industry is new and still growing, recycling processes are already established for the glass, metals, and electronics industries which can accommodate solar panels. Additionally, other components of a solar power system to include inverters, racks, and ESS could also be recycled. Inverters could be recycled as electronic waste, racking could be recycled with similar scrap metals, and ESS could be handled under current battery recycling programs. Another way to

avoid landfilling end-of-life solar panels would be through panel reuse, either by direct reuse or refurbishment. Secondary reuse requires regulatory considerations such as electrical grid interconnection regulations and fire, building, and electrical codes that must be examined for solar panel reuse. However, there are many beneficial ways to reuse solar panels where they are not connected to the electrical grid such as vehicle charging stations or use at remote locations (USEPA 2022b, USEPA 2023e). Should it be determined to recycle or reuse end-of-life solar panels, the installation or local utility company would adhere to all federal, state, and local policies and regulations.

Should unknown, potentially hazardous wastes be discovered or unearthed during construction, contractors would immediately cease work, contact appropriate installation personnel, and await sampling and analysis results before taking further action. Any unknown wastes determined to be hazardous would be managed and disposed of in accordance with applicable laws and regulations.

Toxic Substances. Short-term, negligible, adverse impacts on toxic substances could occur during construction associated with some of the energy readiness systems under the Proposed Action. Installation of some of the systems may require penetration of buildings to run wiring or conduit and depending on the year of construction may have the potential to contain ACM, LBP, or PCBs. Once it is determined which buildings on the installation require wired connections to the proposed energy readiness systems, they would undergo WSMR's master planning and environment review processes and appropriate measures would be taken to reduce the potential for exposure to, and release of, toxic substances. Contractors would wear appropriate personal protective equipment (PPE) and adhere to all federal, state, and local regulations as well as the installation's management plans for toxic substances. All ACM-, LBP-, and PCB-contaminated debris would be disposed of at a USEPA-approved landfill.

3.11.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Hazardous material and waste conditions would remain as described in **Section 3.11.1**. No new impacts to hazardous materials and wastes would be expected to result from the No Action Alternative.

3.12 SAFETY

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Human health and safety address workers' and public health and safety during and following construction, demolition, and training activities.

Site safety requires adherence to regulatory requirements imposed for the benefit of employees and the public. Site safety includes implementation of engineering and administrative practices that aim to reduce risks of illness, injury, death, and property damage. The health and safety of onsite military and civilian workers are safeguarded by numerous DoD and military branch-specific requirements designed to comply with standards issued by federal OSHA, USEPA, and state occupational safety and health (OSH) agencies. These standards specify health and safety requirements, the amount and type of training required for workers, the use of PPE, administrative controls, engineering controls, and permissible exposure limits for workplace stressors.

Health and safety hazards can often be identified and reduced or eliminated before an activity begins. Necessary elements for an accident-prone situation or environment include the presence

of the hazard itself, together with the exposed (and possibly susceptible) population or public. The degree of exposure depends primarily on the proximity of the hazard to the population. Hazards include transportation, maintenance, and repair activities, and the creation of a noisy environment or a potential fire hazard. The proper operation, maintenance, and repair of vehicles and equipment carry important safety implications. Any facility or human-use area with potential explosive or other rapid oxidation process creates unsafe environments due to noise or fire hazards for nearby populations. Noisy environments can also mask verbal or mechanical warning signals such as sirens, bells, or horns.

3.12.1 Affected Environment

Construction Personnel Safety. All personnel performing construction and demolition activities are responsible for following federal and state safety regulations and are required to conduct activities in a manner that does not increase risk to workers or the public. A Health and Safety Plan detailing how safety requirements would be met prior to beginning work would be required.

New Mexico is one of several states that administer their own OSH program according to the provision of the federal OSH Act of 1970, which permits a state to administer its own OSH program if it meets all federal requirements regarding the program's structure and operations. The New Mexico Occupational Health and Safety Bureau has the responsibility of enforcing OSH regulations within the state. Its jurisdiction includes all private and public entities such as city, county, and state government employees. Federal employees are excluded as they are covered by federal OSHA regulations.

OSH programs address the health and safety of people at work. OSH regulations cover potential exposure to a wide range of chemical, physical, and biological hazards, and ergonomic stressors. The regulations are designed to control these hazards by eliminating exposure to the hazards via administrative or engineering controls, substitution, or use of PPE. Occupational health and safety is the responsibility of each employer, as applicable. Employer responsibilities are to review potentially hazardous workplace conditions; monitor exposure to workplace chemical (e.g., asbestos, lead, hazardous substances), physical (e.g., noise propagation, falls), and biological (e.g., infectious waste, wildlife, poisonous plants) agents, and ergonomic stressors; recommend and evaluate controls (e.g., prevention, administrative, engineering, PPE to ensure exposure to personnel is eliminated or adequately controlled; and ensure a medical surveillance program is in place to perform occupational health physicals for those workers subject to the use of respiratory protection or engaged in hazardous waste, asbestos, lead, or other work requiring medical monitoring.

The nearest major hospital that offers emergency room services and inpatient care for the general public, to include construction contractor personnel, is the MountainView Regional Medical Center in Las Cruces, New Mexico. MountainView Regional Medical Center also provides general medical care, specialty care, and urgent care (MountainView Regional 2023).

Military and Civilian Personnel Safety. The WSMR health and safety program operates in compliance with all applicable federal, state, DoD, and Army instructions, laws, and regulations. These regulations have guided the development of SOPs which all installation users are required to follow. Additionally, WSMR provides mission-focused training and guidance to its personnel (WSMR 2014).

The nearest major hospital that offers emergency room services and inpatient care for military personnel is the William Beaumont Army Medical Center in El Paso, Texas. For regular health care services, the McAfee Health Clinic at WSMR provides daily appointments and offers

immunizations and general medical care (WSMR undated). The nearest major hospital that offers emergency room services and inpatient care for the general public, to include civilian personnel, would be the same as those described for construction personnel.

Public Safety. WSMR has its own Range Control, Safety, Fire Department, and Environmental Division offices that all play key roles in safety planning, training, oversight, and response activities. WSMR also participates in the Emergency Operations Plan with other federal, state, and local agencies as part of an extended response network for emergencies (fires, hazardous material spills, mishaps, or multi-hazard events) which requires an expanded team of trained responders, whether on a local or broader regional level.

WSMR lands are generally restricted from public access and public use due to potential safety hazards. For missions that may pose risks to the public outside the installation, WSMR has the ability to enact local highway closures and evacuation of certain private lands. WSMR established a Memorandum of Understanding with the New Mexico Department of Transportation to allow closures of up to 1 hour on U.S. 54 and U.S. 70 (up to 80 minutes in an emergency) and up to 2 hours on U.S. 380, with 48 hours prior notice.

3.12.2 Environmental Consequences

3.12.2.1 *Proposed Action*

Construction Personnel Safety. Short-term, negligible, adverse impacts on the health and safety of construction personnel would occur. Construction activities associated with the new infrastructure would result in a slight increase in the health and safety risk to personnel within the project area. A comprehensive Health and Safety Plan detailing all potential hazards and site-specific guidance would be required to ensure potential safety risks are minimized. The plan would include, at a minimum, emergency response and evacuation procedures; operating manuals; PPE recommendations; procedures for handling, storing, and disposing of hazardous materials and wastes; information on the effects and symptoms of potential exposures; and guidance with respect to hazard identification, including snakes and other dangerous wildlife. Construction personnel would be responsible for compliance with applicable federal, state, and local safety regulations and would be educated through daily safety briefings to review upcoming work activities and associated hazards. Therefore, the Proposed Action would not be expected to result in a significant impact on construction personnel safety.

Military and Civilian Personnel Safety. Short-term, negligible, adverse, and long-term, negligible, beneficial impacts on the health and safety of military and civilian personnel would occur. Construction activities would comply with all applicable safety requirements and installation-specific protocols and procedures therein. The project area would be appropriately delineated and posted with access limited to construction personnel thereby reducing the impact on military and civilian personnel. Under the Proposed Action, EV charging stations would include task lighting, which would increase the safety of personnel charging their vehicles at night and during times of low visibility**.**

Public Safety. No impacts on the health and safety of the public would occur. Because the proposed construction would occur within the boundaries of WSMR, an active military installation that is not open to the public, the Proposed Action would not pose a safety risk to the public. Therefore, the Proposed Action is not expected to result in a significant impact on public safety.

3.12.2.2 *No Action Alternative*

Under the No Action Alternative, construction and installation of energy readiness systems at WSMR would not occur. Safety conditions would remain as described in **Section 3.12.1**. No new

impacts on the health and safety of construction personnel, military and civilian personnel, or the public would be expected to result from the No Action Alternative.

3.13 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The relationship between short-term uses and enhancement of long-term productivity from implementation of the Proposed Action is evaluated from the standpoint of short-term effects and long-term effects. Short-term effects would be those associated with construction of the new energy readiness infrastructure. The long-term effects would be those associated with operation and maintenance of the infrastructure after implementation of the Proposed Action.

The Proposed Action represents an enhancement of long-term productivity and enhanced capability for mission success at WSMR. The negative effects of short-term impacts from construction activities would be minor compared to the long-term positive impacts by enabling WSMR to ensure energy resilience requirements established in Army Directive 2020-03, *Installation Energy and Water Resilience Policy*, and DoDI 4170.11, *Installation Energy Management*.

3.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the impacts that the use of these resources would have on future generations. Irreversible impacts primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals). The irreversible and irretrievable commitments of resources that would result from implementation of the Proposed Actions involve the consumption of material resources used for construction, energy resources, biological resources, and human labor resources. The use of these resources is considered to be permanent.

Material Resources. Material resources used during construction activities for the Proposed Action would potentially include building materials, concrete and asphalt, and various other construction materials and supplies. However, materials that would be consumed are not in short supply, would not limit other unrelated construction activities, and would not be considered significant.

Energy Resources. Energy resources, including petroleum-based products (e.g., gasoline and diesel), used for the Proposed Action would be irretrievably lost. During construction, operation, and maintenance activities, gasoline and diesel would be used for the operation of vehicles and construction equipment. However, consumption of these energy resources would not place a significant demand on their availability in the region. Therefore, less than significant impacts would be expected.

Human Resources. The use of human resources for construction, operation, and maintenance activities is considered an irretrievable loss only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources for the Proposed Action represents employment opportunities and is considered beneficial.

Water Resources. The Proposed Action would result in unavoidable impacts to water resources because water would be required during construction activities for the Proposed Action. However, consumption of these water resources would not place a significant demand on water availability in the region. Therefore, less than significant impacts would be expected.

Biological Resources. The Proposed Action would result in a negligible loss of vegetation and wildlife habitat. Because the project area consists primarily of ground with minimal vegetation, the loss would be negligible and not considered significant; therefore, a less than significant impact on the irretrievable loss of vegetation and wildlife habitat is expected.

3.15 SUMMARY OF POTENTIAL IMPACTS

Table 3-8 summarizes the potential impacts identified in **Sections 3.3** through **3.14**.

Table 3-8. Summary of Potential Impacts Expected from the Proposed Action and No Action Alternative

Resource Area	Proposed Action				No Action Alternative				
	Solar PV System	Microgrid Systems	EV Charging Stations	Backup Power Generators	Solar PV System	Microgrid Systems	EV Charging Stations	Backup Power Generators	Solar PV System
Noise	-◊ - •	-◊ - •	-◊ - •	-◊ - •	/	/	/	/	/
Land Use	-♦	/	/	/	/	/	/	/	/
Air Quality	-◊ +■	-◊	-◊ +■	- •	/	/	/	/	/
Geological Resources	-○ -■	-○ -■	-○ -■	-○ -■	/	/	/	/	/
Water Resources	-◊ -♦	-◊ -♦	-◊ -♦	-◊ -♦	/	/	/	/	/
Biological Resources	-◊ -♦	-◊ -♦	-◊ -♦	-◊ -♦	/	/	/	/	/
Cultural Resources	-○	-○	-○	-○	/	/	/	/	/
Infrastructure	-▼ -■ +♦	-▼ -■ +♦	-▼ -■ +♦	-▼ -■ +♦	/	/	/	/	/
Hazardous Materials and Wastes	-◊ -♦	-◊ -♦	-◊ -♦	-◊ -♦	/	/	/	/	/
Safety	-○ - •	-○ - •	-○ - •	-○ - •	/	/	/	/	/

Impact Symbols:
(-) Adverse Impacts (+) Beneficial Impacts (/) No impacts
(○) Short-term, negligible impacts (•) Long-term, negligible impacts
(◊) Short-term, minor impacts (♦) Long-term, minor impacts
(▼) Short-term, moderate impacts (■) Long-term, moderate impacts

4.0 REASONABLY FORESEEABLE ACTIONS AND CUMULATIVE EFFECTS

CEQ defines cumulative impacts as the "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR Section 1508.7). Cumulative impacts can result from individually minor but collectively significant past, present, and foreseeable future actions. Informed decision-making is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

This cumulative impacts analysis summarizes expected environmental impacts from the combined impacts of past, current, and reasonably foreseeable future projects in accordance with CEQ regulations implementing NEPA and CEQ guidance on cumulative effects. The geographic scope of the analysis varies by resource area. For example, the geographic scope of cumulative impacts on resources such as soils and vegetation are narrow and focused on the location of the resource. The geographic scope of air quality and wildlife and sensitive species is much broader and considers more county-or region-wide activities. Projects that were considered for this analysis were identified by WSMR, news releases and published media reports, and publicly available information and reports from federal, state, and local agencies. Projects that do not occur in proximity (i.e., within several miles) of the proposed project site would not contribute to a cumulative impact and are generally not evaluated further.

4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

Past actions are those within the cumulative impacts analysis areas that have occurred prior to the development of this SEA. The impacts of these past actions are generally described in **Section 3**. Present actions include current or funded construction projects, WSMR operations near the proposed site, and current resource management programs and land use activities within the cumulative impacts analysis areas. Reasonably foreseeable future actions consist of activities that have been approved and can be evaluated with respect to their effects. The following activities are present or reasonably foreseeable future actions:

- Salinas Peak Power Distribution Line Replacement,
- Address Watershed Resiliency on Main Post,
- Replacement and Modernization of Main Cantonment Access Gates,
- Replacement and Modernization of Fire Stations (Main Post, Stallion, Nike Avenue, HELSTF, mid-Range),
- Las Cruces Substation Upgrade,
- Expansion and Repair of Stallion AAF Runway,
- Construct 3D Printed Transient Training Barracks (400 PAX),
- Construct UPH Barracks (200 PAX),
- Construct Central Wash Rack,
- Construct Tank Wash Rack,
- Construct GSA Vehicle Car Wash,

- Construct Transient Training Barracks (NOP),
- Missile Assembly Building,
- Survivability Vulnerability and Assessment Directorate facilities modernization,
- Upgrade Condron Airfield,
- Expand Recreational Camping,
- Construction of a Mini-Campus in partnership with a local university, and
- Increase in the number of weapon impact areas used to support Research, Development, Test, and Evaluation of weapon systems.

4.2 ASSESSMENT OF CUMULATIVE IMPACTS BY RESOURCE

A cumulative impacts analysis must be conducted within the context of the resource areas. The magnitude and context of the impact on a resource area depends on whether the cumulative effects exceed the capacity of a resource to sustain itself and remain productive. The following discusses potential cumulative impacts that could occur as a result of implementing the Proposed Action and other present and reasonably foreseeable future actions. No major, adverse, cumulative impacts were identified in the cumulative impacts analysis.

4.2.1 Noise

The Proposed Action would result in short-term, minor, adverse impacts on noise from construction and installation of energy readiness systems at WSMR. No significant change in the ambient noise levels from operation and maintenance of the new systems would be expected following the construction period. Reasonably foreseeable construction activities proximal to the construction areas associated with the Proposed Action include the Directorate of Emergency Services, Facility Modernization actions at the Las Cruces and El Paso Gates, Las Cruces Substation Upgrade, Expansion and Repair of Stallion AAF Runway, 3D Printed Transient Training Barracks, New UPH Barracks, New Central Wash Rack, Tank Wash Rack, and New GSA Vehicle Car Wash. Proximal construction activities that coincide with the construction period for the Proposed Action may contribute to slightly increased noise levels; however, all such occurrences would be temporary in nature and cease at completion of such construction activities. Noise from operation and maintenance of new energy readiness systems when combined with noise from operation of new infrastructure under the present and reasonably foreseeable actions would be consistent with ongoing operation and maintenance activities at WSMR. Therefore, an increase in the noise environment beyond ambient levels would not occur and long-term, adverse, cumulative impacts from the Proposed Action, when combined with other present and reasonably foreseeable future actions, would not be significant.

4.2.2 Land Use

Short- and long-term, negligible impacts on land use are expected from the additive effects of the Proposed Action in combination with other present and reasonably foreseeable future actions. Construction, operation, and maintenance of the Proposed Action would not alter land use as it is consistent with present land uses. Under the Proposed Action, BMPs would be implemented to ensure negligible impacts on land use.

4.2.3 Air Quality

The Proposed Action would result in short- and long-term, negligible to minor, adverse impacts on air quality from construction and operations. Reasonably foreseeable construction activities at

WSMR that coincide with the construction period for the Proposed Action may contribute additional airborne dust (primarily PM10), however, all such occurrences would be temporary in nature and cease at completion of such construction activities. The PSD major source thresholds are applied to individual projects; therefore, the additive emissions of criteria pollutants at WSMR from the reasonably foreseeable action such as the expansion and repair of Stallion AAF Runway, New Transient and UPH Barracks, facility modernizations, and Salinas Peak distribution line replacement would not be combined with emissions from the Proposed Action and would not exceed the PSD thresholds. Because emissions from the Proposed Action would not be considered significant for the region, cumulative impacts on air quality from the Proposed Action, when combined with other present and reasonably foreseeable future actions, would not be significant.

4.2.4 Geological Resources

Cumulative impacts would include impacts on geology, topography, and soils on a total of 103 acres of new disturbance from general construction activities, such as grading, contouring, and trenching previously disturbed areas as well as from an increase of impervious surfaces. The installation encompasses 2.2 million acres. Additionally, compounded construction activities would require the need for a borrow pit and fill, which could result in future contractual issues due to the associated costs. Negligible to minor cumulative impacts on geology, topography, and soils are expected from the additive effects of the Proposed Action in combination with other present and reasonably foreseeable future actions.

4.2.5 Water Resources

The Proposed Action, when combined with other present and reasonably foreseeable future actions occurring in the surrounding area, may result in short- and long-term, minor, cumulative impacts on water resources. Other projects would include construction of buildings and increased impervious surface area, thus increasing potentially contaminated runoff volume into surface water bodies. Additionally, compounded projects could increase the need for water during construction and induce competition for a limited number of water pipe stands. However, BMPs would be implemented which would minimize potential impacts. The Catastrophic Flood Prevention control measures would also include the installation of retention ponds that would have long-term beneficial impacts on surface water and floodplains as runoff would be managed.

4.2.6 Biological Resources

Construction, operation, and maintenance activities under the Proposed Action, as well as present and reasonably foreseeable future projects on the installation and within the surrounding areas, would result in impacts on vegetation crushing/removal and soil compaction during ground-disturbing activities, which could result in establishment of invasive species. Adverse impacts on vegetation would be minimized with implementation of appropriate BMPs, such as cleaning equipment prior to entering the project area, and measures would be implemented to help prevent and control dissemination of invasive plant species during ground-disturbing activities. Revegetation of disturbed sites with native vegetation would further reduce the establishment of invasive species.

Project activities that require heavy equipment could cause mobile mammals, amphibians, reptiles, and birds, including breeding migratory birds, to temporarily relocate to nearby similar habitat. This disturbance is expected to be minor, and it is assumed that displaced wildlife would return to areas that had not been improved soon after activities conclude or would move to adjacent areas of similar habitat. Adverse impacts on wildlife would be minimized with appropriate

BMPs, such as conducting surveys prior to any construction activities taking place and scheduling project activities to occur outside of the nesting season of March 1 to September 30 to reduce impacts on migratory birds. Although growth and development could be expected to continue outside of WSMR and within the surrounding natural areas, significant adverse impacts on these resources would not be expected. Therefore, the Proposed Action, when combined with other actions both on and off the installation, would not result in a significant cumulative impact on biological resources.

4.2.7 Cultural Resources

With avoidance measures, cumulative impacts on known cultural resources from the Proposed Action and present and reasonably foreseeable future actions would be minor. Archaeological surveys to identify cultural resources would be conducted as necessary prior to ground-disturbing activities in areas that have not been surveyed. Resurvey of project locations and evaluation of identified resources may be necessary to ensure compliance with current standards.

4.2.8 Infrastructure

Construction activities under the Proposed Action, as well as present and reasonably foreseeable future actions on the installation and within the surrounding areas, would result in impacts on all aspects of infrastructure at WSMR. The addition and renovation of new access facilities, assembly buildings, substations, control centers, and other facilities on post would result in long-term, moderate, adverse impacts on the infrastructure at WSMR due to the increase in the consumption of natural gas and water, and in the generation of wastewater and solid waste. The Proposed Action, when combined with other present and reasonably foreseeable future actions occurring in the surrounding area, may result in long-term, moderate, cumulative impacts on infrastructure.

4.2.9 Hazardous Materials and Wastes

The Proposed Action, as well as present and reasonably foreseeable future actions at WSMR would incorporate BMPs and environmental control protection measures to limit and control hazardous materials and wastes into their design and operations plans. Additional construction activities that coincide with the Proposed Action may contribute to slightly increased levels of hazardous materials and petroleum products used and stored and hazardous wastes generated on the installation; however, all such occurrences would be temporary in nature and cease at the completion of such construction activities. Therefore, impacts on hazardous materials and wastes management from the Proposed Action, when combined with other present and reasonably foreseeable future actions, would not be significant.

4.2.10 Safety

No adverse cumulative impacts on health and safety would be expected from the Proposed Action and present and reasonably foreseeable future actions on the installation or surrounding area. Adherence to established procedures, including the use of PPE, fencing project areas and posting signs, and compliance with OSH, DOD, and OSHA standards would reduce or eliminate health and safety impacts on contractors, military personnel, and the general public. These procedures are typical for construction projects on the installation and in surrounding areas. Therefore, the Proposed Action, when combined with other present and reasonably foreseeable future actions, would not result in a significant cumulative impact on health and safety.

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APPENDIX A

FINDING OF NO SIGNIFICANT IMPACT AND FINDING OF NO PRACTICABLE ALTERNATIVE

FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA)
FOR A
20-MW SOLAR PHOTOVOLTAIC SYSTEM
ADDRESSED IN THE
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
ADDRESSING ENERGY READINESS SUPPORT
AT
WHITE SANDS MISSILE RANGE, NEW MEXICO

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DEPARTMENT OF DEFENSE
UNITED STATES ARMY
FINDING OF NO PRACTICABLE ALTERNATIVE FOR A 20-MW SOLAR PHOTOVOLTAIC SYSTEM ADDRESSED IN THE SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT ADDRESSING ENERGY READINESS SUPPORT AT WHITE SANDS MISSILE RANGE, NEW MEXICO

1.0 Introduction

The United States Army Garrison (USAG), White Sands Missile Range (WSMR) encompasses approximately 2.2-million-acres in south-central New Mexico and provides for testing and development of weapons and equipment for military use (Figure 1). The Main Post of WSMR, which encompasses approximately 1,530-acres at the southern end of the installation, contains the installation's headquarters, administrative offices, operation centers, and other facilities. WSMR has approximately 6,000 civilian employees; 350 servicemembers from the U.S. Army, U.S. Air Force, and U.S. Navy; 950 housing residents; and 300 elementary and middle school students utilizing the Main Post. USAG-WSMR proposes to install, operate, and maintain additional energy readiness systems at WSMR to meet the "net zero" installation goal.

To support mission requirements, the Department of the Army (Army) proposes to expand the existing 6-megawatt (MW) solar photovoltaic (PV) system on the Main Post by adding a 20-MW solar PV system over 103 acres. This location has been prioritized for the following reasons: secure location near the primary entrance road to the cantonment area, access by an existing road, proximity to an existing transformer station and Main Post infrastructure, and a majority of the installation is classified as testing zones. Other federal agencies such as the National Park Service (White Sands National Park), U.S. Fish and Wildlife Service (San Andres National Wildlife Refuge), Agricultural Service (Jornada Experimental Research Range), and National Aeronautics and Space Administration (White Sands Test Facility) manage parcels within a portion of the installation.

The purpose of the Proposed Action is to assist WSMR in meeting energy resilience requirements established in Army Directive 2020-03, *Installation Energy and Water Resilience Policy* and Department of Defense Instruction (DoDI) 4170.11, *Installation Energy Management*. Army Directive 2020-03 establishes policy to strengthen energy and water resilience to reduce the risk to Army missions resulting from utility disruptions. Additionally, it outlines the plan to sustain energy for critical facilities for a minimum of 14 days. DoDI 4170.11 establishes Department of Defense (DoD) policy to implement the requirements of Executive Orders (EOs) 13693, *Planning for Federal Sustainability* and 13221, *Energy Efficient Standby Power Devices*. It also establishes that DoD shall strive to modernize infrastructure, increase utility and energy conservation, enhance demand reduction, and improve energy resilience. Finally, EO 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, also applies to the Proposed Action.

Currently, WSMR is not in compliance with Army Directive 2020-03. The Proposed Action would assist WSMR in meeting recommendations outlined in the *2020 Army Installation Energy & Water Plan* to increase renewable energy generation, reduce downtime from power outages, improve energy security, and enhance resilience for WSMR. Implementation of the Proposed Action is vital to ensuring that WSMR energy infrastructure is resilient, efficient, and affordable.

Several alternatives were considered, but did not meet selection criteria, as described in Section 2.4 of the *2024 Supplemental Environmental Assessment for Addressing Energy Readiness Support, White Sands Missile Range, New Mexico*. Avoiding the floodplain entirely for the proposed expansion of the WSMR solar PV system is unrealistic due to mission-related factors, such as lack of developable space and compliance with Army facility requirements. Other constraining factors include major arroyo features on the north and south of the proposed project area; an existing road on the eastern boundary of the project area with operational military space on the east side of that boundary road; cultural sites; and placement of a proposed new access gate north of the current Las Cruces gate. These factors constrain how the proposed project area has been placed at the current location. An alternate location on the eastern boundary of WSMR near the Athena Measurement Radar (AMRAD) substation was considered for a solar PV energy site but eliminated because of the need to upgrade the Las Cruces substation and the distribution powerline that parallels the proposed project area. If the proposed action were not to take place in this specific area, connecting to the existing solar PV system and associated infrastructure would not be possible. The Army also considered the no action alternative; however, this would result in WSMR maintaining the current inadequate state of the installation's energy supply in an emergency.

The draft finding was made available for public review and comment for 30 days. It was published in local area newspapers and digitally in the WSMR Garrison Publication website under Environmental Documents at https://home.army.mil/wsmr/index.php/ about/garrison/directorate-public-works-dpw/environmental on 11 July 2024 which is hereby incorporated by reference. Hard copies of the Draft SEA, FONSI, and FONPA were made available by request. Additionally, hard copies were available for review at three libraries in surrounding communities and at the WSMR Main Post library. Comments were received from New Mexico Department of Game and Fish, and New Mexico Environmental Department. Comments were addressed through use of best management practices.

This draft finding incorporates the analysis in the *2014 Final Environmental Assessment of Alternative energy Facility Projects, White Sands Missile Range, New Mexico*, the *2016 Programmatic Environmental Assessment for Construction and Operation of Solar Photovoltaic renewable Energy Projects on Army Installations*, and the *2024 Supplemental Environmental Assessment for Addressing Energy Readiness Support, White Sands Missile Range, New Mexico*.

2.0 Proposed Action

The Proposed Action would enable WSMR to successfully meet energy resilience requirements established in Army Directive 2020-03 and Department of Defense Instruction 4170.11, *Installation Energy Management*. The 103.0-acre project area for the 20-MW ground-mounted solar PV system would be constructed surrounding the existing 6-MW solar PV system on the Main Post. Of the 103.0-acre project area, approximately 9.0 acres of disturbance fall within the floodplain. The proposed solar PV

system expansion was analyzed as part of the *2014 Final Environmental Assessment of Alternative Energy Facility Projects, White Sands Missile Range, New Mexico*. The Proposed Action would use axis tracking solar PV arrays mounted on an assembly that move throughout the day, positioning the array at an optimum angle to capture sunlight. Grading and vegetation removal would occur over the entire area to level and prepare the land for construction. When feasible, disturbed areas would be revegetated using native vegetation approved by the Environmental Division. Grading debris (e.g., bushes, rocks, etc.) would be hauled to an approved off-installation landfill. Should fill be needed for this project, the estimated amount will be identified in design plans, and source coordinated with the Environmental Division. Construction duration would be anticipated for up to 14 months and activities would include excavation for footings, conduit trenches, and power poles. The 20- MW solar PV system would be connected to the existing electrical distribution line that runs north-south along the east side of Owen Road, which will eventually be replaced with new equipment. Panels would be secured and rated to withstand wind gusts of over 100 miles per hour (mph) and sustained winds of 50 mph. A chain link fence would be installed around the solar PV system and maintenance of the facility would be conducted by a third-party utility company providing services (i.e., equipment, installation, operation, and maintenance) through legal agreements. Permanent requirements would include solar panels, inverters, transformers, an access road, and data communications.

3.0 Floodplain Impacts and Mitigation Measures

EO 11988 and 13690 states that if the only practicable alternative requires siting in a floodplain, the agency shall, prior to taking action, design or modify its action to minimize potential harm to or within the floodplain. Installations are required to maintain local, state, and federal compliance for actions with the potential to impact local waters. WSMR implements low impact development (LID) and runoff controls according to Section 438 of the Energy Independence and Security Act (EISA) of 2007. This ensures that new development outside the floodplain improves and preserves stream quality, as well as managing runoff quantity. When work within the floodplain is unavoidable, Standard Operating Procedures require that encroachment will not cause a measurable change to the upstream or downstream base flood elevation. In addition, any fill within flood zones shall result in no net loss of natural floodplain storage. Any loss of floodplain storage due to filling is offset by providing an equal volume of flood storage at or adjacent to the development site. Periodic monitoring of on-going construction also occurs to ensure adherence to the associated site-specific Stormwater Pollution Prevention Plans.

Implementation of the Proposed Action would result in the Army impacting approximately 9.0 acres of floodplain to expand the solar PV system on WSMR. Most of the flood area within the proposed 20-MW solar array project area is in the 0-0.2-meter depth range.
Under the Proposed Action, the Army would implement best management practices (BMPs) and low-impact-development (LID) measures to reduce the potential for

adverse impacts on the floodplain. WSMR is in a closed basin that does not connect to waters of the United States and is not subject to the Clean Water Act (CWA). Therefore, WSMR does not have National Pollutant Discharge Elimination System (NPDES) permits. However, WSMR does implement Best Management Practices (BMP) for stormwater pollution prevention and requires the development of a Stormwater Pollution Prevention Plan (SWPPP) that is prepared in accordance with the U.S. EPA SWPPP requirements. Additional BMPs and LID measures are incorporated into the Proposed Action to avoid or minimize impacts on floodplains and are collectively described, as follows:

- Construction staging areas would be located within pre-existing disturbed areas within proximity to the site and no new ground would be cleared.

- Construction vehicles would use existing roads to the fullest extent possible.

- Removal of native vegetation would be avoided to the extent practicable for erosion and invasive weed control. Invasive weed control would follow guidelines established in the WSMR Integrated Pest Management Plan.

- Disturbed areas would be restored to the fullest extent feasible and native vegetation would be allowed to reseed naturally as approved by the Environmental Division.

- BMPs and erosion control measures would be implemented to reduce the potential for runoff or erosion and sedimentation during construction.

- The Catastrophic Flood Prevention control measures would also include the installation of retention ponds that would have long-term beneficial impacts on surface water and floodplains as runoff would be managed.

- The extension and fortification of the levee system and use of bioretention ponds is being considered in a separate NEPA process.

- WSMRR 200-2 requires personnel to participate in Environmental Awareness Training prior to beginning work on projects.

Taken together, these and other yet to be determined BMPs and mitigation measures would avoid or minimize the loss of and impacts on floodplains at WSMR. These measures represent all practicable measures to minimize harm to floodplains.

4.0 Finding of No Practicable Alternative

During development of the Proposed Action, the WSMR Environmental Office worked proactively to ensure the purpose and need of the Proposed Action was met while also avoiding as many potential impacts to floodplains as practicable. Due to operational requirements, it was determined that complete avoidance of floodplains and/or wetlands was not feasible; however, the Proposed Action minimizes potential impacts to the greatest degree practicable while also achieving the required results.

Accordingly, I find there is no practicable alternative to siting the Proposed Action entirely outside of the floodplains; however, the Army will utilize all practicable measures to avoid and minimize impacts to the greatest extent practicable.

JONES.OMAR.JAMES.IV.1044410075 Digitally signed by JONES.OMAR.JAMES.IV.1044410075 Date: 2025.01.05 06:17:55 -06'00'

Date

OMAR J. JONES IV
Lieutenant General, USA
Commanding

Attachments:
Figure 1. Site Map
Figure 2. Project Area and Floodplain

References:
EO 11988, Floodplain Management. 24 May 1977
EO 13690, Establishing a Federal Flood Risk Management and a Process for Further Soliciting and Considering Stakeholder Input. 30 January 2015
Final Environmental Assessment of Alternative energy Facility Projects, White Sands Missile Range, New Mexico. 01 July 2014
Programmatic Environmental Assessment for Construction and Operation of Solar Photovoltaic renewable Energy Projects on Army Installations. November 2016
Supplemental Environmental Assessment for Addressing Energy Readiness Support, White Sands Missile Range, New Mexico. 31 October 2024

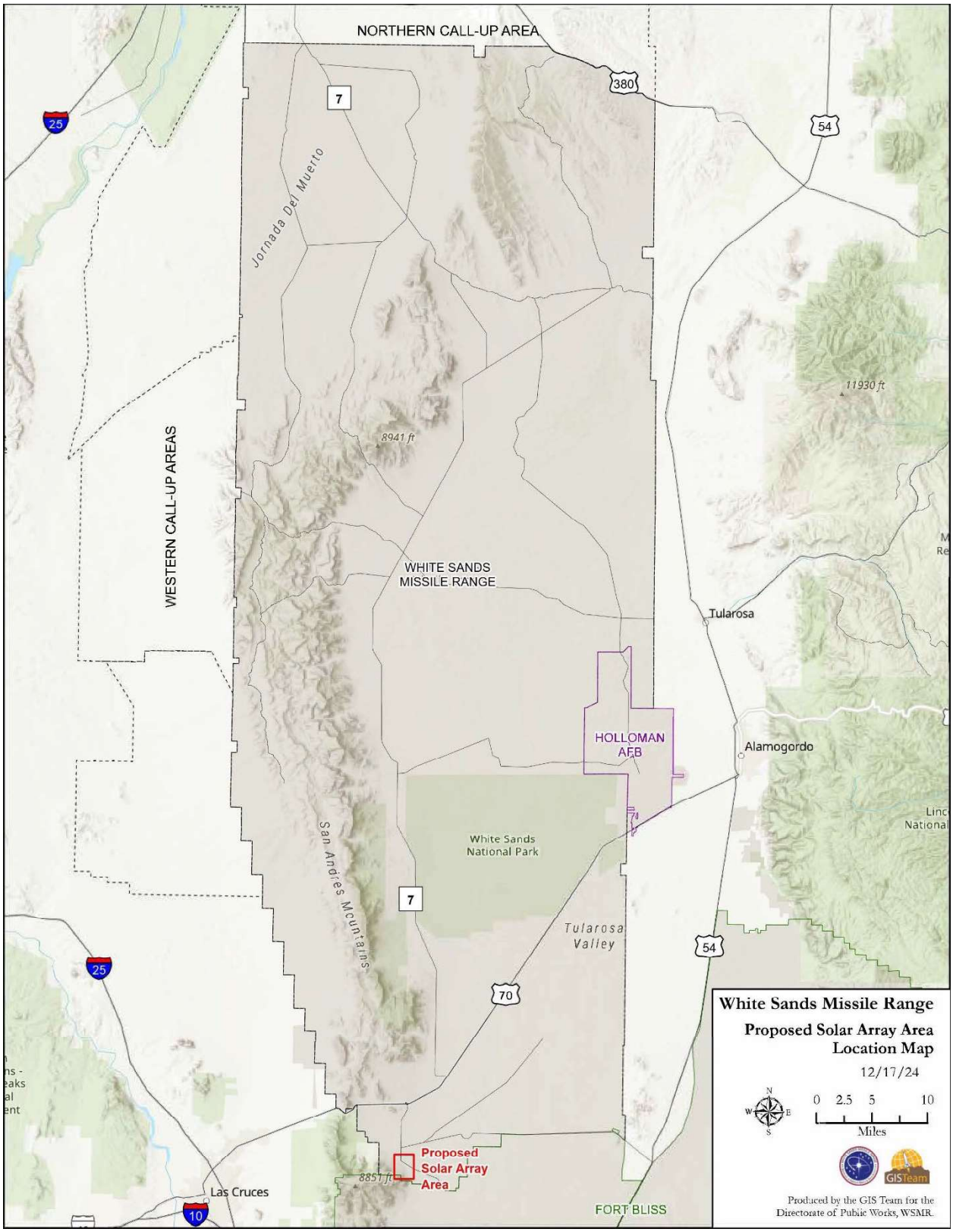

Figure 1. Site map for proposed 20-MW solar photovoltaic system.

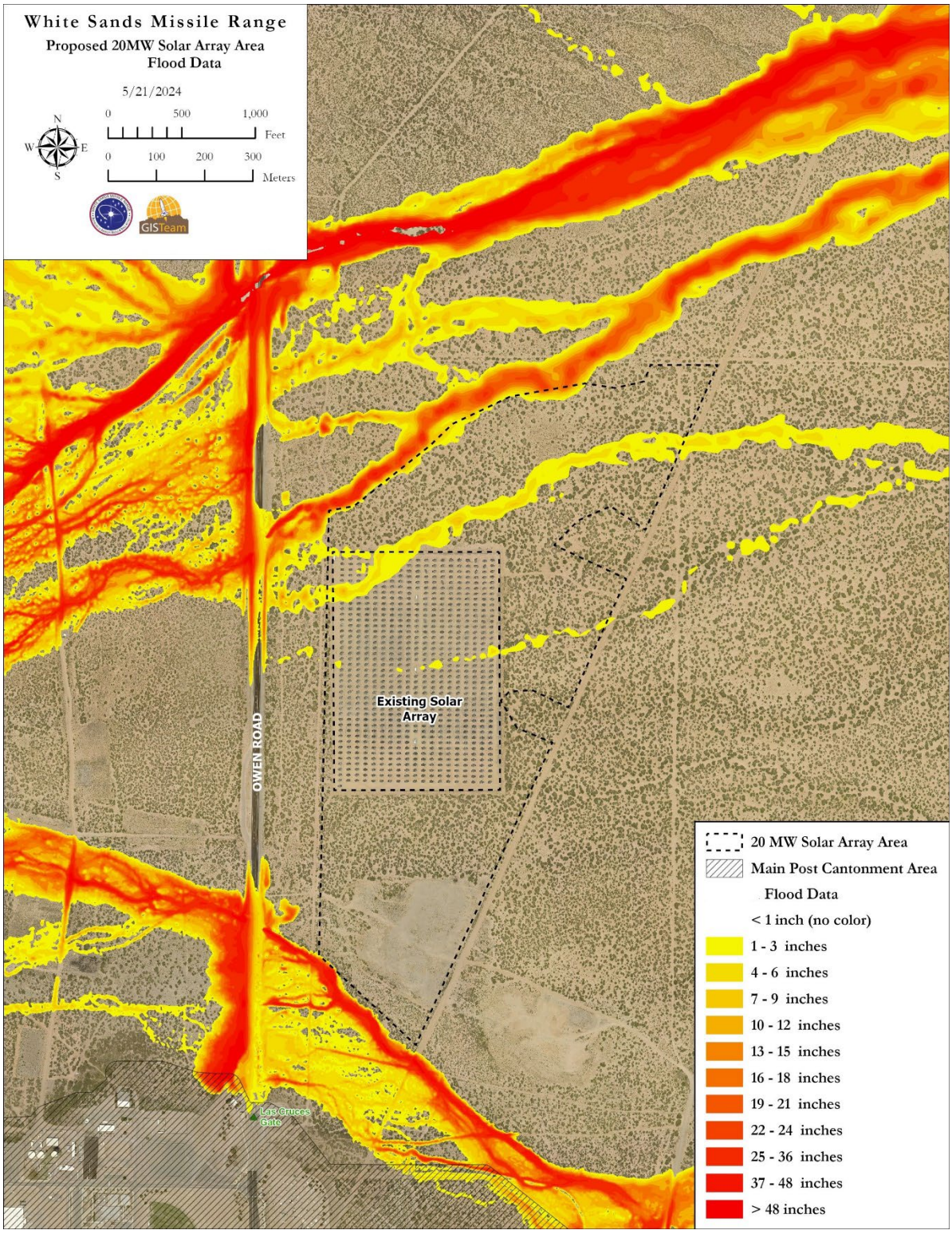

Figure 5. Proposed 20-MW Solar Photovoltaic System Project Area and Floodplain

APPENDIX B

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING AND PUBLIC INVOLVEMENT MATERIALS

Appendix B

Interagency and Intergovernmental Coordination for Environmental Planning and Public Involvement Materials

Federal, State, and Local Agencies – Distribution List

The Honorable Martin Heinrich
U.S. Senate
303 Hart Senate Office Building
Washington DC 20510

The Honorable Ben Ray Luján
U.S. Senate
498 Russell Senate Office Building
Washington DC 20510

The Honorable Gabe Vasquez
U.S. House of Representatives
1517 Longworth House Office Building
Washington DC 20515

Ms. Stephanie Garcia Richard
Commissioner of Public Lands
New Mexico State Land Office
310 Old Santa Fe Trail
Santa Fe NM 87501

Mr. Blake Roxlau
Section Manager, Environmental Design Division
New Mexico Department of Transportation
PO Box 1149
Santa Fe NM 87504

Mr. Collin Haffey
Forest and Watershed Health Coordinator
Forest and Watershed Health Office
EMNRD-Forestry Division
4001 Edith Blvd. NE
Albuquerque NM 87107

Mr. Mark Watson
New Mexico Department of Game and Fish
PO Box 25112
Santa Fe NM 87504

Mr. James C. Kenney
Cabinet Secretary
New Mexico Environment Department
Office of General Counsel and Environmental Policy
PO Box 5469
Santa Fe NM 87502-5469

Mr. Abe Franklin
New Mexico Environment Department
Surface Water Quality Bureau, Watershed Protection Section
PO Box 5469
Santa Fe NM 87502-5469

Mr. Bill Childress
District Manager
Bureau of Land Management, Las Cruces District Office
1800 Marquess Street
Las Cruces NM 88005-3371

Mr. Matthew Atencio
Acting Field Manager
Bureau of Land Management, Socorro Field Office
901 S. Highway 85
Socorro NM 87801-4168

Ms. Earthea Nance, PhD, PE
Regional Administrator
U.S. Environmental Protection Agency, Region 6
1201 Elm Street Suite 500
Dallas TX 75270

Mr. Fernando R. Macias
County Manager
County of Doña Ana New Mexico
845 N Motel Boulevard
Las Cruces NM 88007

Mr. Ifo Pili
City Manager
City of Las Cruces
700 N Main Street
Las Cruces NM 88001

Ms. Pamela Heltner
County Manager
County of Otero New Mexico
1101 New York Avenue
Alamogordo NM 88310-6935

Mr. Michael Hawkes
County Manager
County of Socorro New Mexico
PO Box 1
Socorro NM 87801

Mr. Brian Cesar
City Manager
City of Alamogordo
1376 E Ninth Street
Alamogordo NM 88310

Mr. Ravi Bhasker
Mayor
City of Socorro
111 School of Mines Road
PO Box K
Socorro NM 87801

Ms. Amber Vaughn
Sierra County Manager
855 Van Patten
Truth or Consequences NM 87901

Ms. Marie Frias Sauter
Superintendent
U.S. National Park Service, White Sands National Park
PO Box 1086
Holloman Air Force Base NM 88330

Mr. Spencer Robison
Holloman AFB, 49th Civil Engineer Squadron
Asset Management Flight 49 CES/CEIE
550 Tobosa Avenue
Holloman Air Force Base NM 88330-8458

Ms. Yvette Waychus
Conservation Branch Chief
USAG Fort Bliss, DPW-E-C
622 Pleasonton Road
Fort Bliss TX 79916

Federal, State, and Local Agencies Responses Received

MICHELLE LUJAN GRISHAM
GOVERNOR

JAMES C. KENNEY
CABINET SECRETARY

August 8, 2024

Department of the Army
U.S. Army Garrison White Sands
Environmental Division (Bldg. 163/DPW)
ATTN: Customer Support Branch
White Sands Missile Range, New Mexico 88002-5000

Submitted electronically to: USARMYGarrisonWSMREnvironmentalAssessments@army.mil

RE: Draft Supplemental Environmental Assessment for Addressing Energy Readiness Support at White Sands Missile Range, New Mexico

Dear Chief Knight,

The New Mexico Environment Department (NMED) reviewed the Draft Supplemental Environmental Assessment for Addressing Energy Readiness Support at White Sands Missile Range (WSMR). NMED offers the attached comments for WSMR's consideration to ensure compliance with applicable federal and NMED regulations and standards of the proposed actions. NMED wishes to highlight two critical issues: the longstanding expiration of groundwater discharge permits and the necessity to discuss potential permitting requirements for emissions from the proposed new generators.

Strong intergovernmental coordination is essential to ensure protection of human health and the environment. NMED offers a few areas of potential environmental impacts in the attachment for you to evaluate.

Thank you for providing the opportunity to review the project materials. Please reach out to us to env.review@env.nm.gov with any questions or concerns you may have about the comments.

Sincerely,

Jonas Armstrong

Digitally signed by Jonas Armstrong
Date: 2024.08.09 10:07:24 -06'00'

Jonas Armstrong, Director
Office of Strategic Initiatives

Attachment (1)

Attachment

Introduction

The New Mexico Environment Department (NMED) reviewed the Draft Supplemental Environmental Assessment (EA) for Addressing Energy Readiness Support at White Sands Missile Range (WSMR). WSMR is proposing to install, operate and maintain additional energy readiness options by expanding an existing solar array; microgrid systems; backup battery systems and fuel generators; and electric vehicle (EV) charging stations.

Comments

Surface Water Quality

Operations must ensure protection of all Surface Waters of the State at all times in accordance with NMED regulations. The project identifies Salt Creek as being outside of the proposed project area. However, construction activities within the project area may affect Surface Waters of the State as defined by regulation in 20.6.4.7 NMAC, including tributaries to Salt Creek that are intermittent and ephemeral arroyos and subject to 20.6.4.97 and 20.6.4.98 NMAC, respectively. Surface Waters of the State shall be free of any water contaminant in such quantity and of such duration as may be reasonable to avoid the probability of injuring human health, animal or plant life or property, or unreasonably interfering with the public welfare or the use of property.

With both the solar array and EV charging stations including battery storage, there is a fire risk associated with the proposals outlined in the EA. WSMR should use Best Management Practices (BMPs) to ensure no runoff containing aqueous film forming foam (AFFF) reaches the stream as defined in NMED regulations for intermittent and ephemeral streams. Emerging contaminants are defined in 20.6.4.7.E(2) NMAC as contaminants that may cause significant ecological or human health effects at low concentration. Some such emerging contaminants are per- and polyfluoroalkyl substances (PFAS), a known contaminant within AFFF used for Class B firefighting. WSMR should implement BMPs to mitigate AFFF fluids spread to Surface Waters of the State and ensure any leaks or releases are contained.

WSMR is required to report all spills immediately to NMED as required by the New Mexico Water Quality Control Commission (WQCC) regulations (20.6.2.1203 NMAC). For non-emergencies during normal business hours, call 505-428-2500. For non-emergencies after hours, call 866-428-6535 or 505-428-6535 (voice mail, twenty-four hours a day). For emergencies only, call 505-827-9329 twenty-four hours a day (NM Dept of Public Safety).

In addition to the above regulatory standards and the Best Management Practices (BMPs) identified in the June 2024 Draft Supplemental Environmental Assessment (EA), SWQB recommends including the following BMPs in the final EA to avoid contamination and to protect surface and groundwater quality:

- Fuel, oil, hydraulic fluid, lubricants, and other petrochemicals must have a secondary containment system to prevent spills and should be stored outside of the flood-prone zone.
- Appropriate spill clean-up materials such as absorbent pads must be available on-site at all times during road construction, site preparations, drilling and reclamation to address potential

spills.

- Pressure wash and/or steam clean heavy equipment before construction begins and inspect daily for leaks.
- Locate retention ponds outside of natural waterways. Locating retention ponds outside of natural waterways is important so that fine sediment pollution is captured before the sediment is allowed to reach a surface water of the state.

Ground Water Quality

WSMR does not have a track record of complying with NMED ground water permitting requirements, and the proposed project may have additional permitting requirements. Proposed operations must satisfy conditions set by the Ground Water Quality Bureau to protect groundwater quality in accordance with WQCC Ground and Surface Water Protection Regulations, 20.6.2 NMAC. The project identifies WSMR to obtain a Discharge Permit from NMED if it is deemed necessary. If wastewater is discharged directly to a city sewer line or impoundment, the facility should contact the Ground Water Quality Bureau about wastewater disposal.

According to NMED records, the discharge permit, DP-297 White Sands Missile Range – HELSTF, has been expired since November 23, 1998; DP-492 WSMR - HELSTF Technical Support Area has been expired since June 10, 2001; and DP-976 WSMR - Main Post WWTP has been expired since February 4, 2007. NMED takes this opportunity to reiterate its position that WSMR must submit a discharge permit renewal application for each of these three discharge permits (DP-297, DP-492 and DP-976).

Drinking Water

By taking into account water usage and groundwater impacts, several alternatives that may have negatively affected water resources were eliminated from consideration. There are no regulated public groundwater system sources within 200 feet of the project areas, nor any regulated public surface water system intakes within 10 miles downgradient, so this project is unlikely to have a significant negative impact on any regulated public water system.

Petroleum Storage Tank

If an abandoned storage tank system or petroleum impacted soil and/or water is discovered during construction, the Petroleum Storage Tank Bureau must be notified (20.5.118 NMAC, etc.). In the event that an abandoned storage tank system or petroleum impacted soil and/or water is discovered during any construction activity, please notify the Petroleum Storage Tank Bureau during business hours via the "Leak of the Week" at: https://www.env.nm.gov/petroleum_storage_tank/ (see box to the right, *Report a Leak or Spill*) or call 505-476-4397. During non-business hours, please call 505-827-9329. Owners, operators, and others dealing with petroleum storage tank systems must comply with all regulations in 20.5 NMAC, New Mexico's Petroleum Storage Tank regulations.

Air Quality

The proposed action of using dust suppression techniques during land disturbance activities and construction is supported by the Air Quality Bureau (AQB). In addition, the AQB supports the proposed revegetation of the disturbed lands to help suppress fugitive dust.

On page 3-13 (under 3.5.2.1 Proposed Action) of the Draft Supplemental EA, it is unclear if WSMR is proposing 5 new generators (line 28) or is proposing 6 new generators (line 30 and 31). The text states, "Two propane generators would be installed at the Stallion Range Center and four diesel, propane, or natural gas generators would be installed at Main Post.

Prior to taking any action, WSMR needs to contact Jim Nellessen, NMED's Major Source Manager at (505) 629-6283 to discuss whether the emissions from the proposed new generators need to be permitted under WSMR's Title V permit.

4

GOVERNOR
Michelle Lujan Grisham

DIRECTOR AND SECRETARY
TO THE COMMISSION
Michael B. Sloane

STATE OF NEW MEXICO
DEPARTMENT OF GAME & FISH

One Wildlife Way, Santa Fe, NM 87507

Tel: (505) 476-8000 | Fax: (505) 476-8180

For information call: (888) 248-6866

wildlife.dgf.nm.gov

6 August 2024

Department of the Army
U.S. Army Garrison White Sands Environmental Division
Building 163/DPW
White Sands Missile Range, NM 88002

RE: Draft Environmental Assessment Addressing Energy Readiness Support, White Sands Missile Range, New Mexico; NMDGF Project No. 3628.

The New Mexico Department of Game and Fish (Department) has reviewed the Draft Environmental Assessment Addressing Energy Readiness Support (Draft EA). The U.S. Department of the Army is proposing to install, operate, and maintain additional energy readiness systems at the White Sands Missile Range (WSMR), New Mexico. The Proposed Action will incorporate the use of various technologies to promote energy resiliency on WSMR. The Proposed Action includes: (1) expanding the existing 6-megawatt solar photovoltaic (PV) system on the Main Post by adding a 20-megawatt solar PV system; (2) installing microgrid systems designed to incorporate carport and roof-top PV panels; (3) installing Energy Storage Systems and additional generators powered by natural gas, propane, or diesel to contribute to the desired goal of having 14 days of backup power capacity for critical facilities; and (4) installing electric vehicle charging stations within disturbed areas near existing facilities.

The Department provides the following recommendations to minimize potential impacts to wildlife:

- To eliminate or minimize the need to site solar PV arrays in undisturbed wildlife habitat, use microgrid systems on existing facility roof tops and carport parking areas to the maximum extent possible.

- All migratory birds are protected against direct take under the federal Migratory Bird Treaty Act (16 U.S.C. Sections 703-712). In addition, hawks, falcons, vultures, owls, songbirds, and other insect-eating birds are protected from take under New Mexico State Statutes (17-2-13 and 17-2-14 NMSA), unless permitted by the applicable regulatory agency. To minimize the likelihood of adverse impacts to migratory bird nests, eggs, or nestlings during project construction activities, the Department recommends that ground disturbance and vegetation removal activities be conducted outside of the primary breeding season. That season for migratory songbirds and most raptors is 1 March – 1 September; for golden eagle (*Aquila chysaetos canadensis*) and great horned owl (*Bubo virginianus*) it is 1 January – 15 July. If ground disturbing and clearing activities must be conducted during the breeding season, the area should be surveyed for active nest sites (with birds or eggs present in the nesting territory) and avoid disturbing active nests until young have fledged. For active nests, establish adequate buffer zones to minimize disturbance to nesting birds. Buffer distances should be a minimum of 100 feet from songbird

and raven nests; 0.25 miles from most raptor nests; and 0.5 miles for ferruginous hawk (*Buteo regalis*), golden eagle, peregrine falcon (*Falco peregrinus*), and prairie falcon (Falco mexicanus) nests. Active nest sites in trees or shrubs that must be removed should be mitigated by qualified biologists or wildlife rehabilitators. Department biologists are available to consult on nest site mitigation and can facilitate contact with qualified personnel.

- Your project could negatively impact prairie dog colonies if they occur within your project area. The black-tailed prairie dog (*Cynomys ludovicianus*) is designated as a New Mexico Species of Greatest Conservation Need, and prairie dog colonies provide important habitat for other grassland wildlife. Wherever possible, occupied prairie dog colonies should be left undisturbed, and all project activities should be directed off the colony. Any burrows that are located on the project site should be surveyed by a qualified biologist to determine whether prairie dog burrows are active or inactive and whether burrowing owls (*Athene cunicularia hypugaea*) may also be utilizing the site. Colonies within the range of the black-tailed prairie dog can be surveyed by a qualified biologist diurnally, year-round using binoculars. If ground-disturbing activities cannot be relocated off the prairie dog colony, or if project activities involve control of prairie dogs, the Department recommends live-trapping and relocation of prairie dogs. The Department can provide recommendations regarding the suitability of potential translocation areas and procedures.

- Due to potential impacts on burrowing owls if they occur within your project area, the Department recommends that a preliminary burrowing owl survey be conducted by a qualified biologist, using the Department's burrowing owl survey protocol, before any ground-disturbing activities occur. Should burrowing owls be documented in the project area, please contact the Department or the U.S. Fish and Wildlife Service (USFWS) for further recommendations regarding relocation or avoidance of impacts.

- Any new or retrofitted, above-ground electrical transmission and distribution lines, substations, and transformer equipment should be constructed in conformance with the Avian Power Line Interaction Committee's (APLIC's) "Suggested Practices for Avian Protection on Power Lines", 2006 and "Reducing Avian Collisions with Power Lines", 2012 (www.aplic.org/mission.php).

- Grading or blading within the proposed 20-megawatt PV project area should be minimized to the greatest extent possible. This will help retain wildlife habitat features within the site and preserve existing vegetation and soil structure. Keeping the existing soil and root structures intact also helps to minimize erosional run-off and reduce biodiversity loss within the site (Grodsky and Hernandez 2020).

- Security perimeter fencing around the 20-megawatt solar facility should be constructed to allow for some wildlife permeability. Leaving a 6- to 8-inch gap between the ground surface and bottom of the fence will allow smaller terrestrial wildlife species to move freely through the area and make use of any suitable habitat within the solar facility.

- For post-construction reclamation of the project area, the Department recommends that WSMR use only native plant species and that the reclamation seed mix is designed to enhance local pollinator habitat. The Department also recommends that only certified weed-free seed be used to avoid inadvertently introducing non-native species to the reclamation site. Any alternate seeds used to substitute for primary plant species that are unavailable at the time of reclamation should also be native. When possible, the Department recommends using seeds that are

sourced from the same region and habitat type as the reclamation site and suggests including seeds from a region that represents potential future climatic conditions at the site.

Thank you for the opportunity to review and comment on the Draft EA. If you have any questions, please contact: Ron Kellermueller, Mining and Energy Habitat Specialist, Ecological and Environmental Planning Section at (505) 270-6612 or ronald.kellermueller@dgf.nm.gov.

Sincerely,

Virginia Seamster

Digitally signed by Virginia Seamster
Date: 2024.08.06 15:07:58 -06'00'

Virginia Seamster, Ph.D.
Assistant Chief for Technical Guidance, Ecological and Environmental Planning Section

cc: USFWS NMES Field Office

Grodsky, S.M., and R.R. Hernandez. 2020. Reduced ecosystem services of desert plants from ground-mounted solar energy development. Nature Sustainability 3:1036–1043. https://doi.org/10.1038/s41893-020-0574-x

U.S. Fish and Wildlife Service – Distribution List

Ms. Amy Leuders
Regional Director
U.S. Fish and Wildlife Service, Southwest Regional Office
PO Box 1306
Albuquerque NM 87103-1306

Mr. Shawn Sartorius
Field Supervisor
U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office
2105 Osuna Road NE
Albuquerque NM 87113-1001

Ms. Jennifer Romero
Acting Refuge Manager
U.S. Fish and Wildlife Service, San Andres National Wildlife Refuge
5686 Santa Gertrudis Drive
Las Cruces NM 88012

Ms. Corrie Borgman
Wildlife Biologist
U.S. Fish and Wildlife Service
PO Box 1306
Albuquerque NM 87103-1306

State Historical Preservation Office – Distribution List

Mr. Jeff Pappas, PhD
State Historic Preservation Officer and Director
New Mexico Historic Preservation Division
Department of Cultural Affairs
Bataan Memorial Building
407 Galisteo Street Suite 236
Santa Fe NM 87501

Native American Tribes – Distribution List

Governor Vernon B. Abeita
Pueblo of Isleta
PO Box 1270
Isleta NM 87022

President Gabe Aguilar
Mescalero Apache Tribe
PO Box 227
Mescalero NM 88340

Chairman Kasey Velasquez
White Mountain Apache Tribe
PO Box 700
Whiteriver AZ 85941

Chairman Mark Woommavovah
Comanche Nation of Oklahoma
PO Box 908
Lawton OK 73502

APPENDIX C

AIR QUALITY SUPPORT DOCUMENTATION

Appendix C
Air Quality Calculations

The Army has considered net emissions generated from all sources of air emissions that may be associated with the Proposed Action. More specifically, project-related direct emissions would result from the following:

> *Site preparation, construction, and installation activities* – Use of heavy construction equipment (e.g., aerial lifts, cranes, forklifts, welders) worker vehicles traveling to and from the project area, use of paints and architectural coatings, paving off gases, and fugitive dust from earth-moving activities and ground disturbance.
>
> *Backup Power Generator Operation* – Use of generators to provide 14 days of backup energy for critical facilities.

Emissions factors are representative values that attempt to relate the quantity of a pollutant released with the activity associated with the release of that pollutant. These factors are usually expressed as the weight of pollutant emitted per unit weight, volume, distance, or duration of the pollutant emitting activity. In most cases, these factors are simply an average of all available data of acceptable quality and are generally assumed to be representative of long-term averages for all emitters in the source category. The emission factors presented in this appendix are generally from the Compilation of Air Pollutant Emission Factors (AP-42) and WebFIRE (USEPA's online emissions factor database).

All direct and indirect emissions associated with the Proposed Action were estimated. Construction emissions were estimated using predicted equipment use for demolition (EV charging stations only), site grading, trenching/excavation, construction, and paving. Operational emissions from generators were estimated under the assumption the generators would be operating continuously for 14 days.

C.1 EMISSIONS ESTIMATION METHODOLOGY

The construction period would involve the use of various non-road equipment, power generators, and trucks. Information regarding the number of pieces and types of construction equipment to be used on the project, the schedule for deployment of equipment (monthly and annually), and the approximate daily operating time (including power level or usage factor) were estimated for each individual project component on a schedule of construction activity. Each project component (i.e., solar PV array, microgrid systems, and EV charging stations) was assumed to occur over a 2-year construction period from October 2026 through September 2028.

The following on-road vehicle type abbreviations and their definitions are used throughout this appendix.

LDGV: Light-Duty Gasoline Vehicle (Passenger Cars)
LDGT: Light-Duty Gasoline Truck (0–8,500 Pounds Gross Vehicle Weight Rating [GVWR])
HDGV: Heavy-Duty Gasoline Vehicle (8,501 to > 60,000 Pounds GVWR)
LDDV: Light-Duty Diesel Vehicle (Passenger Cars)
LDDT: Light-Duty Diesel Truck (0–8,500 Pounds GVWR)
HDDV: Heavy-Duty Diesel Vehicle (8,501 to > 60,000 Pounds GVWR)
MC: Motorcycles (Gasoline)

C.1.1 Construction – Demolition Phase

C.1.1.1 Assumptions

Average days worked per week: 5

Construction Exhaust

Equipment Name	Number Of Equipment	Hours per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

Vehicle Exhaust

Average Hauling Truck Capacity (cubic yard): 20
Average Hauling Truck Round Trip Commute (miles): 20

Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

Worker Trips

Average Worker Round Trip Commute (miles): 20

Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

C.1.1.2 Emission Factors

Construction Exhaust Emission Factors (pounds/hour)

Concrete/Industrial Saws Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0336	0.0006	0.2470	0.3705	0.0093	0.0093	0.0030	58.539
Rubber Tired Dozers Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
LDGV	000.192	000.002	000.099	002.870	000.004	000.004	000.000	000.024	00303.869
LDGT	000.209	000.003	000.175	003.239	000.006	000.005	000.000	000.026	00396.310
HDGV	000.856	000.006	000.851	013.446	000.024	000.021	000.000	000.051	00912.039
LDDV	000.074	000.001	000.080	003.109	000.003	000.002	000.000	000.008	00307.078
LDDT	000.081	000.001	000.120	002.137	000.003	000.003	000.000	000.009	00358.668
HDDV	000.118	000.004	002.424	001.549	000.042	000.039	000.000	000.032	01234.892
MC	002.457	000.003	000.660	012.092	000.022	000.020	000.000	000.054	00389.894

C.1.1.3 Formulas

Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (0.00042 * BA * BH) / 2000

$PM10_{FD}$: Fugitive Dust PM_{10} Emissions (TONs)
0.00042: Emission Factor (pounds/cubic feet)

BA: Area of Building to be demolished (square feet)
BH: Height of Building to be demolished (feet)
2000: Conversion Factor pounds to tons

Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Workdays (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
2000: Conversion Factor pounds to tons

Vehicle Exhaust Emissions per Phase

VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (square feet)
BH: Height of Building being demolish (feet)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 cubic yard / 27 cubic feet)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Worker Trips Emissions per Phase

VMTWT = WD * WT * 1.25 * NE

VMTWT: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Workdays (days)
WT: Average Worker Round Trip Commute (miles)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

VPOL = (VMTWT * 0.002205 * EFPOL * VM) / 2000

VPOL: Vehicle Emissions (TONs)
VMTWT: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EFPOL: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

C.1.2 Construction – Site Grading Phase

C.1.2.1 Assumptions

Average days worked per week: 5

Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	2	8
Other Construction Equipment Composite	2	8
Rollers Composite	1	8
Rubber Tired Dozers Composite	3	8
Scrapers Composite	6	8
Tractors/Loaders/Backhoes Composite	2	8

Vehicle Exhaust

Average Hauling Truck Capacity (cubic yards): 20
Average Hauling Truck Round Trip Commute (miles): 20

Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

Worker Trips

Average Worker Round Trip Commute (miles): 20

Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

C.1.2.2 Emission Factors

Construction Exhaust Emission Factors (pounds/hour)

Graders Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0676	0.0014	0.3314	0.5695	0.0147	0.0147	0.0061	132.89
Other Construction Equipment Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Rollers Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0409	0.0007	0.2500	0.3762	0.0122	0.0122	0.0036	67.123
Rubber Tired Dozers Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.1671	0.0024	1.0824	0.6620	0.0418	0.0418	0.0150	239.45
Scrapers Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.1495	0.0026	0.8387	0.7186	0.0334	0.0334	0.0134	262.81
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
LDGV	000.216	000.002	000.112	003.201	000.005	000.004	000.000	000.024	00297.167
LDGT	000.211	000.003	000.197	003.559	000.006	000.005	000.000	000.026	00385.433
HDGV	000.808	000.006	000.860	013.075	000.025	000.022	000.000	000.051	00894.420
LDDV	000.071	000.001	000.083	003.088	000.003	000.002	000.000	000.008	00300.475
LDDT	000.071	000.001	000.122	002.092	000.003	000.003	000.000	000.009	00348.850
HDDV	000.100	000.004	002.413	001.475	000.040	000.036	000.000	000.032	01258.368
MC	002.651	000.003	000.755	013.028	000.024	000.021	000.000	000.055	00389.875

C.1.2.3 Formulas

Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM_{10} Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 pounds / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Workdays (days)
2000: Conversion Factor pounds to tons

Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Workdays (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
2000: Conversion Factor pounds to tons

Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Worker Trips Emissions per Phase

VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Workdays (days)
WT: Average Worker Round Trip Commute (miles)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

C.1.3 Construction – Trenching/Excavating Phase

C.1.3.1 Assumptions

Average Days worked per week: 5

Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipment Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

Vehicle Exhaust

Average Hauling Truck Capacity (cubic yards): 20
Average Hauling Truck Round Trip Commute (mile): 20

Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

Worker Trips

Average Worker Round Trip Commute (miles): 20

Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

C.1.3.2 Emission Factors

Construction Exhaust Emission Factors (pounds/hour)

Excavators Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0559	0.0013	0.2269	0.5086	0.0086	0.0086	0.0050	119.70
Other General Construction Equipment Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0442	0.0012	0.2021	0.3473	0.0068	0.0068	0.0039	122.60
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0335	0.0007	0.1857	0.3586	0.0058	0.0058	0.0030	66.872

Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
LDGV	000.216	000.002	000.112	003.201	000.005	000.004	000.000	000.024	00297.167
LDGT	000.211	000.003	000.197	003.559	000.006	000.005	000.000	000.026	00385.433
HDGV	000.808	000.006	000.860	013.075	000.025	000.022	000.000	000.051	00894.420
LDDV	000.071	000.001	000.083	003.088	000.003	000.002	000.000	000.008	00300.475
LDDT	000.071	000.001	000.122	002.092	000.003	000.003	000.000	000.009	00348.850
HDDV	000.100	000.004	002.413	001.475	000.040	000.036	000.000	000.032	01258.368
MC	002.651	000.003	000.755	013.028	000.024	000.021	000.000	000.055	00389.875

C.1.3.3 Formulas

Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM_{10} Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 pounds / 1 Acre Day)

ACRE: Total acres (acres)
WD: Number of Total Workdays (days)
2000: Conversion Factor pounds to tons

Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Workdays (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
2000: Conversion Factor pounds to tons

Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (cubic yards)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (cubic yards)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Worker Trips Emissions per Phase

VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Workdays (days)
WT: Average Worker Round Trip Commute (miles)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

C.1.4 Construction – Building Construction Phase

C.1.4.1 Assumptions

Average Days worked per week: 5

Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Aerial Lifts Composite	1	6
Bore/Drill Rigs Composite (Solar PV Array Only)	1	6
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Other General Industrial Equipment Composite	3	8
Welders Composite	3	8

Vehicle Exhaust

Average Hauling Truck Round Trip Commute (miles): 20

Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

Worker Trips

Average Worker Round Trip Commute (miles): 20

Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

Vendor Trips

Average Vendor Round Trip Commute (miles): 40

Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

C.1.4.2 Emission Factors

Construction Exhaust Emission Factors (pounds/hour)

Aerial Lifts Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0184	0.0003	0.1365	0.1645	0.0047	0.0047	0.0016	34.763
Bore/Drill Rigs Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0428	0.0017	0.2863	0.5006	0.0041	0.0041	0.0038	164.96
Cranes Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0680	0.0013	0.4222	0.3737	0.0143	0.0143	0.0061	128.77
Forklifts Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0236	0.0006	0.0859	0.2147	0.0025	0.0025	0.0021	54.449
Generator Sets Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0287	0.0006	0.2329	0.2666	0.0080	0.0080	0.0025	61.057
Other General Industrial Equipment Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0747	0.0016	0.3947	0.4438	0.0130	0.0130	0.0067	152.40
Welders Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0214	0.0003	0.1373	0.1745	0.0051	0.0051	0.0019	25.650

Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
LDGV	000.216	000.002	000.112	003.201	000.005	000.004	000.000	000.024	00297.167
LDGT	000.211	000.003	000.197	003.559	000.006	000.005	000.000	000.026	00385.433
HDGV	000.808	000.006	000.860	013.075	000.025	000.022	000.000	000.051	00894.420
LDDV	000.071	000.001	000.083	003.088	000.003	000.002	000.000	000.008	00300.475
LDDT	000.071	000.001	000.122	002.092	000.003	000.003	000.000	000.009	00348.850
HDDV	000.100	000.004	002.413	001.475	000.040	000.036	000.000	000.032	01258.368
MC	002.651	000.003	000.755	013.028	000.024	000.021	000.000	000.055	00389.875

C.1.4.3 Formulas

Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Workdays (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
2000: Conversion Factor pounds to tons

Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (square feet)
BH: Height of Building (feet)
(0.42 / 1000): Conversion Factor cubic feet to trips (0.42 trip / 1,000 cubic feet)
HT: Average Hauling Truck Round Trip Commute (miles/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Workdays (days)
WT: Average Worker Round Trip Commute (miles)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Vendor Trips Emissions per Phase

VMT_{VT} = BA * BH * (0.38 / 1000) * HT

VMT_{VT}: Vendor Trips Vehicle Miles Travel (miles)
BA: Area of Building (square feet)
BH: Height of Building (feet)
(0.38 / 1000): Conversion Factor cubic feet to trips (0.38 trip / 1,000 cubic feet)
HT: Average Hauling Truck Round Trip Commute (miles/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vendor Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

C.1.5 Construction – Paving Phase

C.1.5.1 Assumptions

Average Days worked per week: 5

Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	1	8
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

Vehicle Exhaust

Average Hauling Truck Round Trip Commute (miles): 20

Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

Worker Trips

Average Worker Round Trip Commute (miles): 20

Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

C.1.5.2 Emission Factors

Paving Phase Emission Factors (pounds/hour)

Cement and Mortar Mixers Composite								
	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0085	0.0001	0.0534	0.0414	0.0020	0.0020	0.0007	7.2673
Pavers Composite								
	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	CH_4	CO_2e
Emission Factors	0.0815	0.0008	0.4432	0.4804	0.0269	0.0269	0.0073	78.116

Paving Equipment Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0624	0.0007	0.3831	0.4023	0.0236	0.0236	0.0056	69.078
Rollers Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0464	0.0007	0.2939	0.3784	0.0158	0.0158	0.0041	67.139
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_X**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CH_4**	**CO_2e**
Emission Factors	0.0364	0.0007	0.2127	0.3593	0.0080	0.0080	0.0032	66.879

Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.240	000.002	000.137	004.148	000.003	000.003	000.000	000.025	00334.045
LDGT	000.270	000.003	000.236	004.715	000.005	000.004	000.000	000.026	00429.693
HDGV	001.053	000.006	000.993	016.203	000.025	000.022	000.000	000.052	00933.502
LDDV	000.061	000.001	000.097	003.986	000.003	000.002	000.000	000.008	00347.372
LDDT	000.113	000.001	000.227	003.202	000.004	000.003	000.000	000.008	00390.523
HDDV	000.135	000.004	002.683	001.759	000.062	000.057	000.000	000.033	01306.331
MC	003.047	000.003	000.571	013.043	000.024	000.021	000.000	000.051	00386.862

C.1.5.3 Formulas

Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Workdays (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (pounds/hour)
2000: Conversion Factor pounds to tons

Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (square feet)
0.25: Thickness of Paving Area (feet)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 cubic yard / 27 cubic feet)
HC: Average Hauling Truck Capacity (cubic yards)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC cubic yards)
HT: Average Hauling Truck Round Trip Commute (miles/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Workdays (days)
WT: Average Worker Round Trip Commute (miles)
1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000
V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

Off-Gassing Emissions per Phase

VOC_P = (2.62 * PA) / 43,560
VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (pounds/acre)
PA: Paving Area (square feet)
43560: Conversion Factor square feet to acre (43,560 square feet / $acre)^2$ / acre)

C.1.6 Operation – Emergency Generators

C.1.6.1 Assumptions

Emergency Generator's Horsepower: 1,000
Average Operating Hours Per Year (hours): 336

C.1.6.2 Emission Factors – Diesel

Type of Fuel used in Emergency Generator: Diesel

Emergency Generators Emission Factor (pounds/horsepower-hour)

VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
0.000716	0.0000125	0.0259	0.00688	0.000809	0.000809	000.000	000.000	1.33

C.1.6.3 Emission Factors – Propane

Type of Fuel used in Emergency Generator: Natural Gas - 4 Stroke Lean Burn

Emergency Generators Emission Factor (pounds/horsepower-hour)

VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
0.000927	0.000005	0.006656	0.004377	0.000001	0.000001	000.000	000.000	0.920156

C.1.6.4 Formulas

Emergency Generator Emissions per Year

AEPOL= (NGEN * HP * OT * EFPOL) / 2000
AEPOL: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EFPOL: Emission Factor for Pollutant (pounds/horsepower-hour)

C.2 PROPOSED ACTION AIR EMISSIONS ANALYSIS

Action Location

State: New Mexico

County: Doña Ana, Socorro, Otero
Regulatory Areas: Not in a Regulatory Area

Construction Period
Start: October 2026
End: September 2028

C.2.1 Action Description

The Proposed Action is to install, operate, and maintain additional energy readiness systems at WSMR including an additional 20-MW solar PV system adjacent to an existing 6-MW solar PV system on the Main Post; a microgrid system in the Stallion Range Center and others where appropriate; solar carports in the Stallion Range Center; battery storage systems where needed; electric vehicle charging station near existing facilities and within existing disturbed areas; and additional generators powered by natural gas, propane, and diesel to provide 14 days of backup power for critical facilities on the Main Post and Stallion Range Center.

For the purposes of this analysis, it was assumed grading would not be required for the sites proposed for solar carports, EV charging stations, generators, transformers, inverters, and ESS components. All elements of the Proposed Action would be constructed or installed in FY 2027 through FY 2028 (i.e., October 2026 through September 2028).

C.2.1.1 Construction of a Solar PV System

The solar PV system would be constructed over a 24-month period from October 2026 through September 2028.

Site grading would occur on approximately 103 acres (4,487,000 square feet). Site grading would begin in October 2026 and last approximately 5 months. It was assumed 450,000 cubic feet of material would be hauled off-site during the grading period.

Trenching would be required for distribution and communications lines (approximately 120,000 linear feet), perimeter fencing (approximately 16,000 linear feet), and concrete pads (approximately 500 square feet). A 3-foot trench width for distribution/communications lines and a 1-foot trench width for perimeter fencing was assumed. Therefore, the total trenched area would be 376,500 square feet. Trenching would begin in March 2027 and last approximately 5 months. It was assumed 35,000 cubic feet of material would be hauled off-site to the WSMR landfill during the trenching period.

Construction would include the 103-acre solar PV array. During this period, 762 solar strings with foundation poles would be installed. The construction area for each solar string was assumed to be 500 square feet, for a total construction area of 381,000 square feet (762 strings x 500 square feet = 381,000 square feet). Construction would begin in August 2027 and last approximately 12 months.

Paving for the access road and equipment pads would occur on approximately 3,500 square feet. Paving would begin in August 2028 and last approximately 2 months.

C.2.1.2 Construction of a Microgrid System

The microgrid system in the Stallion Range Center would be constructed over a 24-month period from October 2026 through September 2028. It was assumed the carport PV array, generator,

transformer, inverter, breaker, controller, and ESS components would be installed on pre-disturbed, leveled sites and would not require grading.

Trenching would be required for new fencing (approximately 600 linear feet) and concrete pads (approximately 10,000 square feet). A 1-foot trench width for fencing was assumed. The total trenched area would be 10,600 square feet. Trenching would begin in October 2026 and last approximately 8 months. It was assumed 10,000 cubic feet of material would be hauled off-site to the WSMR landfill during the trenching period.

Construction would installation of all microgrid equipment and the carport PV array. The total construction area was assumed to be 50,000 square feet. Construction would begin in June 2027 and last approximately 12 months.

Paving for the carport and equipment pads would occur on approximately 50,000 square feet. Paving would begin in June 2028 and last approximately 4 months.

C.2.1.3 Construction of EV Charging Stations

The 11 EV charging stations would be constructed over a 24-month period from October 2026 through September 2028. It was assumed each EV charging station would be installed in an existing parking area and would not require grading.

Demolition of a 9-foot by 18-foot area for each charging station would be required, for a total of 1,782 square feet. Demolition would begin in October 2026 and last approximately 3 months.

Trenching would be required at each charging station for conduit (approximately 100 linear feet) and counterbalance plate (9-feet by 18-feet). A 3-foot trench width for conduit lines was assumed. The total trenched area would be 5,082 square feet. Trenching would begin in January 2027 and last approximately 6 months. It was assumed 5,000 cubic feet of material would be hauled off-site to the WSMR landfill during the trenching period.

Construction would include the 11 EV charging stations. The construction area for each charging station was assumed to be 9-feet by 18-feet, for a total construction area of 1,782 square feet. Construction would begin in July 2027 and last approximately 12 months.

Paving for each charging station would occur on a 9-foot by 18-foot area, for a total of 1,782 square feet. Paving would begin in July 2028 and last approximately 3 months.

C.2.1.4 Main Post Emergency Generators

Four diesel generators would be installed at the Main Post. Diesel was used as the power source for the new Main Post generators to equate a worse-case emissions scenario. However, the power source for the generators also could include natural gas and propane. To equate operational emissions, it was assumed diesel generators would become operational in 2029. Continuous operating time was assumed to be 14 days (336 hours) on a yearly basis to equate the backup power requirement and a worse-case scenario.

C.2.1.5 Stallion Range Center Emergency Generators

Two propane generators would be installed at the Stallion Range Center. To equate operational emissions, it was assumed the propane generators would become operational in 2029.

Continuous operating time was assumed to be 14 days (336 hours) on a yearly basis to equate the backup power requirement and a worse-case scenario.

C.2.2 Assumptions

C.2.2.1 Construction of a Solar PV System

Site Grading Phase
Start: October 2026
Phase duration: 5 months
Area of site to be graded (square feet): 4,487,000
Amount of material to be hauled offsite (cubic yards): 450,000

Trenching/Excavating Phase
Start: March 2027
Phase duration: 5 months
Area of site to be trenched/excavated (square feet): 376,500
Amount of material to be hauled on or offsite (cubic yards): 35,000

Building Construction Phase
Start: August 2027
Phase duration: 12 months
Area of building (square feet): 381,000
Height of building (feet): 5

Paving Phase
Start: August 2028
Phase duration: 2 months
Paving area (square feet): 3,500

C.2.2.2 Construction of a Microgrid System

Trenching/Excavating Phase
Start: October 2026
Phase duration: 8 months
Area of site to be trenched/excavated (square feet): 10,600
Amount of material to be hauled on or offsite (cubic yards): 10,000

Building Construction Phase
Start: June 2027
Phase duration: 12 months
Area of building (square feet): 50,000
Height of building (feet): 5

Paving Phase
Start: June 2028
Phase duration: 4 months
Paving area (square feet): 50,000

C.2.2.3 Construction of EV Charging Stations

Demolition Phase
Start: October 2026
Phase duration: 3 months

Area of site to be graded (square feet): 1,782
Height of demolition (square feet): 1

Trenching/Excavating Phase

Start: January 2027
Phase duration: 6 months
Area of site to be trenched/excavated (square feet): 5,082
Amount of material to be hauled on or offsite (cubic yards): 500

Building Construction Phase

Start: July 2027
Phase duration: 12 months
Area of building (square feet): 1,782
Height of building (feet): 5

Paving Phase

Start: July 2028
Phase duration: 3 months
Paving area (square feet): 1,782

C.2.2.4 Main Post Emergency Generators

Start: January 2029
End: Indefinite
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 4
Emergency Generator's Horsepower: 1,000
Average Operating Hours per Year (hours): 336

C.2.2.5 Stallion Range Center Emergency Generators

Start: January 2029
End: Indefinite
Type of Fuel used in Emergency Generator: Natural Gas - 4 Stroke Lean Burn
Number of Emergency Generators: 2
Emergency Generator's Horsepower: 1,000
Average Operating Hours per Year (hours): 336

C.2.3 Proposed Action Emissions Summary

Proposed Action Total Estimated Construction Emissions – Construction of a Solar PV System (tons)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Emissions	1.428599	0.028273	9.010242	9.701339	242.212736	0.300682	0.000	0.022039	3265.7

Proposed Action Total Estimated Construction Emissions – Construction of a Microgrid System (tons)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Emissions	0.686629	0.013504	3.663779	5.189954	0.974076	0.130308	0.000	0.003436	1305.4

Proposed Action Total Estimated Construction Emissions – Construction of EV Charging Stations (tons)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Emissions	0.639613	0.012655	3.429152	4.85488	0.423266	0.119442	0.000	0.002846	1212.5

Proposed Action Estimated Operations Emissions – Main Post Emergency Generators (tons)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Emissions	0.481152	0.0084	17.4048	4.62336	0.543648	0.543648	0.000	0.000	893.8

Proposed Action Estimated Operations Emissions – Stallion Range Center Emergency Generators (tons)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
Emissions	0.311472	0.00168	2.236416	1.470672	0.000336	0.000336	0.000	0.000	309.2

Proposed Action Total Estimated Emissions by Year (tpy)

	VOC	SO_X	NO_X	CO	PM_{10}	$PM_{2.5}$	Pb	NH_3	CO_2e
2026	0.574	0.011	3.767	3.720	134.356	0.129	<0.001	0.011	1344.7
2027	1.334	0.027	7.620	9.715	109.087	0.255	<0.001	0.013	2847.7
2028	0.847	0.016	4.716	6.311	0.167	0.167	<0.001	0.005	1591.2
2029	0.793	0.010	19.641	6.094	0.544	0.544	<0.001	<0.001	1202.9
2030 (steady state)	0.793	0.010	19.641	6.094	0.544	0.544	<0.001	<0.001	1202.9

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APPENDIX D

DETAILED SOIL MAPS FOR PROJECT AREAS

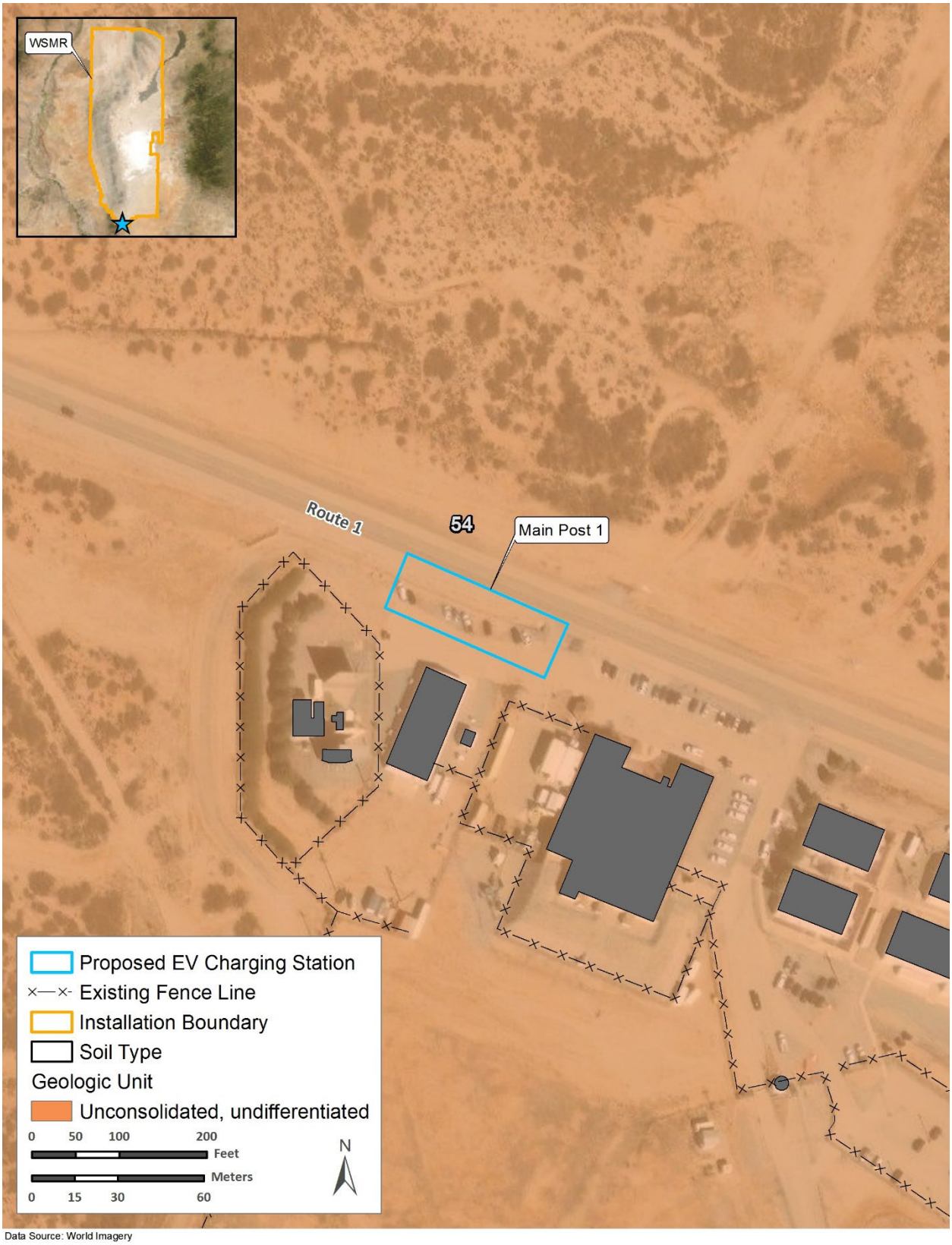

Figure D-1. Main Post 1 EV Charging Station (EVS21244) Soils

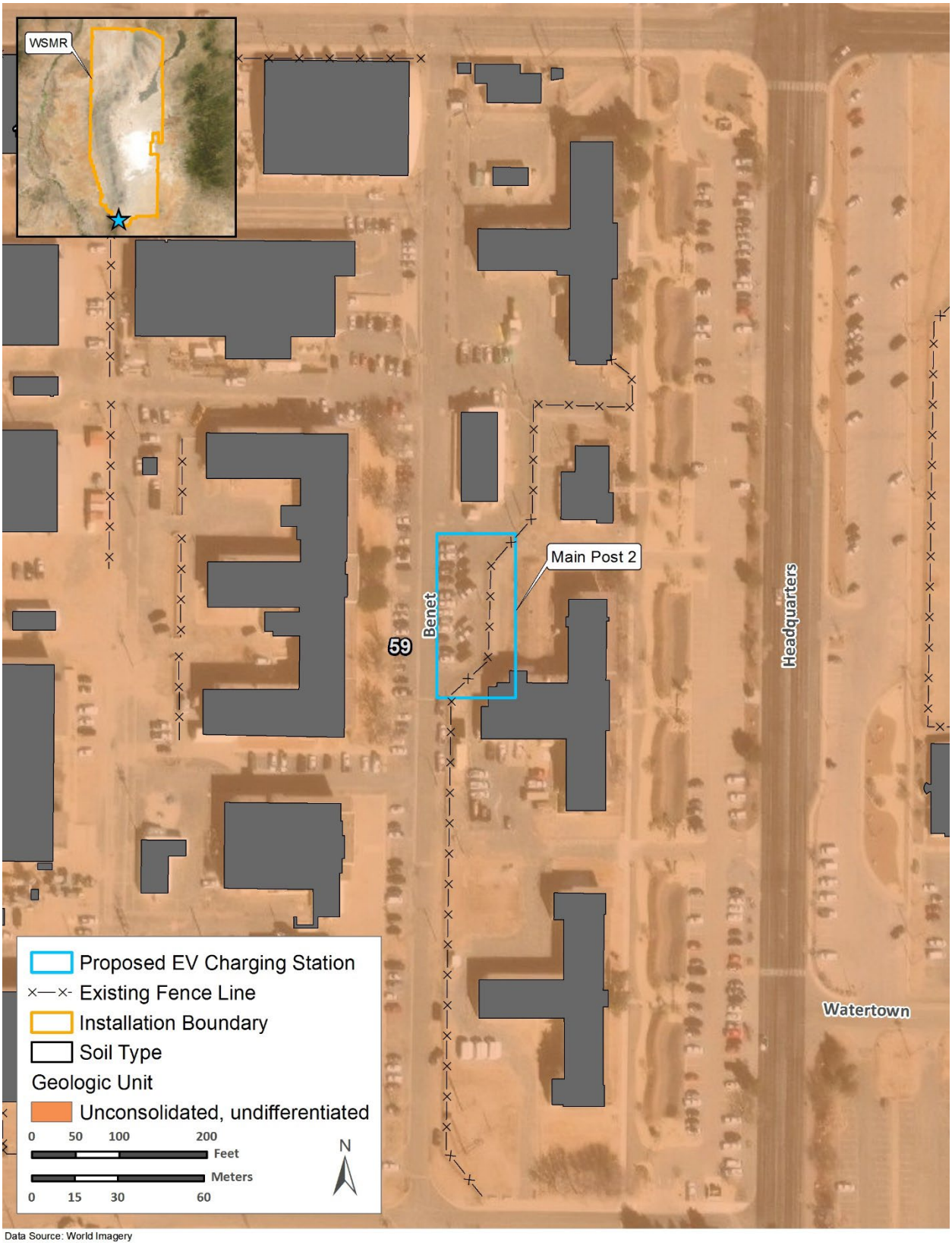

Figure D-2. Main Post 2 EV Charging Station (EVS01530) Soils

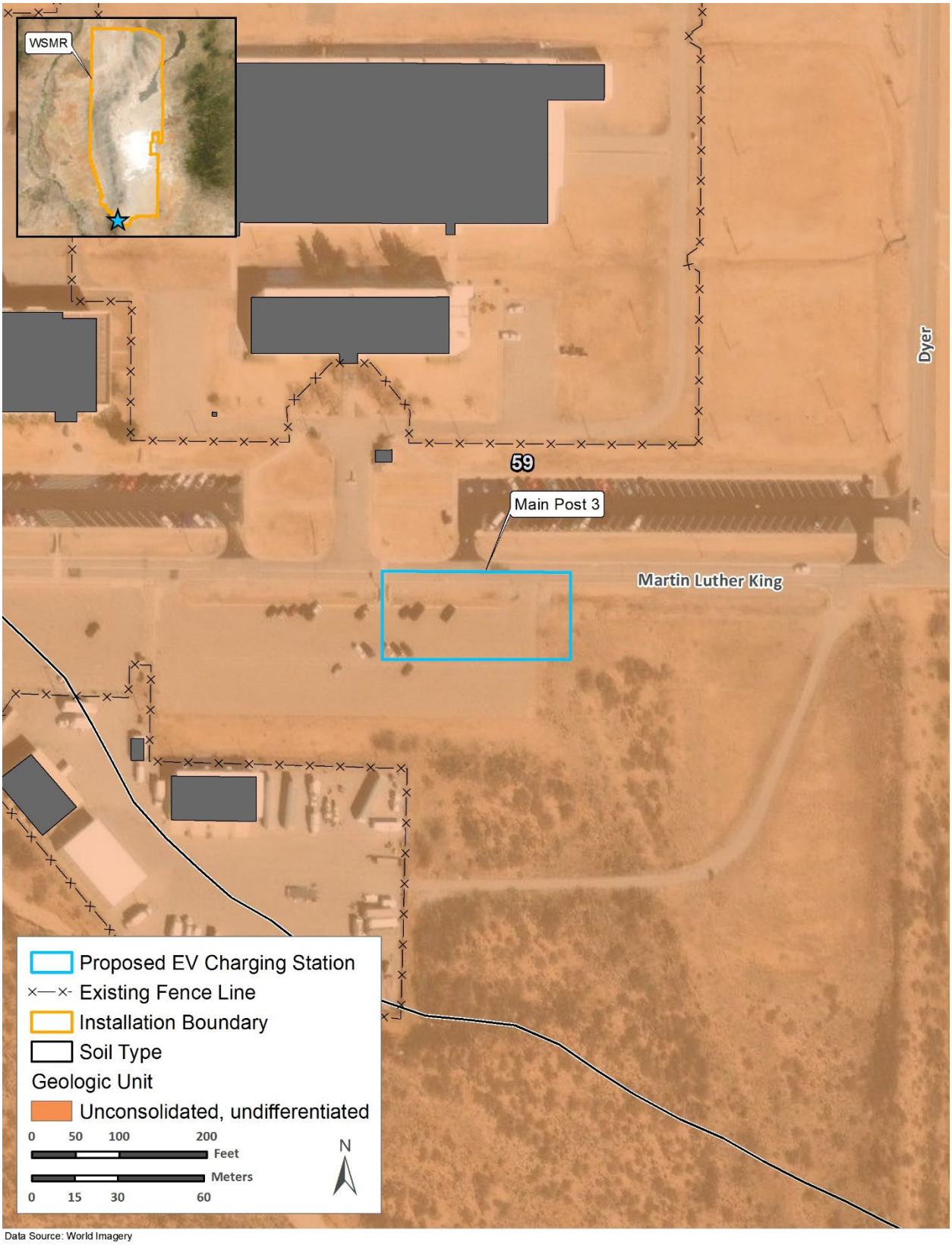

Figure D-3. Main Post 3 EV Charging Station (EVS01400) Soils

Figure D-4. Main Post 4 EV Charging Station (EVS21080) Soils

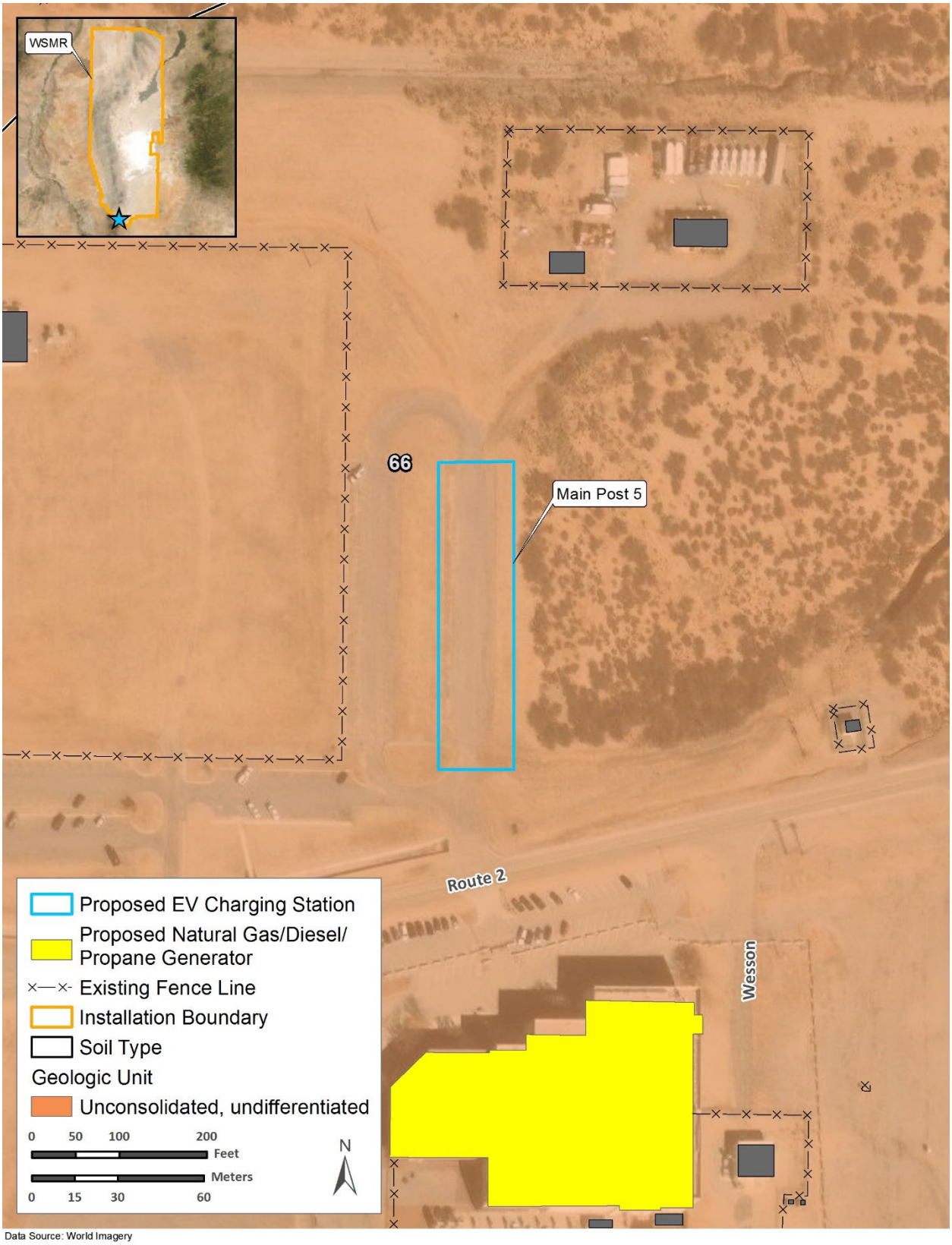

Figure D-5. Main Post 5 EV Charging Station (EVS00300) Soils

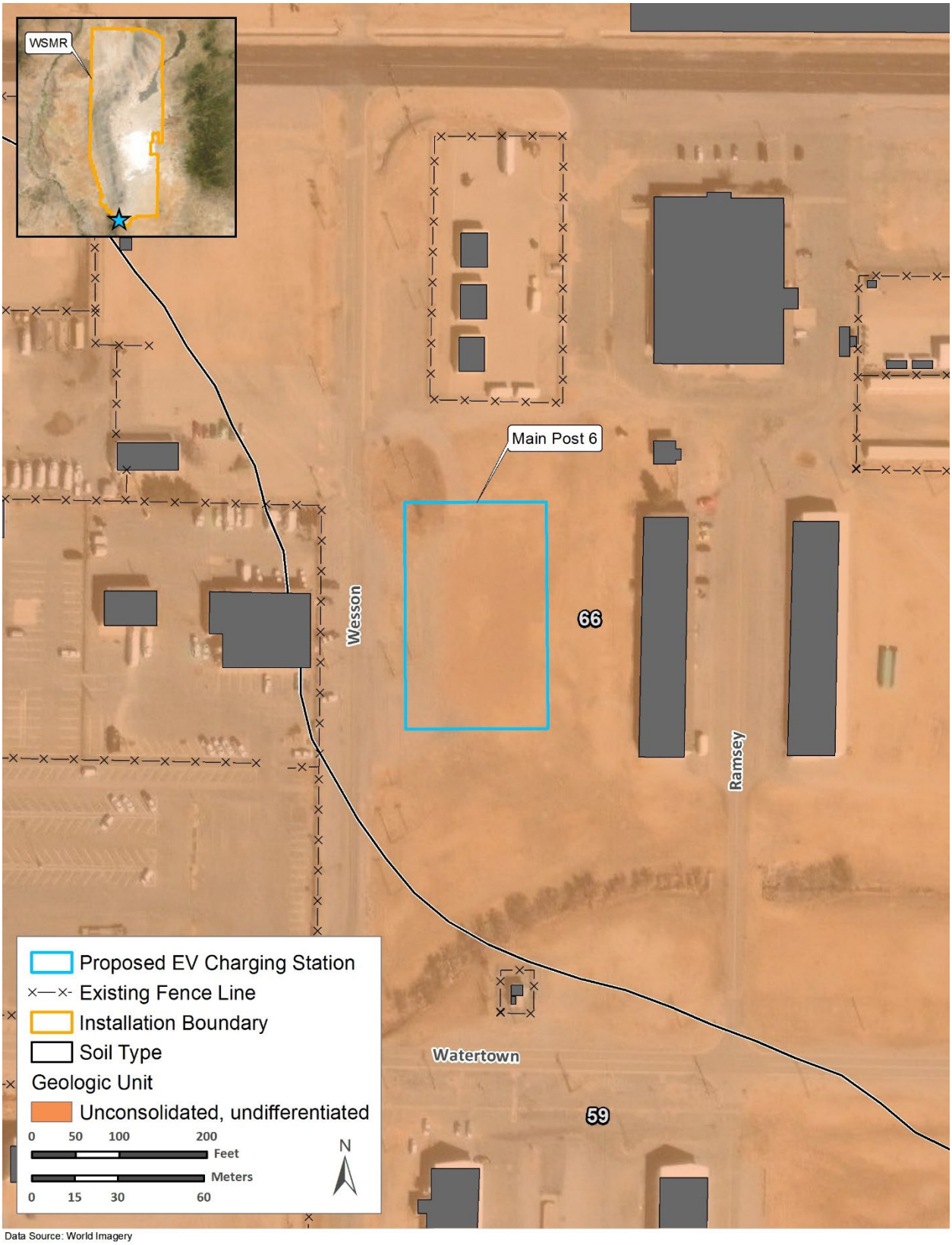

Figure D-6. Main Post 6 EV Charging Station (EVS01866) Soils

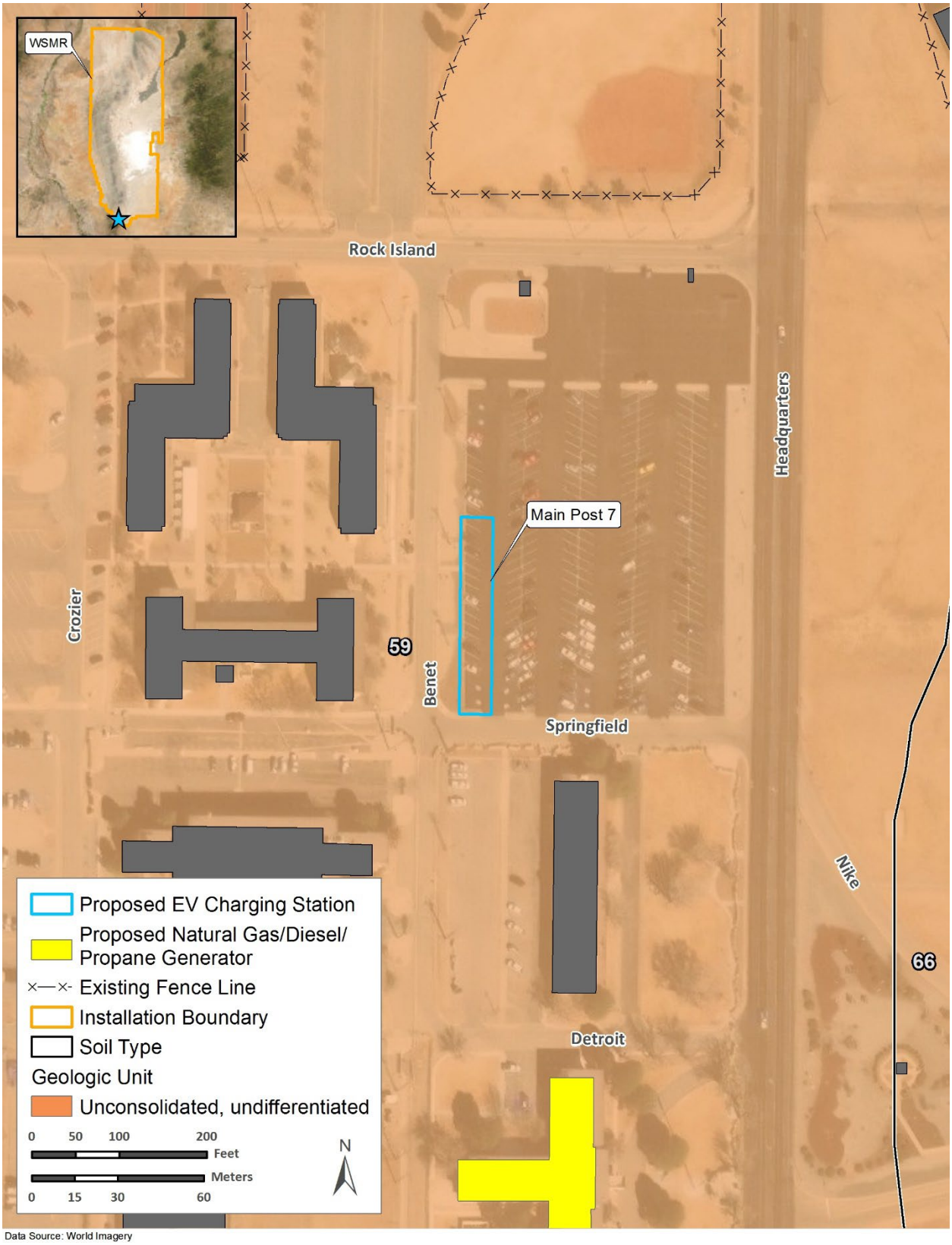

Figure D-7. Main Post 7 EV Charging Station (EVS00102) Soils

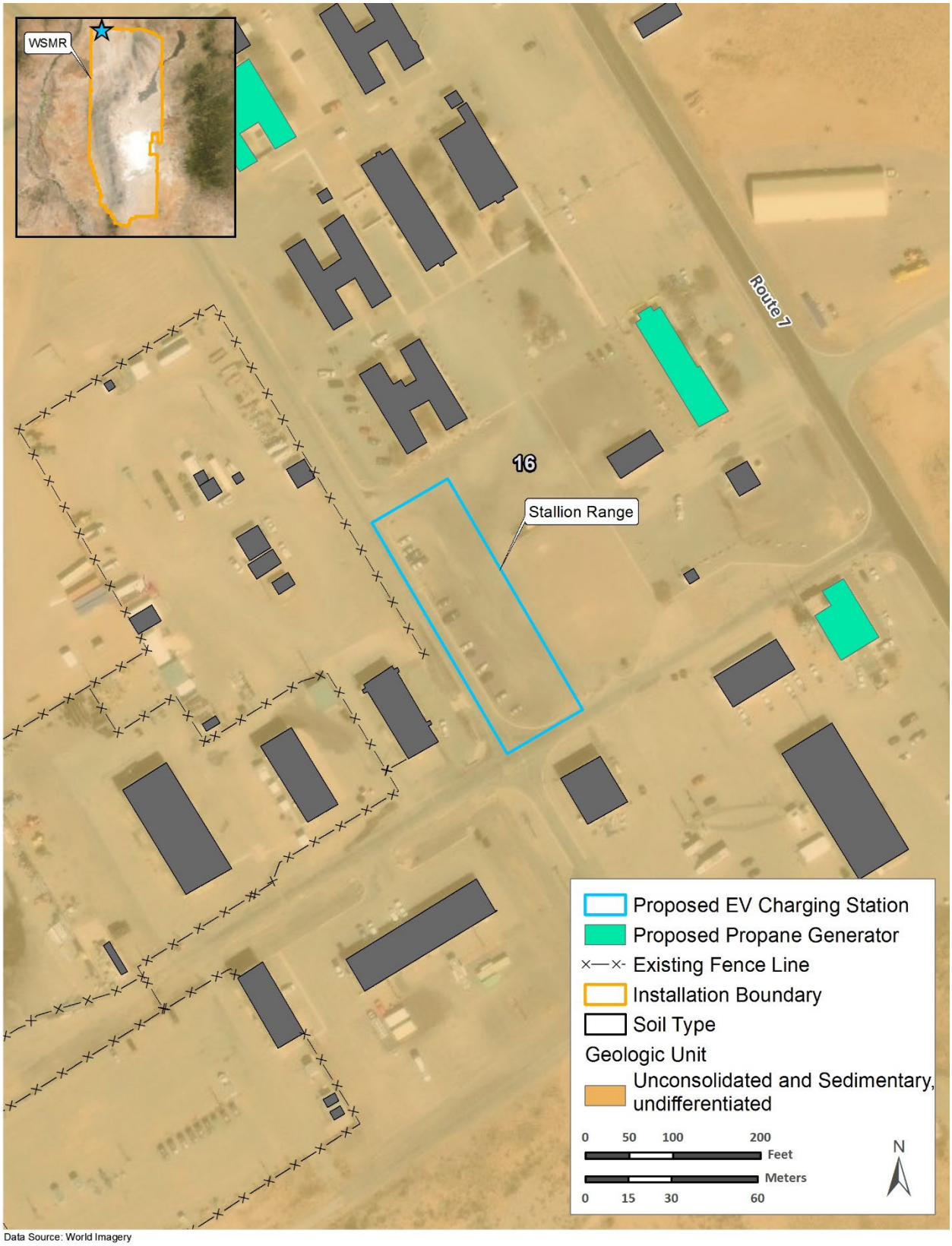

Figure D-8. Stallion Range EV Charging Station (EVS34230) Soils

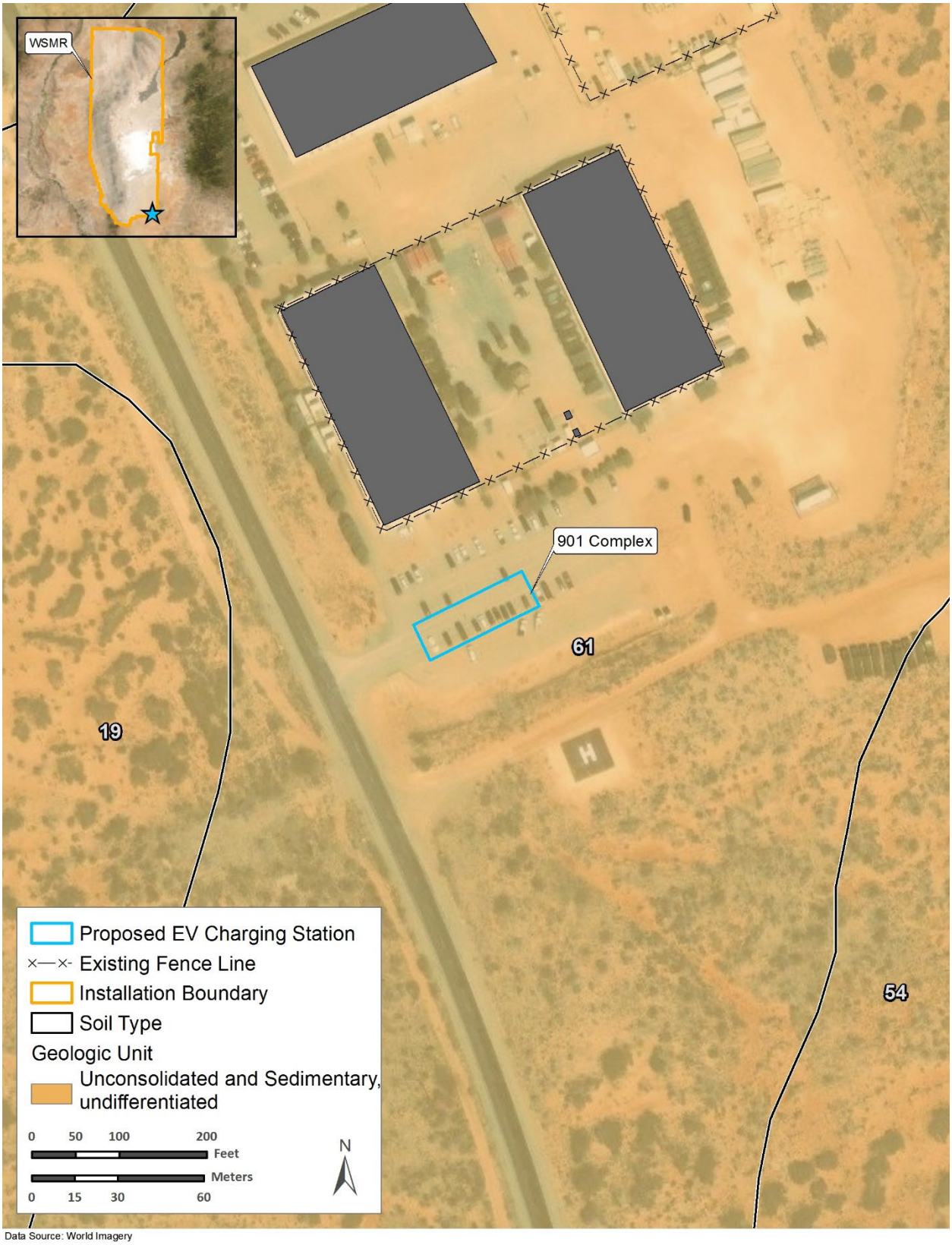

Figure D-9. 901 Complex EV Charging Station (EVS90121) Soils

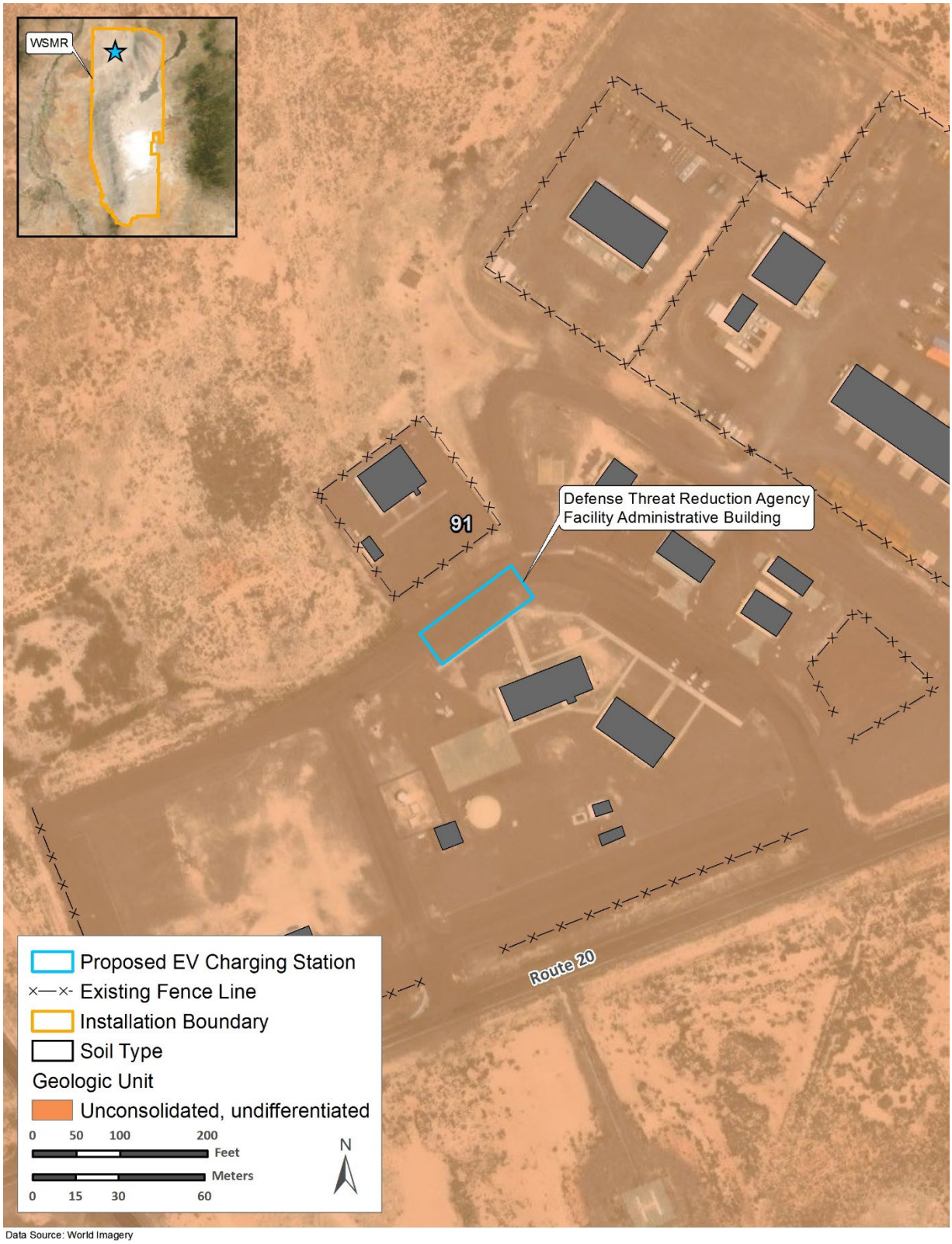

Figure D-10. DTRA Facility Administrative Building EV Charging Station (EVS34761) Soils

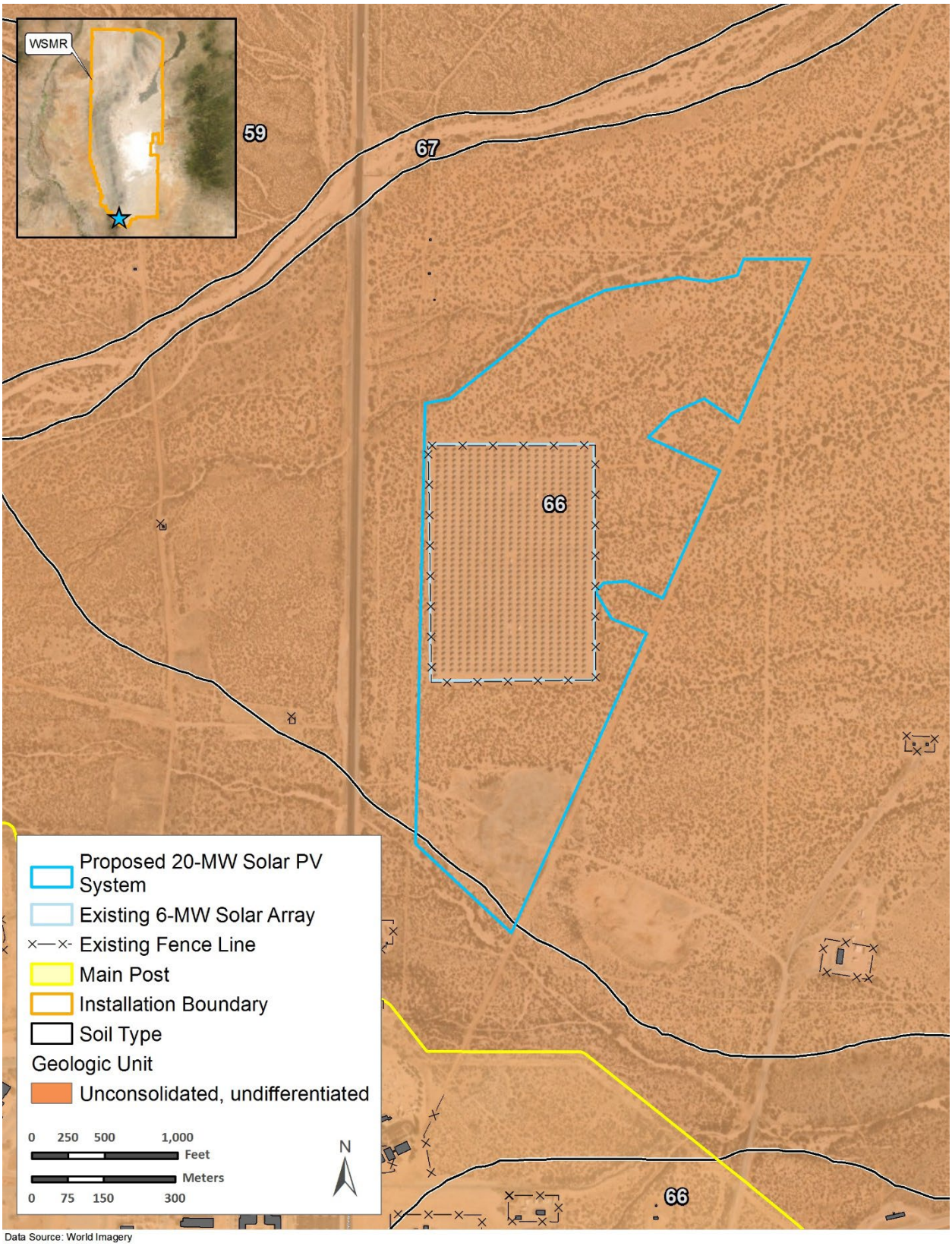

Figure D-11. 20-MW Solar PV System Soils

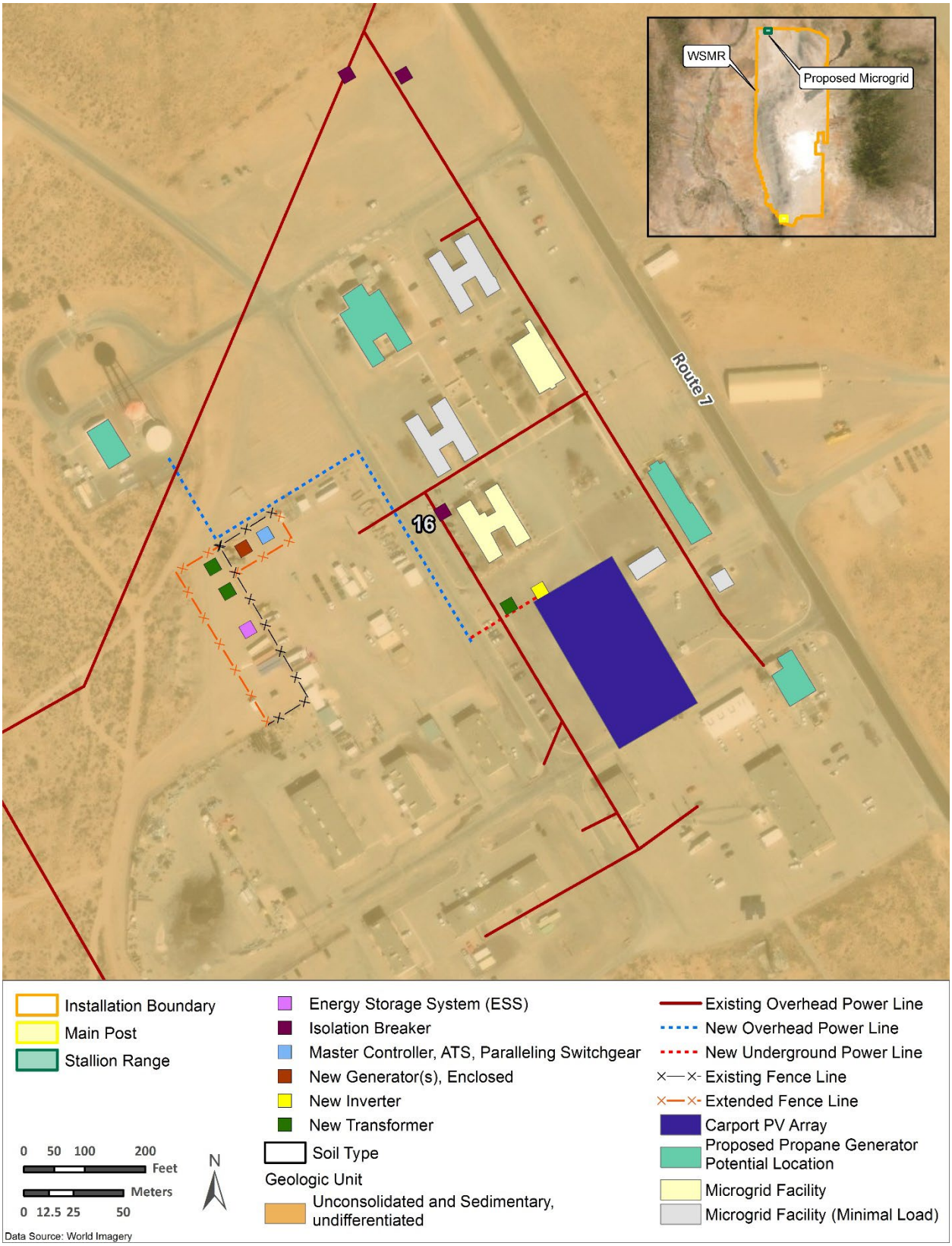

Figure D-12. Solar Carport and Microgrid Soils

FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA)
FOR A
20-MW SOLAR PHOTOVOLTAIC SYSTEM
ADDRESSED IN THE
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
ADDRESSING ENERGY READINESS SUPPORT
AT
WHITE SANDS MISSILE RANGE, NEW MEXICO

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DEPARTMENT OF DEFENSE
UNITED STATES ARMY
FINDING OF NO PRACTICABLE ALTERNATIVE FOR A 20-MW SOLAR PHOTOVOLTAIC SYSTEM ADDRESSED IN THE SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT ADDRESSING ENERGY READINESS SUPPORT AT WHITE SANDS MISSILE RANGE, NEW MEXICO

1.0 Introduction

The United States Army Garrison (USAG), White Sands Missile Range (WSMR) encompasses approximately 2.2-million-acres in south-central New Mexico and provides for testing and development of weapons and equipment for military use (Figure 1). The Main Post of WSMR, which encompasses approximately 1,530-acres at the southern end of the installation, contains the installation's headquarters, administrative offices, operation centers, and other facilities. WSMR has approximately 6,000 civilian employees; 350 servicemembers from the U.S. Army, U.S. Air Force, and U.S. Navy; 950 housing residents; and 300 elementary and middle school students utilizing the Main Post. USAG-WSMR proposes to install, operate, and maintain additional energy readiness systems at WSMR to meet the "net zero" installation goal.

To support mission requirements, the Department of the Army (Army) proposes to expand the existing 6-megawatt (MW) solar photovoltaic (PV) system on the Main Post by adding a 20-MW solar PV system over 103 acres. This location has been prioritized for the following reasons: secure location near the primary entrance road to the cantonment area, access by an existing road, proximity to an existing transformer station and Main Post infrastructure, and a majority of the installation is classified as testing zones. Other federal agencies such as the National Park Service (White Sands National Park), U.S. Fish and Wildlife Service (San Andres National Wildlife Refuge), Agricultural Service (Jornada Experimental Research Range), and National Aeronautics and Space Administration (White Sands Test Facility) manage parcels within a portion of the installation.

The purpose of the Proposed Action is to assist WSMR in meeting energy resilience requirements established in Army Directive 2020-03, *Installation Energy and Water Resilience Policy* and Department of Defense Instruction (DoDI) 4170.11, *Installation Energy Management*. Army Directive 2020-03 establishes policy to strengthen energy and water resilience to reduce the risk to Army missions resulting from utility disruptions. Additionally, it outlines the plan to sustain energy for critical facilities for a minimum of 14 days. DoDI 4170.11 establishes Department of Defense (DoD) policy to implement the requirements of Executive Orders (EOs) 13693, *Planning for Federal Sustainability* and 13221, *Energy Efficient Standby Power Devices*. It also establishes that DoD shall strive to modernize infrastructure, increase utility and energy conservation, enhance demand reduction, and improve energy resilience. Finally, EO 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, also applies to the Proposed Action.

Currently, WSMR is not in compliance with Army Directive 2020-03. The Proposed Action would assist WSMR in meeting recommendations outlined in the *2020 Army Installation Energy & Water Plan* to increase renewable energy generation, reduce downtime from power outages, improve energy security, and enhance resilience for WSMR. Implementation of the Proposed Action is vital to ensuring that WSMR energy infrastructure is resilient, efficient, and affordable.

Several alternatives were considered, but did not meet selection criteria, as described in Section 2.4 of the *2024 Supplemental Environmental Assessment for Addressing Energy Readiness Support, White Sands Missile Range, New Mexico*. Avoiding the floodplain entirely for the proposed expansion of the WSMR solar PV system is unrealistic due to mission-related factors, such as lack of developable space and compliance with Army facility requirements. Other constraining factors include major arroyo features on the north and south of the proposed project area; an existing road on the eastern boundary of the project area with operational military space on the east side of that boundary road; cultural sites; and placement of a proposed new access gate north of the current Las Cruces gate. These factors constrain how the proposed project area has been placed at the current location. An alternate location on the eastern boundary of WSMR near the Athena Measurement Radar (AMRAD) substation was considered for a solar PV energy site but eliminated because of the need to upgrade the Las Cruces substation and the distribution powerline that parallels the proposed project area. If the proposed action were not to take place in this specific area, connecting to the existing solar PV system and associated infrastructure would not be possible. The Army also considered the no action alternative; however, this would result in WSMR maintaining the current inadequate state of the installation's energy supply in an emergency.

The draft finding was made available for public review and comment for 30 days. It was published in local area newspapers and digitally in the WSMR Garrison Publication website under Environmental Documents at https://home.army.mil/wsmr/index.php/ about/garrison/directorate-public-works-dpw/environmental on 11 July 2024 which is hereby incorporated by reference. Hard copies of the Draft SEA, FONSI, and FONPA were made available by request. Additionally, hard copies were available for review at three libraries in surrounding communities and at the WSMR Main Post library. Comments were received from New Mexico Department of Game and Fish, and New Mexico Environmental Department. Comments were addressed through use of best management practices.

This draft finding incorporates the analysis in the *2014 Final Environmental Assessment of Alternative energy Facility Projects, White Sands Missile Range, New Mexico*, the *2016 Programmatic Environmental Assessment for Construction and Operation of Solar Photovoltaic renewable Energy Projects on Army Installations*, and the *2024 Supplemental Environmental Assessment for Addressing Energy Readiness Support, White Sands Missile Range, New Mexico*.

2.0 Proposed Action

The Proposed Action would enable WSMR to successfully meet energy resilience requirements established in Army Directive 2020-03 and Department of Defense Instruction 4170.11, *Installation Energy Management*. The 103.0-acre project area for the 20-MW ground-mounted solar PV system would be constructed surrounding the existing 6-MW solar PV system on the Main Post. Of the 103.0-acre project area, approximately 9.0 acres of disturbance fall within the floodplain. The proposed solar PV

system expansion was analyzed as part of the *2014 Final Environmental Assessment of Alternative Energy Facility Projects, White Sands Missile Range, New Mexico*. The Proposed Action would use axis tracking solar PV arrays mounted on an assembly that move throughout the day, positioning the array at an optimum angle to capture sunlight. Grading and vegetation removal would occur over the entire area to level and prepare the land for construction. When feasible, disturbed areas would be revegetated using native vegetation approved by the Environmental Division. Grading debris (e.g., bushes, rocks, etc.) would be hauled to an approved off-installation landfill. Should fill be needed for this project, the estimated amount will be identified in design plans, and source coordinated with the Environmental Division. Construction duration would be anticipated for up to 14 months and activities would include excavation for footings, conduit trenches, and power poles. The 20- MW solar PV system would be connected to the existing electrical distribution line that runs north-south along the east side of Owen Road, which will eventually be replaced with new equipment. Panels would be secured and rated to withstand wind gusts of over 100 miles per hour (mph) and sustained winds of 50 mph. A chain link fence would be installed around the solar PV system and maintenance of the facility would be conducted by a third-party utility company providing services (i.e., equipment, installation, operation, and maintenance) through legal agreements. Permanent requirements would include solar panels, inverters, transformers, an access road, and data communications.

3.0 Floodplain Impacts and Mitigation Measures

EO 11988 and 13690 states that if the only practicable alternative requires siting in a floodplain, the agency shall, prior to taking action, design or modify its action to minimize potential harm to or within the floodplain. Installations are required to maintain local, state, and federal compliance for actions with the potential to impact local waters. WSMR implements low impact development (LID) and runoff controls according to Section 438 of the Energy Independence and Security Act (EISA) of 2007. This ensures that new development outside the floodplain improves and preserves stream quality, as well as managing runoff quantity. When work within the floodplain is unavoidable, Standard Operating Procedures require that encroachment will not cause a measurable change to the upstream or downstream base flood elevation. In addition, any fill within flood zones shall result in no net loss of natural floodplain storage. Any loss of floodplain storage due to filling is offset by providing an equal volume of flood storage at or adjacent to the development site. Periodic monitoring of on-going construction also occurs to ensure adherence to the associated site-specific Stormwater Pollution Prevention Plans.

Implementation of the Proposed Action would result in the Army impacting approximately 9.0 acres of floodplain to expand the solar PV system on WSMR. Most of the flood area within the proposed 20-MW solar array project area is in the 0-0.2-meter depth range.
Under the Proposed Action, the Army would implement best management practices (BMPs) and low-impact-development (LID) measures to reduce the potential for

adverse impacts on the floodplain. WSMR is in a closed basin that does not connect to waters of the United States and is not subject to the Clean Water Act (CWA). Therefore, WSMR does not have National Pollutant Discharge Elimination System (NPDES) permits. However, WSMR does implement Best Management Practices (BMP) for stormwater pollution prevention and requires the development of a Stormwater Pollution Prevention Plan (SWPPP) that is prepared in accordance with the U.S. EPA SWPPP requirements. Additional BMPs and LID measures are incorporated into the Proposed Action to avoid or minimize impacts on floodplains and are collectively described, as follows:

- Construction staging areas would be located within pre-existing disturbed areas within proximity to the site and no new ground would be cleared.

- Construction vehicles would use existing roads to the fullest extent possible.

- Removal of native vegetation would be avoided to the extent practicable for erosion and invasive weed control. Invasive weed control would follow guidelines established in the WSMR Integrated Pest Management Plan.

- Disturbed areas would be restored to the fullest extent feasible and native vegetation would be allowed to reseed naturally as approved by the Environmental Division.

- BMPs and erosion control measures would be implemented to reduce the potential for runoff or erosion and sedimentation during construction.

- The Catastrophic Flood Prevention control measures would also include the installation of retention ponds that would have long-term beneficial impacts on surface water and floodplains as runoff would be managed.

- The extension and fortification of the levee system and use of bioretention ponds is being considered in a separate NEPA process.

- WSMRR 200-2 requires personnel to participate in Environmental Awareness Training prior to beginning work on projects.

Taken together, these and other yet to be determined BMPs and mitigation measures would avoid or minimize the loss of and impacts on floodplains at WSMR. These measures represent all practicable measures to minimize harm to floodplains.

4.0 Finding of No Practicable Alternative

During development of the Proposed Action, the WSMR Environmental Office worked proactively to ensure the purpose and need of the Proposed Action was met while also avoiding as many potential impacts to floodplains as practicable. Due to operational requirements, it was determined that complete avoidance of floodplains and/or wetlands was not feasible; however, the Proposed Action minimizes potential impacts to the greatest degree practicable while also achieving the required results.

Accordingly, I find there is no practicable alternative to siting the Proposed Action entirely outside of the floodplains; however, the Army will utilize all practicable measures to avoid and minimize impacts to the greatest extent practicable.

JONES.OMAR.JAMES.IV.1044410075 Digitally signed by JONES.OMAR.JAMES.IV.1044410075 Date: 2025.01.05 06:17:55 -06'00'

Date

OMAR J. JONES IV
Lieutenant General, USA
Commanding

Attachments:
Figure 1. Site Map
Figure 2. Project Area and Floodplain

References:
EO 11988, Floodplain Management. 24 May 1977
EO 13690, Establishing a Federal Flood Risk Management and a Process for Further Soliciting and Considering Stakeholder Input. 30 January 2015
Final Environmental Assessment of Alternative energy Facility Projects, White Sands Missile Range, New Mexico. 01 July 2014
Programmatic Environmental Assessment for Construction and Operation of Solar Photovoltaic renewable Energy Projects on Army Installations. November 2016
Supplemental Environmental Assessment for Addressing Energy Readiness Support, White Sands Missile Range, New Mexico. 31 October 2024

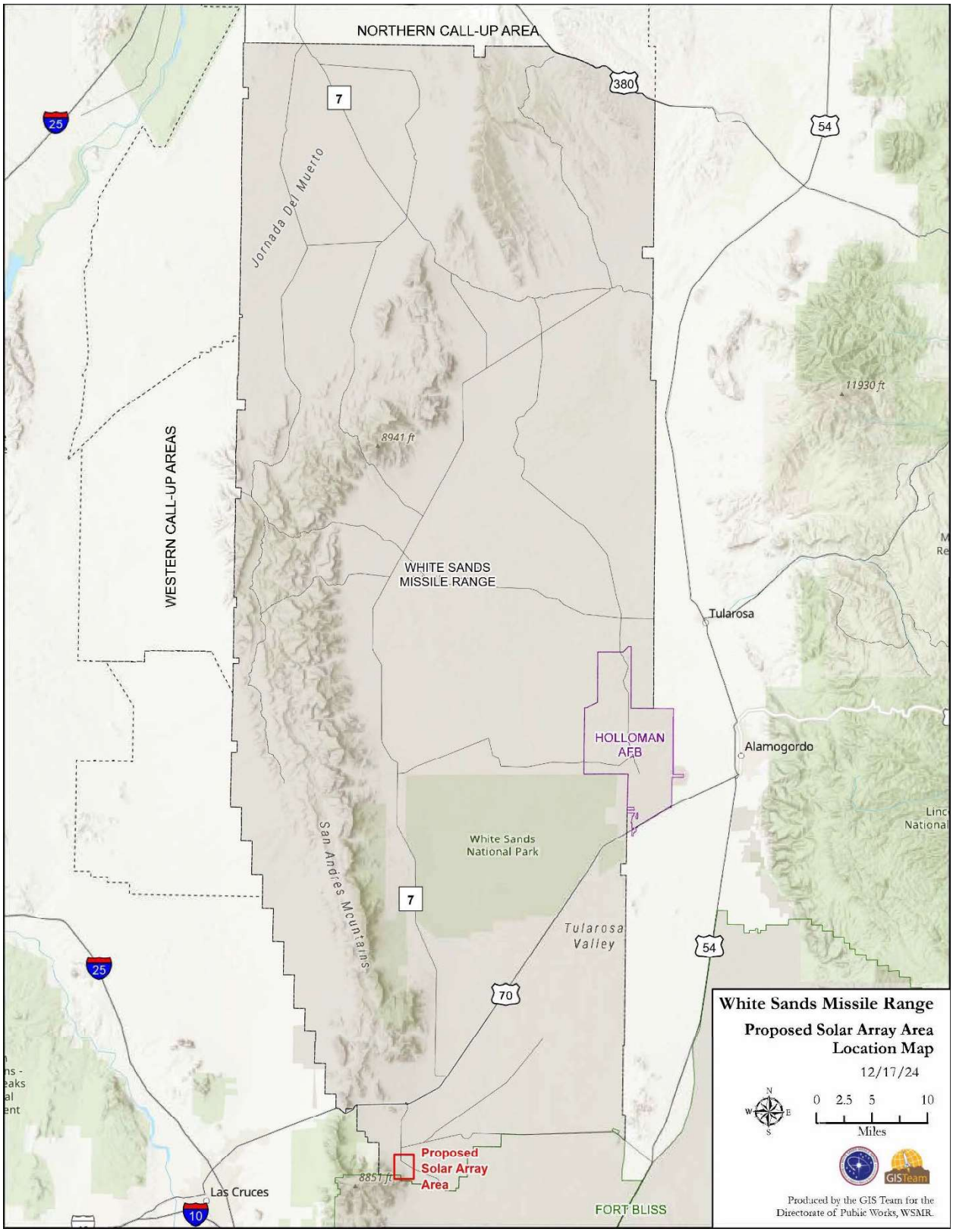

Figure 1. Site map for proposed 20-MW solar photovoltaic system.

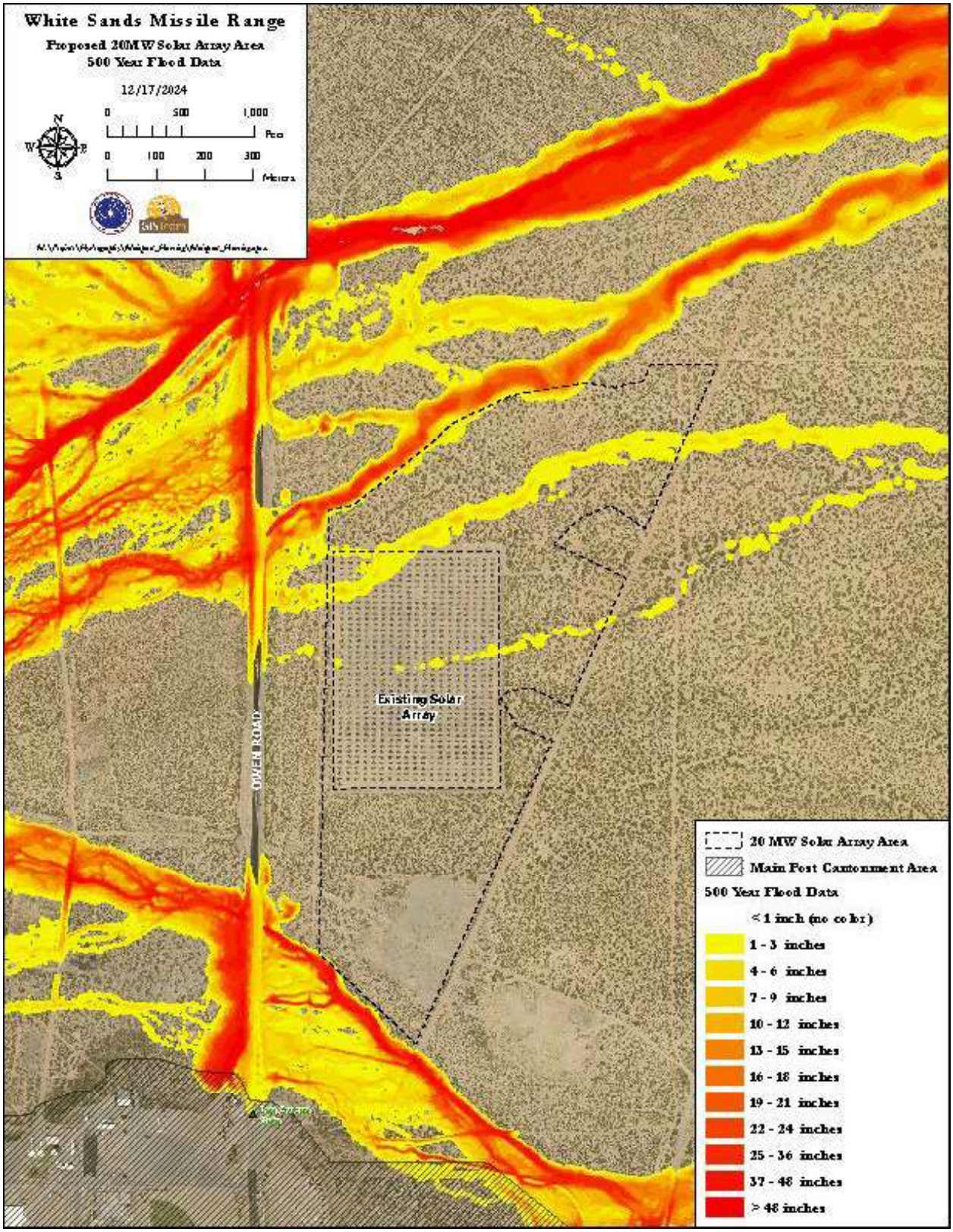

Figure 2. Proposed 20-MW solar photovoltaic system project area and floodplain.