DRAFT

ENVIRONMENTAL ASSESSMENT SOLAR PHOTOVOLTAIC FACILITIES ON THE TRAINING RANGES, FORT BLISS, TEXAS AND NEW MEXICO

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Prepared for:

U.S. Army Garrison Command
Fort Bliss
El Paso, Texas

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Draft

ENVIRONMENTAL ASSESSMENT
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ON THE TRAINING RANGES

FORT BLISS, TEXAS AND NEW MEXICO

PREPARED FOR:

_____ _____

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DRAFT FINDING OF NO SIGNIFICANT IMPACT

1.0 Purpose of and Need for the Proposed Action

The action will construct photovoltaic facilities on the training ranges of Fort Bliss. The purpose of the construction is to allow Fort Bliss to meet near-term energy mandates including the Energy Policy Act of 2005. Additionally, the Department of the Army (Army) is interested in enhancing energy security through increased electrical self-sufficiency in the event that regional power supplies are interrupted. By enhancing the energy security of Fort Bliss with renewable energy resources, the Army will also support Department of Defense, Army, and other Federal government goals and objectives for increasing use of renewable energy, lowering greenhouse gas (GHG) emissions, and reducing the Army's reliance on fossil fuels.

2.0 DESCRIPTION OF ALTERNATIVES

Proposed Action Alternative

Fort Bliss proposes to use solar energy to meet the Federal government's requirements that continue to focus on more renewable energy resources. Fort Bliss will construct, operate, and maintain proven solar Photovoltaic (PV) facilities to meet near-term energy mandates for renewable energy production and GHG emissions reduction. As an Installation, Fort Bliss currently derives less than 5% of its energy from renewable sources. It is estimated that the Proposed Action Alternative would generate 73,000 megawatt hours (MWh) per year which would supply approximately 15 % of the total energy consumed by Fort Bliss on an annual basis. Solar technologies and construction locations on Fort Bliss must meet specific requirements to be viable projects.

Several alternatives were considered during the initial identification of renewable power sources. Three types of solar energy technologies were identified that met the screening criteria: Photovoltaic, Concentrated Solar, and Dish Stirling. Fort Bliss chose the PV arrays alternative as the most proven technology, with the least amount of maintenance and the best choice for near term application. Construction, electrical tie-in, and operations and maintenance are the three primary phases for installation and operation of solar technologies.

Additionally, during the initial planning phases, Fort Bliss identified four specific training area locations for the PV arrays. The four sites are identified as the Infantry Brigade Combat Training (IBCT) site, Orogrande Range Camp site, McGregor Range Camp site, and Doña Ana Range Camp site.

No Action Alternative

Under the No Action Alternative, the site-specific solar PV projects described in the Proposed Action Alternative would not be implemented. Various near-term Federal statutes and Executive Orders that mandate changes in energy consumption and production may not be met, and the No Action Alternative would not provide energy security to the range camps nor help the installation reduce GHG emissions. The No Action Alternative would not meet the purpose and need of complying with the Energy Policy Act of 2005 and other applicable initiatives.

3.0 SUMMARY OF ENVIRONMENTAL RESOURCES AND IMPACTS

Implementation of the Proposed Action Alternative with the incorporated design, construction, operation, and safety measures would have no significant impacts on land use, soils, biological resources, cultural resources, water resources, air quality, hazardous materials and waste, airspace, transportation and infrastructure, health and safety, and noise on Fort Bliss or the surrounding area. The cumulative impacts from the construction of training facilities and support infrastructure were addressed in the *Fort Bliss, Texas and New Mexico Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement,* for which a Record of Decision (ROD) was signed 30 April 2007 and the *Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement,* for which a ROD was signed 8 June 2010. This EA is tiered to these documents. The Proposed Action Alternative will not materially change the analysis in these documents.

4.0 CONCLUSION

Based on the analyses of the Proposed Action Alternative and the design, construction, operation, and safety measures presented in the EA, I conclude that the impacts of the Proposed Action Alternative will not significantly affect the human or natural environment of Fort Bliss or the surrounding area. I further conclude that the Proposed Action Alternative will impose no direct or indirect effects than cannot be mitigated or that could contribute to cumulative effects requiring preparation of an Environmental Impact Statement, pursuant to the National Environmental Policy Act of 1969 (Public Law 91-190). Therefore a Finding of No Significant Impact (FNSI) is warranted.

_____ _____

Date

EXECUTIVE SUMMARY

Purpose of and Need for the Proposed Action

In 2005, the Energy Policy Act mandated Federal facilities use at least 5 percent (%) renewable energy by 2010 and 7.5 % in 2013 and thereafter. The Act was designed to spur innovation and planning to achieve target mandates by specific dates. Other initiatives and Executive Orders have further strengthened these requirements. The purpose of the Proposed Action is to help Fort Bliss meet these near-term energy mandates and enhance energy security through increased self-sufficiency for electricity, especially if the regional power supply is interrupted. The recently completed Master Plan Environmental Impact Statement (EIS) and Grow the Force EIS included installation of power infrastructure within the established Main Cantonments and range camps for the expanding mission at Fort Bliss. However, the site sizes required to adequately furnish Solar Photovoltaic (PV) power require that the arrays be constructed outside the developed cantonment areas and on training lands, thereby necessitating a change in land use. Due to this change in land use, as well as development on relatively undisturbed training lands, a National Environmental Policy Act (NEPA) analysis at the Environmental Assessment (EA) level was required. By enhancing the energy security of Fort Bliss with renewable energy resources, the Department of the Army (Army) will also support Department of Defense, Army, and other Federal government goals and objectives for increasing use of renewable energy, lowering greenhouse gas (GHG) emissions, and reducing the Army's reliance on fossil fuels.

Proposed Action Alternative

Fort Bliss proposes to construct, operate, and maintain proven PV arrays on the training areas to supply power to the Range Camps and the East Biggs area of Fort Bliss. Fort Bliss proposes to use solar energy to meet the Federal government's requirements that continue to focus on more renewable energy resources. As an Installation, Fort Bliss currently derives less than 5% of its energy from renewable sources. It is estimated that the Proposed Action Alternative would generate 73,000 megawatt hours (MWh) per year, which would supply approximately 15 % of the total energy consumed by Fort Bliss on an annual basis.

Any alternative identified as being viable for analysis in the EA must satisfy the purpose and need. Several alternatives were considered during the identification of the Proposed Action Alternative. Several renewable power source alternatives were considered during the initial planning. Three types of solar energy technologies were identified: Photovoltaic, Concentrated Solar, and Dish Stirling. Fort Bliss chose the PV arrays alternative as the most proven technology, with the least amount of maintenance and the best choice for near-term application. Construction, electrical tie-in, and operations and maintenance are the three primary phases for installation and operation of PV solar technologies. The PV alternative is the only alternative carried forward for analysis in the EA.

Also during the initial planning phases, Fort Bliss identified four PV locations on the training lands and outside the main and range base camp cantonments. The four known sites are identified as the Infantry Brigade Combat Training (IBCT) site, Orogrande Range Camp site, McGregor Range Camp site, and Doña Ana Range Camp site.

No Action Alternative

Under the No Action Alternative, the site-specific solar PV projects described in the Proposed Action Alternative would not be implemented. The No Action would continue reliance on utility-provided energy and the vulnerability of Fort Bliss's energy supplies from regional outages would continue to threaten Army mission objectives. For example, during the deep freeze of 2010, the electrical utility went into a rolling black-out mode, and Fort Bliss was forced to close for several days, seriously hampering its mission of training Soldiers in a time of war. Under the No Action Alternative, various near-term Federal statutes and Executive Orders that mandate changes in energy consumption and production would not be met, and the push for renewable energy production/use and reduction of GHG emissions would be negatively affected. Most importantly, the No Action Alternative would not meet the purpose and need of helping the installation comply with the Energy Policy Act of 2005.

Environmental Consequences

The EA determined that the Proposed Action Alternative, with specified design, construction, operation, and safety measures, would have no long-term, adverse impacts on the environment. Potential impacts on resources that could be affected by the implementation of the alternatives described above are summarized in Table ES-1. Cumulative impacts of recent Army initiatives for mandated expansion and construction activities at Fort Bliss are discussed in the *Fort Bliss, Texas and New Mexico Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement* for which a Record of Decision (ROD) was signed 30 April 2007 and the *Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement,* for which a ROD was signed 8 June 2010. This EA is tiered to those documents. The Proposed Action Alternative will not materially change the analyses in those documents.

Table ES-1. Summary Matrix of Potential Impacts

Resource	No Action Alternative	Proposed Action Alternative
Air Quality, Greenhouse Gases (GHG), and Climate Change	No direct impacts on air quality or GHG and climate change would occur. However, Fort Bliss would not meet Federal energy mandates and would continue to rely on fossil fuels for energy which generate air emissions.	Temporary and minor increases in air pollution would occur from the use of construction equipment (combustion emissions) and the disturbance of soils (fugitive dust) during construction of the PVs. The air emissions from the proposed operational activities do not exceed Federal *de minimis* thresholds. The impacts on air quality, GHG and climate change from the implementation of this alternative would be minor. Beneficial indirect impacts would also occur through the reduction of GHG and air emissions associated with generation of electricity from El Paso Electric's (EPE) fossil fuel burning plants.
Airspace	No impacts on airspace operations would occur.	There would be no change in the airspace designation. The impacts on airspace operations would be negligible and be limited to the low potential for glare from the PV arrays.
Biological Resources	No impacts on biological resources would occur.	No Federally listed threatened or endangered species would be affected. The potential impact on biological resources as a result of the loss of vegetation and wildlife habitat would be considered long-term but minor because of the vast amounts of similar habitat and vegetation communities throughout Fort Bliss. Some Federally listed Sensitive Species and migratory birds protected under the Migratory Bird Treaty Act (MBTA) may be minimally impacted. To minimize impacts on migratory birds, all site preparation would require either a preconstruction survey for bird activity and nests would be avoided or the work would be carried out in the fall and winter months, to coincide with the non-breeding season.
Cultural Resources	No impacts on cultural resources would occur.	Surveys determined that no surface archaeological sites eligible for inclusion in the National Register of Historic Places (NRHP) would be affected at any of the four sites. Additionally, none of the proposed Solar PV sites are within the viewshed of a historic district. Therefore, no impacts on or historic properties would occur at any of the four PV sites.
Energy Demand	No construction, maintenance, or operation of PVs would occur. Therefore, Fort Bliss and the Army would not meet Federal mandates or its goal of achieving secure renewable power. Additionally, due to the anticipated growth of personnel and energy-consuming facilities on Fort Bliss, the No Action Alternative could eventually require expansion of EPE's fossil fuel generation capacity.	Fort Bliss and the Army would meet its Federal mandates to reduce nonrenewable energy consumption and obtain its power needs from a secure energy source. The 73,000 MWh anticipated to be supplied by the four known PV sites would supply approximately 15% of the total energy consumed at Fort Bliss on an annual basis. By reducing Fort Bliss' reliance on outside energy sources, as well as providing Fort Bliss with a minimum of 15% of its projected electricity consumption in the near future, the implementation of the Proposed Action Alternative would have a beneficial impact on energy demands, not only for Fort Bliss, but throughout the El Paso Region.
Hazardous Materials and Waste	There would be no increase in the use and generation of hazardous materials and wastes on Fort Bliss.	A limited amount of potentially hazardous materials and waste would be used or generated at the proposed solar renewable energy source (PV) sites from maintenance and operational activities, including petroleum, oil, and lubricants (POL). Any hazardous wastes generated as part of this project would be disposed or recycled according to the Installation Hazardous Waste Management Plan. Impacts from hazardous materials and waste would occur as a result of this alternative; however, those impacts would be minor.
Health and Safety	No impacts on health and safety would occur.	All proposed PV sites would be surveyed for unexploded ordnance (UXO) prior to ground disturbance. None of the sites are within known dudded or munitions impact areas. Therefore, negligible to minor impacts on health and safety would be expected as a result of this alternative.
Land Use	No changes in land use would occur.	Land use would change from training to facilities and from relatively semi-disturbed desert lands to PV solar array farms. This loss of training lands or degradation of a natural area would be minimal in comparison to the amount of similar lands available within the region and on Fort Bliss.
Noise	No change in the noise environment would occur.	The implementation of this alternative would result in minimal impacts on the noise environment within Fort Bliss since the PV arrays operate in a silent mode. There are no nearby sensitive noise receptors and noise impacts from construction and maintenance activities would be temporary and considered minor.
Radio Frequency and Spectrum Use	No changes to radio frequency or spectrum use would occur.	The proposed equipment to be used for the PV surveys would meet or exceed requirements established by the Federal Communication Commission and MIL-STD-461F. Negligible to minor impacts on radio frequency or spectrum use would occur.
Socioeconomics	Detrimental socioeconomic impacts would be minor since the projects would not be built; however, energy consumption at Fort Bliss would continue to grow. Energy to meet this demand would have to be generated elsewhere, shifting the potential socioeconomic impacts elsewhere.	Implementation of the Proposed Action Alternative could provide a beneficial impact on the local economies due to minimal increases in revenues for local business as a result of construction activities. Most of the increase in workforce and revenue would be temporary. However, there would be some residual work required for long term operation and maintenance of the solar PV facilities. Fort Bliss currently receives a 20% discount on power purchased from EPE as mandated by state law, which is subsidized by the rest of the EPE rate base customers. As Fort Bliss purchases less power from EPE, the remaining EPE customers will see a reduction in their overall electric bill resulting from a decrease in the subsidy they pay.
Environmental Justice and Protection of Children	No impacts on environmental justice or protection of children would occur.	No disproportionate health or environmental effects on minorities or low-income populations or communities would occur as a result of the Proposed Action Alternative, as none are located near the proposed PV sites.
Soils	No impacts on soils would occur.	No special or prime farmland soils are located at the four PV sites. Approximately 432 acres of typical Chihuahuan Desert soils would be developed for the solar arrays and this amount of soil would be disturbed as part of the Proposed Action. These impacts are considered long-term, but would not result in major impacts on the soil resources of the region based on the overall availability of the same type desert soils within and outside of Fort Bliss.

Table ES-1, continued

Resource	No Action Alternative	Proposed Action Alternative
Traffic and Transportation	No changes for traffic and transportation resources would occur.	Traffic would increase slightly on the main highways during construction of the PV arrays. However, this is expected to only occur during the delivery and removal of construction equipment (not expected to exceed 6-months per PV site). Maintenance and ongoing operations of the PV arrays would not impact traffic or transportation within Fort Bliss or the region because passenger transport vehicles would be used and only periodically (approximately 1 to 2 times per month, depending on climatic conditions).
Water Resources	No impacts on surface water would occur. No direct impacts on groundwater would occur; however, the continued use of fossil fuels to supply electricity to Fort Bliss would continue to deplete the groundwater supply in the region.	No Federally regulated waters of the U.S. would be affected, as none are located near the four PV sites. Groundwater impacts would be negligible due to the small amount of water (approximately 0.2 acre-feet per year) needed to clean and wash the proposed PV arrays.

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SECTION 1.0
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

The Department of the Army (Army) must meet near-term (as soon as 2013) requirements of Federal statutes and Executive Orders (EOs) which mandate changes in U.S. energy production and consumption toward more sustainable technologies and strategies. The Army (and by extension, Fort Bliss) must support the following Federal goals, mandates, and directives which highlight and address the need to increase the production and use of power derived from renewable energy sources:

- EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*,
- *Energy Policy Act of 2005* (EPAct),
- *Energy Independence and Security Act* of 2007 (EISA),
- The *National Defense Authorization Act* of 2007 (NDAA 2007)
- The *Army Energy Strategy for Installations* (Army 2005)
- The *Army Energy and Water Campaign Plan for Installations*

A movement toward greater use of renewable energy sources at Army installations is also becoming increasingly important for energy security reasons, especially at remote sites on Fort Bliss, including Orogrande, McGregor, and Doña Ana range camps. The Army recognizes threats to its installations and operations posed by the reliance on centralized, utility-provided energy, as well as vulnerabilities to occasional regional electrical power disruption. These challenges were directly addressed by the *2010 Quadrennial Defense Review* (QDR), which cited the need for Department of Defense (DoD) installations to "assure access to reliable supplies of energy and protect the ability to deliver sufficient energy to meet operational needs" (DoD 2010). In 2010, a hard freeze caused Fort Bliss to shut down for several days due to rolling blackouts initiated by the El Paso Electric (EPE) utility. Other blackouts occur, usually during high wind events at vulnerable electrical line corridors. These events highlighted the need for Fort Bliss to seek more dependable sources of power using installation assets.

This Environmental Assessment (EA) has been prepared by Gulf South Research Corporation (GSRC) on behalf of U.S. Army Corps of Engineers (USACE) for Fort Bliss to comply with the National Environmental Policy Act (NEPA) of 1969 (Public Law [PL] 91-190; 42 U.S. Code [USC] 4321-4347), as amended. Preparation of this EA followed instructions established in 32 Code of Federal Regulations [CFR] 651, *Environmental Analysis of Army Actions*, and 40 CFR 1500-1508, Council on Environmental Quality (CEQ) regulations.

1.2 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to provide renewable energy to assist Fort Bliss (Figure 1-1) in complying with the near-term Federal mandates, and enhance the energy security and self–sufficiency of Fort Bliss range camps. Fort Bliss must ensure that critical mission and training support continues to function when local or regional power outages occur and continue

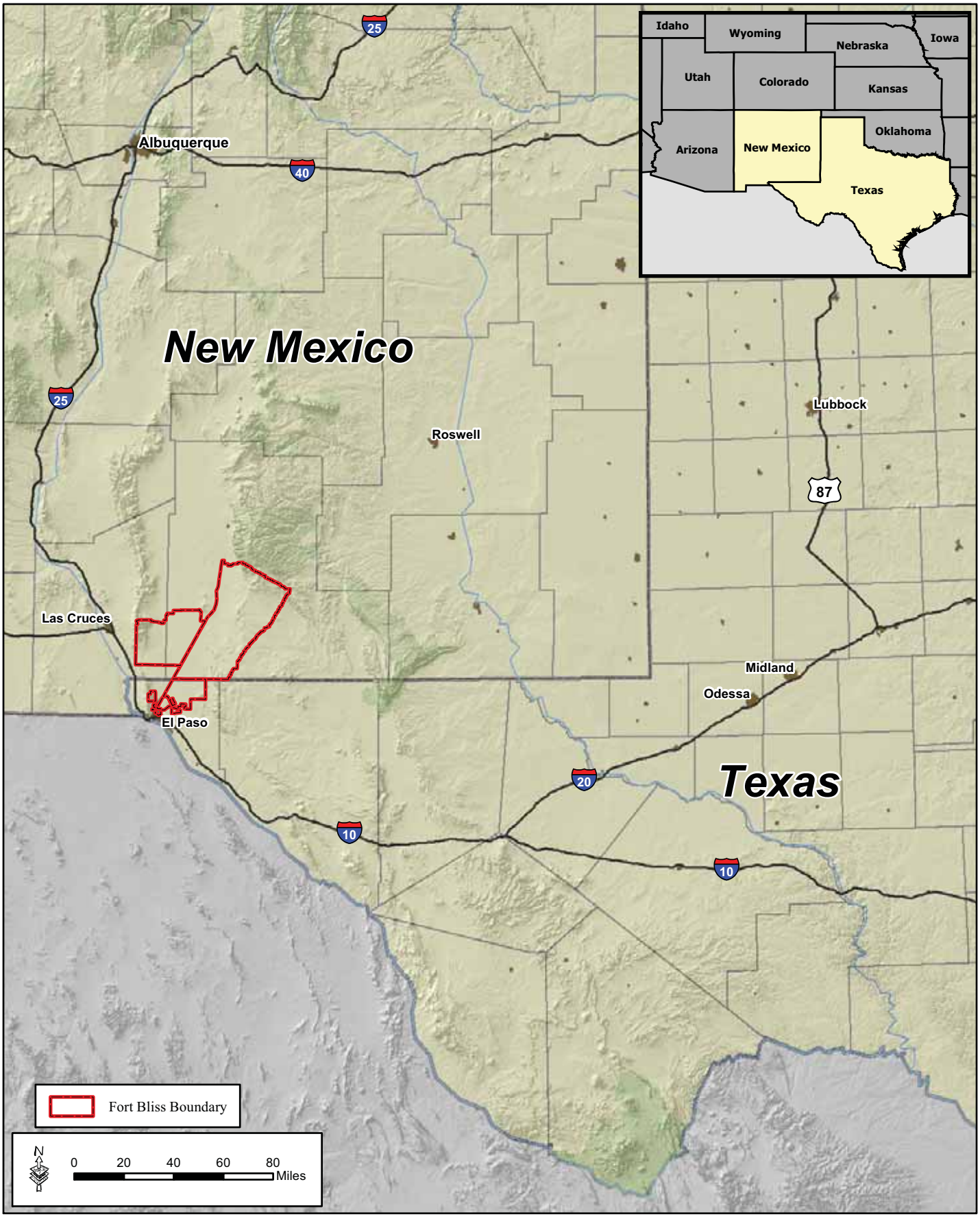

Figure 1-1: Vicinity Map

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efforts toward meeting near-term renewable energy mandates. A need exists to provide secure and Army-controlled electricity to Fort Bliss, especially to the range camps, via sustainable and renewable means.

The *Army Energy Strategy for Installations* (Army 2005) and the *Army Energy and Water Campaign Plan for Installations* (Army 2006) highlight the need to increase the use of power derived from renewable sources. The EPAct requires increasing Federal government electrical consumption from renewable energy sources starting in Fiscal Year (FY) 2010, with a goal of 7.5 percent (%) of energy consumption from these sources in FY 2013 and thereafter. Additionally, EO 13423 mandates that at least 50% of the renewable energy used must come from "new renewable sources" placed in service starting in 1999. Currently, the Army derives approximately 2.1% of its energy from renewable energy sources (less than 5% for Fort Bliss, according to U.S. Army Energy and Water Reporting System 2011).

Fort Bliss objectives in deriving power from commercially proven renewable technologies established within the installation are summarized as follows:

- Provide proven renewable energy to aid Fort Bliss in meeting the Federal near-term mandates and goals.
- Enhance the energy security and self-sufficiency of Fort Bliss range camps to support critical operations.

1.3 Scope

This EA identifies, documents, and evaluates the potential effects of the Proposed Action and No Action Alternatives on the natural and human environment of Fort Bliss and the region. During the process of weighing the relative suitability of different renewable energy technologies, solar photovoltaic (PV) array energy systems were determined the most favorable to meet the purpose and need for the Proposed Action. The other technologies that were not selected are discussed in Section 2.3. This EA, therefore, analyzes the construction, operation, and maintenance of commercially-proven solar PV projects at four locations on Fort Bliss: the Infantry Brigade Combat Training (IBCT) site, Orogrande Range Camp site, McGregor Range Camp site, and the Doña Ana Range Camp site (Figure 1-2). Analysis has also been done to assess the effects of past, ongoing, and future projects in the area to gain a better understanding of the potential cumulative impacts in the study area.

1.4 Decision(s) To Be Made

The Army, through the Garrison Commander (GC) and the Directorate of Public Works – Fort Bliss, is the lead agency responsible for the completion of the EA. If no significant environmental impacts are determined based on the evaluation of impacts in the EA, a Finding of No Significant Impact (FNSI) will be approved and signed. If it is determined that the Proposed Action Alternative will have significant environmental impacts, the action will either be cancelled or a Notice of Intent (NOI) will be published leading to the preparation of an Environmental Impact Statement (EIS).

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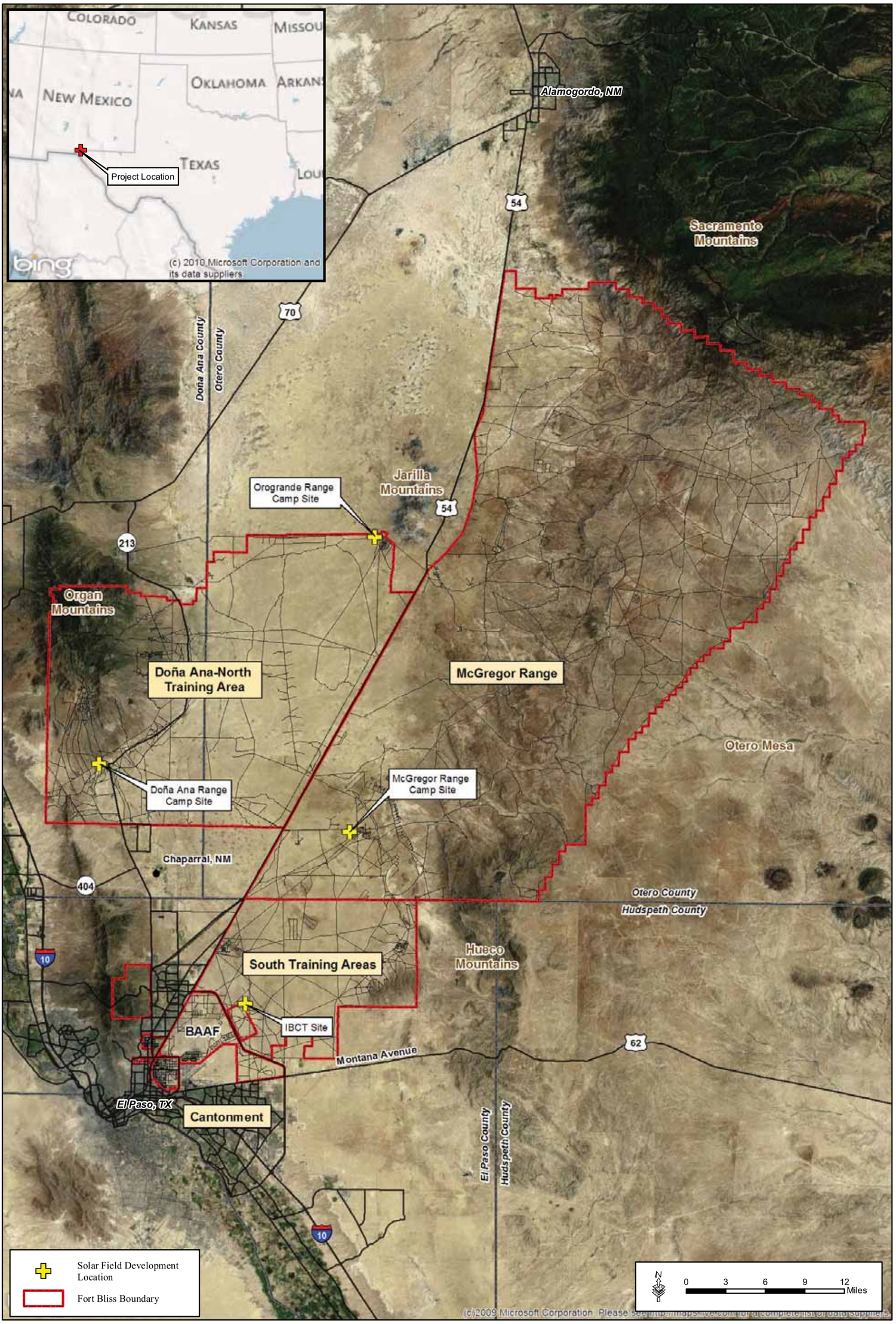

Figure 1-2: Proposed Site Location Map

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1.5 Public Participation

In the preparation of this EA, input and comments will be solicited from the public in accordance with NEPA. The EA and draft FNSI (if applicable) will be made available to the public for comments at least 30 days prior to signing of the FNSI and initiation of the Proposed Action Alternative. The distribution of the EA will include local libraries and any agencies, organizations, and individuals who have expressed interest in the project, including EPE. A distribution list can be found in Appendix A of the EA (Interagency and Public Coordination).

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SECTION 2.0
PROPOSED ACTION AND ALTERNATIVES

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 No Action Alternative

Under the No Action Alternative, the site-specific solar PV projects described in the Proposed Action Alternative would not be implemented. Centralized, utility-provided energy has the potential to be disrupted, thereby posing a threat to Army and Fort Bliss mission objectives. Various near-term Federal statutes and EOs that mandate changes in energy consumption and production would not be addressed, and the No Action Alternative would not increase renewable energy production or use. The No Action Alternative would not meet the near-term renewable energy objectives of Fort Bliss or the Army, nor would it meet the purpose and need for the proposed projects.

2.2 Proposed Action Alternative

2.2.1 Proposed Renewable Energy Sites

The Proposed Action is to construct and operate commercially-proven solar renewable PV array facilities on Fort Bliss at McGregor, Doña Ana, and Orogrande Range Base Camps in New Mexico, and the IBCT area of the Main Cantonment in Texas. The four sites are identified in this document as the McGregor Range Camp site, Doña Ana Range Camp site, Orogrande Range Camp site, and the IBCT site. These sites are described in the following table (Table 2-1) and their general locations were presented previously in Figure 1-2. Figures 2-1 through 2-4 show the four sites and their proposed boundaries, the existing electrical distribution grid, and proposed electrical tie in.

Table 2-1. Proposed Sites

PV Site	Location	UTM Coordinates[1, 2]	Size
Doña Ana Range Camp	Southwest of Doña Ana Range Camp, west of New Mexico (NM) 213 (War Highway), north of Fort Bliss Training Area 3B, Doña Ana County, New Mexico.	357,302.662 E; 3,557,960.204 N	32 acres
IBCT	Northeast of the IBCT Area, East Fort Bliss, between Military Route Green and an EPE electrical line in Fort Bliss, South Training Area 1B, El Paso County, Texas.	375,218.0786 E; 3,528,514.331 N	234 acres
McGregor Range Camp	West of McGregor Range Camp on south side of McGregor Range Road, northeast corner of Fort Bliss Training Area 8, Otero County, New Mexico.	387,791.4727 E; 3,549,502.574 N	122 acres
Orogrande Range Camp	West of Orogrande Range Camp, between the installation boundary and Military Route Blue, Fort Bliss Training Area 7B, Otero County, New Mexico.	390,914.309 E; 3,585,772.032 N	32 acres

[1] Approximate center point
[2] NAD83, Zone 13

2.2.2 Solar Energy Sources

The proposed solar energy technology should be compatible with the mission of Fort Bliss, and site development and operation of the technology should not adversely impact training activities. Additionally, potable water usage of the proposed solar energy technology should be minimal and consistent with Fort Bliss and DoD water conservation goals.

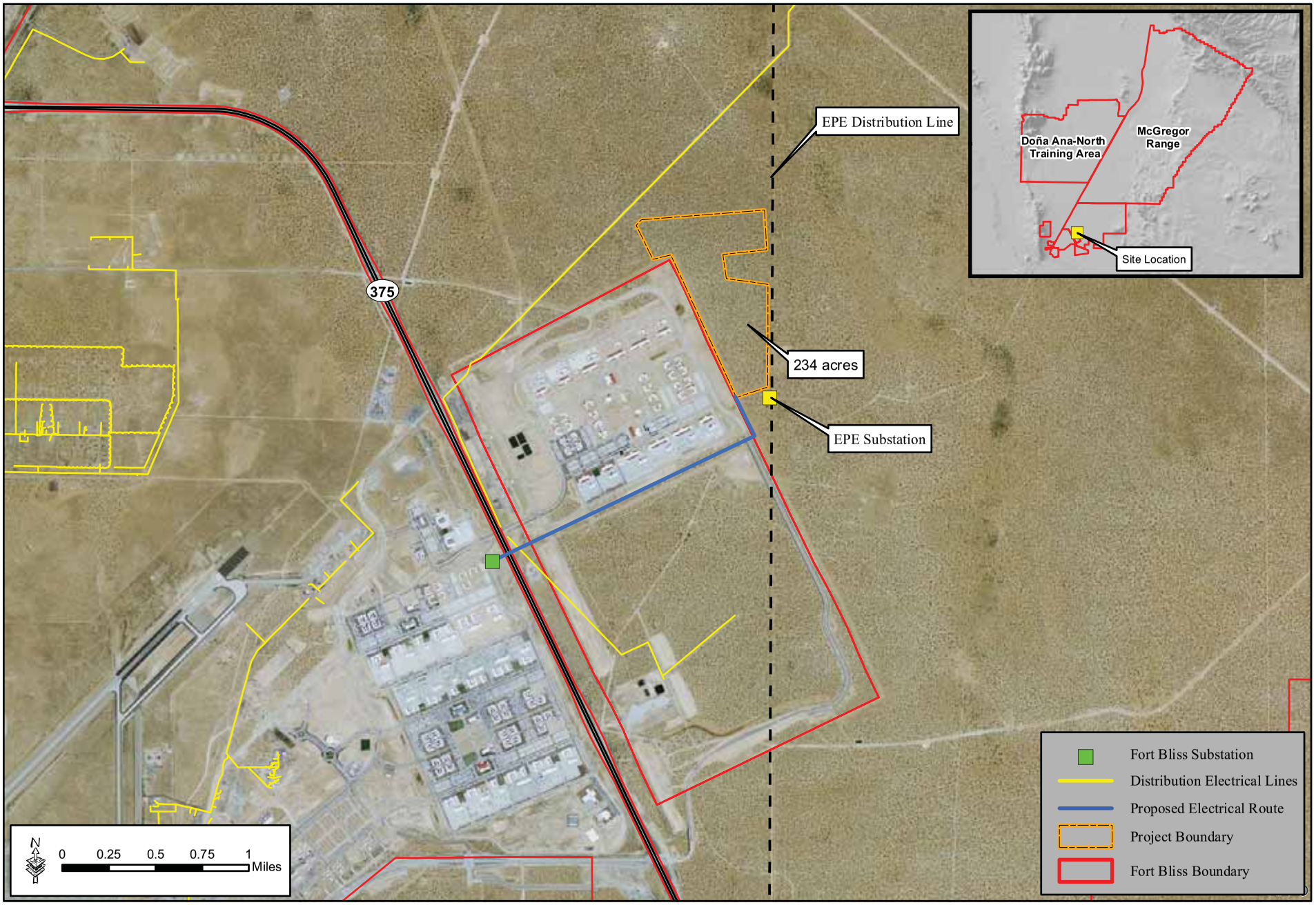

Figure 2-1: IBCT Site

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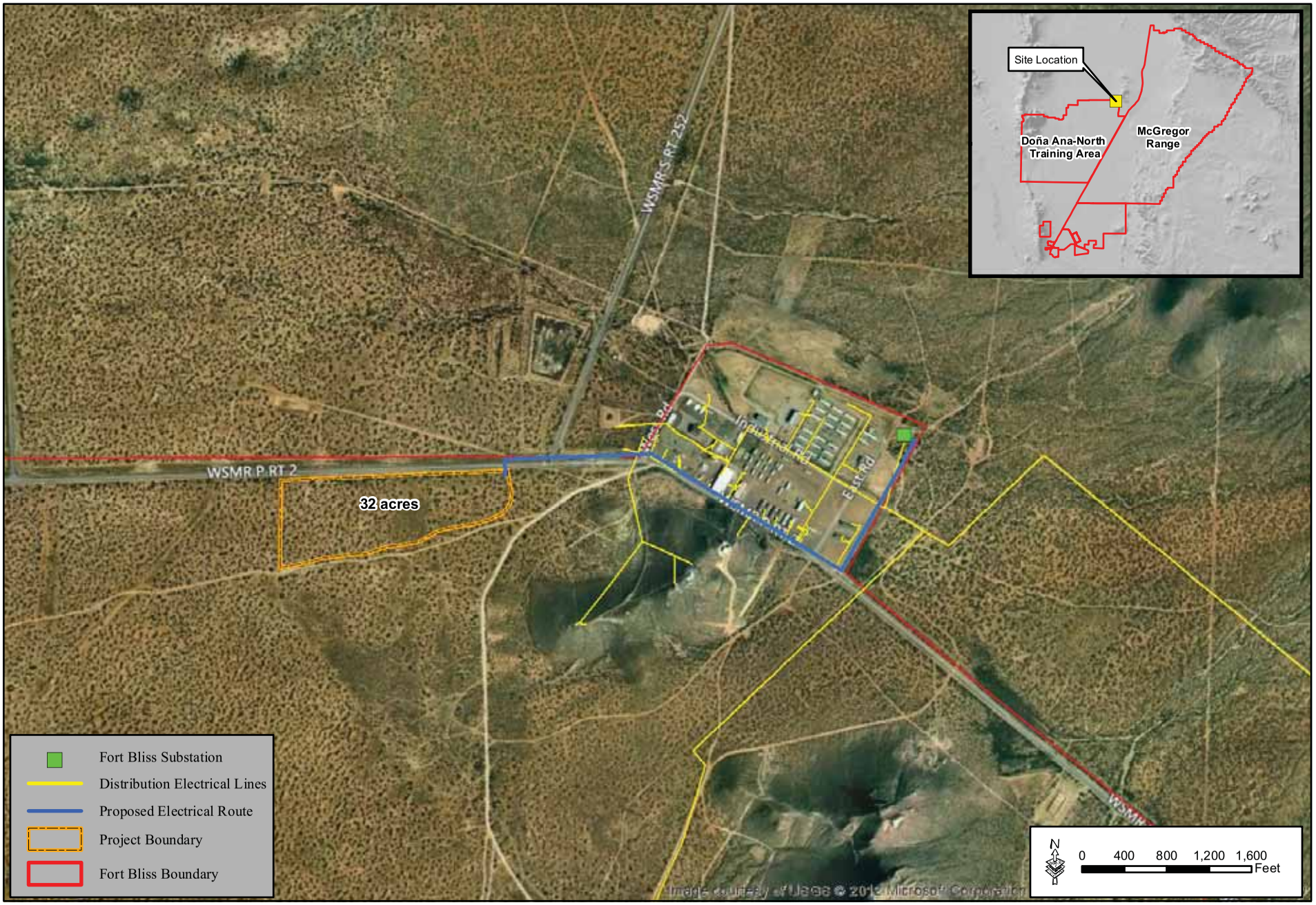

Figure 2-2: Orogrande Range Camp Site

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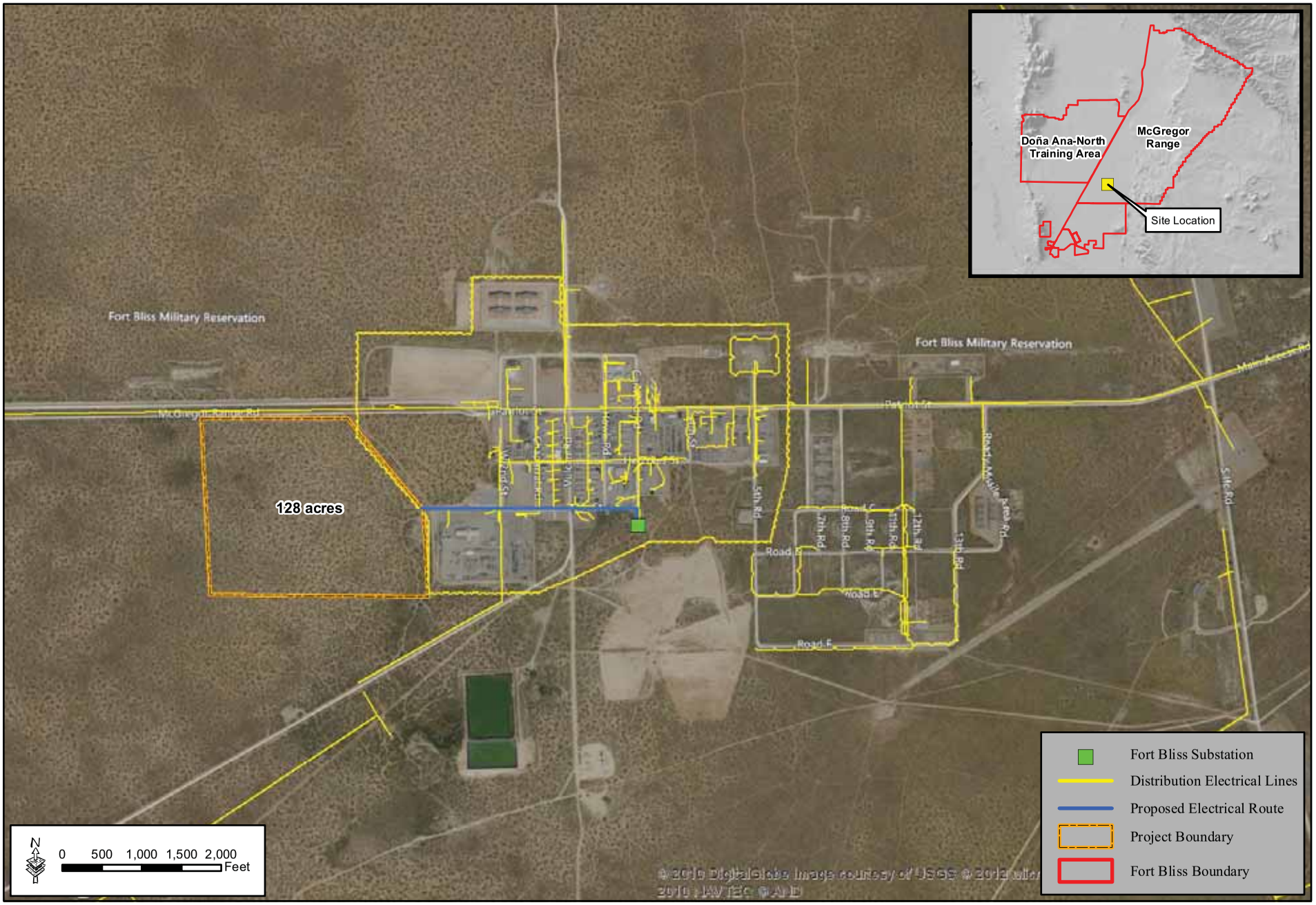

Figure 2-3: McGregor Range Camp Site

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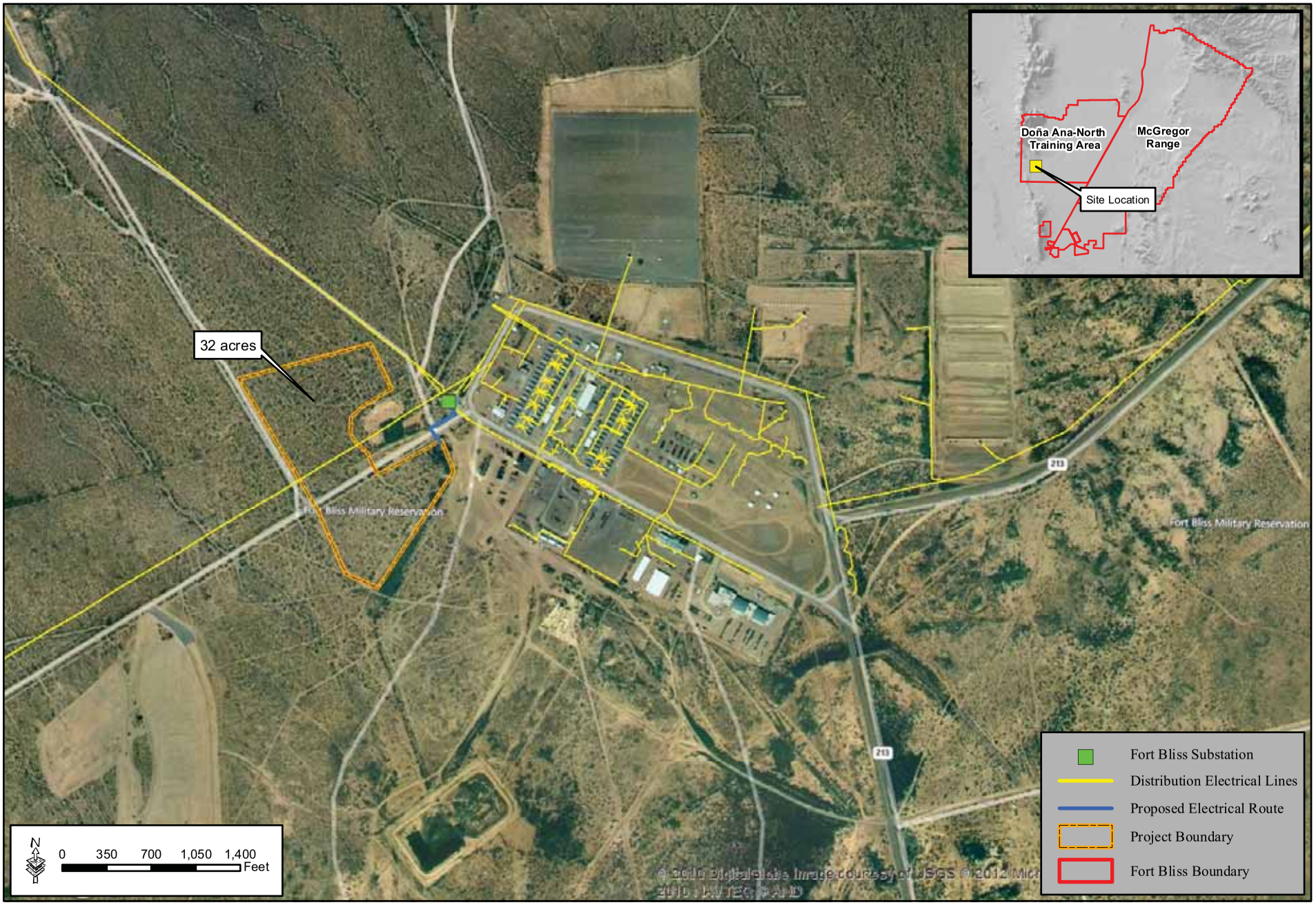

Figure 2-4: Doña Ana Range Camp Site

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PV renewable energy sources are considered the most commercially-proven renewable energy technologies presently available that would best meet the objectives presented in Section 1.0. Although several types of solar technologies have been developed that are essentially ready for installation "out of the box", it is the PV technology that was chosen and which will be the primary focus of this EA. The four PV panel sites would generate an estimated 73,000 megawatt hours (MWh) per year, supplying approximately 15% of Fort Bliss' projected energy consumption by 2015 (Tomlinson 2011a), and thus serving to meet mandated energy goals.

Two other technologies, Concentrating Solar PV and Dish Stirling, were considered but determined unviable due to technological and cost issues. However, they are presented here as possibilities if costs and technologies change in a favorable way.

Installation and operation of any renewable energy farm involves three main phases: construction, electrical tie-in, and operations and maintenance.

2.2.2.1 Photovoltaic (PV)

The PV technology converts sunlight directly into electric current through the use of semiconductors. Semiconductors are usually composed of crystalline silicon wafers, either single crystal or polycrystalline, and thin film amorphous silicon. When semiconducting materials are exposed to light, they absorb some of the sun's energy in the form of photons and emit electrons in the form of electricity. The electricity produced is direct current (DC) (Bureau of Land Management [BLM] and U.S. Department of Energy [DOE] 2010).

The basic PV cell produces only a small amount of power. To produce more power, PV cells are interconnected to form panels that can range in output from 10 to 300 watts. Several PV panels are installed in a rack to form an array. Arrays can be mounted at a fixed angle facing south or they can be mounted on a tracking system that follows the sun's path to optimize and increase power production.

The power-producing components of a PV facility consist of the solar array field (the PV panels), the power conditioning system (PCS), which contains an inverter to convert the energy produced from DC to alternating current (AC) for use on the electrical grid, and a transformer to boost voltage for feeding the power into the electrical grid. Tracking systems utilize hydraulic or electric motors, which are closed systems, to rotate the solar panels so that they are continuously perpendicular to the sun.

PV technology requires flat or gently rolling terrain with unobstructed southerly views. Approximately 6 acres are required to produce 1 megawatt (MW) of electricity per year. To minimize site disturbance, the sites would be cleared, grubbed, and graded only to the extent needed to construct the PV arrays and provide access and stormwater drainage. Best Management Practices (BMPs) per Fort Bliss Construction Stormwater Pollution Prevention Plan (SWPPP) guidance would be utilized to control fugitive dust and erosion during construction (Army 2011). Following construction, all disturbed areas, including maintenance roads, would be surfaced with gravel. Stormwater drainage would comply with Section 438 of the EISA 2007. All site preparation and utility installation would require either a preconstruction biological survey or that the work would be carried out in the fall and winter months to coincide

with the non-breeding season for birds. Each site would include a chain-link perimeter fence with gates to provide security and exclude large animals.

The PV arrays would be approximately 15 feet high, depending upon on panel type (fixed or tracking), ballasting requirements, and tilt of the panels. They would be placed in rows with maintenance roads between rows. Electrical conduits between the solar panels and the feeder line would be underground, and the electric feeder line to connect the arrays to the electrical grid would either be buried or overhead. They would be installed adjacent to existing roads or utility right-of-ways. Overhead electric lines would be constructed in accordance with avian protection guidelines, as described in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee [APLIC] 2006). The depth of all underground lines would be dependent upon the voltage, in accordance with the National Electric Safety Code (NESC). Final siting of utility lines would be reviewed by Directorate of Public Works-Environmental Division (DPW-E) archaeologists and biologists prior to construction.

The number of PV arrays, their arrangement, and the length of the electric feeder line would be dependent upon the dimensions of each site, the power requirements of the end-using facility, and the distance and route of the electric feeder line from the site to the substation.

Water use for operations and maintenance would include washing of the solar panels when necessary. The estimated water use for panel washing is approximately 0.007 acre-feet (ac-ft)/year (yr)/MW (BLM and DOE 2010). Unwanted vegetation would be controlled by mowing or through the use of herbicides.

2.2.2.2 Concentrating Solar Photovoltaic (CPV)

CPV technology utilizes mirrors or lenses to focus sunlight onto high-efficiency solar cells and tracking systems to capture additional energy from the sun over longer periods of daylight for increased energy efficiency. CPV systems use silicon solar cells or high performance multi-junction solar cells (typically made of aluminum, gallium, indium, nitrogen, phosphorus, and antimony). These solar cells are typically more expensive than conventional cells used on flat panel PV systems, but concentrating the solar energy decreases the required cell area while increasing cell efficiency. Additionally, CPV systems generate excess heat and some systems require cooling systems to dissipate the heat. The cooling systems may be passive, such as backing the cell onto a highly conductive metal, such as copper, or active, such as forced air or water cooling through a closed system.

Approximately 2.2 acres are required to produce 1 MW of electricity (Cameron 2011). Construction, electrical tie-in, and operations and maintenance would be site specific and similar in nature to PV systems. Water usage would be the same as PV systems, or approximately 0.007 ac-ft/yr/MW (BLM and DOE 2010).

2.2.2.3 Dish Stirling (DS)

A DS system is a technology that produces power through the action of an external heat engine (Stirling Engine) rather than through steam production. A typical DS system consists of a parabolic concentrator, a receiver, an external heat engine, and a generator. Sunlight is

concentrated onto the receiver, which transfers the heat to a gas (usually hydrogen or helium) contained in the sealed external heat engine. As the gas is heated, its increasing pressure drives a piston, thus powering the generator and producing electricity. Individual DS systems have been designed with power-generating capacities of 25 kilowatts (kW). To achieve the desired power production, individual units would need to be installed as grouped units (BLM and DOE 2010).

Approximately 9 acres per MW are needed. The DS is tolerant of slope change, though construction can be more complex on steeper slopes because of the need to optimize the geometry of the receiver tilt. The electrical tie-in would be similar to that described for PV systems. The amount of water needed for mirror washing would be dependent upon the fugitive dust conditions, but is estimated at 0.007 ac-ft/yr/MW (BLM and DOE 2010).

2.3 Alternatives Excluded From Further Consideration

The following alternatives have been considered, but have been excluded from further analysis in this EA. Although these alternative technologies would not meet the near-term energy goals of Fort Bliss, they could be considered later under appropriate NEPA analysis.

2.3.1 Use of Other Renewable Energy Technologies

Several other technologies were considered to satisfy the specific near-term purpose and need of the project including wind, geothermal, waste-to-energy (WTE), biomass, and concentrating solar power. Wind energy would not be viable to provide near-term electrical power for Fort Bliss due to the long lead-in required to establish large-scale wind turbine farms, limited wind data, and other issues. Existing wind data suggests that wind turbines would likely need to be built in remote, high elevation areas where wind potential is more favorable, requiring new electrical lines over long distances.

Although Fort Bliss has known geothermal hotspots; the extent of the resource and the viability of the resource to provide energy production are unknown at this time. A study is presently underway to evaluate the potential for geothermal development but, even if viable, this resource could not meet the near-term energy requirements of the numerous Federal mandates and EOs.

WTE technology utilizes municipal solid waste to produce electric energy. Municipal solid waste collected from Fort Bliss and the City of El Paso (depending upon the scale) would be burned to convert water to steam to power generators that produce electricity. WTE technologies are largely not commercially-proven and would require extensive environmental studies which would preclude the use in meeting the near-term renewable energy requirements.

Biomass technology utilizes organic material, such as vegetation cuttings and garbage, in a process to produce alcohol or other fuels which could then be burned to generate electricity. Like WTE, biomass technology is not widely used, consumes large volumes of water (scarce in this region), and would require a lengthy lead-in process that would not meet the purpose and need of this proposed action.

Concentrating solar power technologies, such as the parabolic trough, solar power tower, and compact linear Fresnel reflector, concentrate the sun's energy to produce heat by using mirrors

or lenses to focus a large area of sunlight onto a receiver filled with a heat transfer fluid (typically a mix of synthetic organic oils). The solar-heated fluid (at more than 300 degrees Celsius [C]) flows through a heat exchanger, where its heat is transferred to water, producing steam and driving a generator. However, these systems consume large volumes of water and would have an overly long timeframe for implementation to be a viable technology for the present objectives.

2.3.2 Off-Post Solar Energy Technologies

The construction and operation of renewable energy technologies outside of Fort Bliss would not provide the Installation with the necessary energy security to ensure critical Installation operations. Critical operations require that energy development support the installation's energy security needs and that energy transmission and supply be protected through on-post energy generation. In addition, EO 13423, Sec. 2(b), states that the Federal agencies should implement new renewable energy generation projects on agency property for agency use. Likewise, EPAct, Sec. 203, further reinforces that preference by allowing Federal agencies a double credit toward the agencies' renewable energy consumption mandate if the renewable energy is produced and used on-site.

2.3.3 Purchasing Renewable Energy Credits

Renewable energy credits are tradable, non-tangible energy commodities that represent proof that 1 MWh of electricity was generated from an eligible renewable energy resource. Renewable energy credits can be sold or traded and the owner of the renewable energy credit can claim to have purchased renewable energy. Under this alternative, development of renewable energy would not occur on Fort Bliss. Instead, renewable energy credits would be purchased on the open market from renewable energy producers. This alternative, however, would not alleviate the energy threat to the installation or enhance energy security, as the energy needs of the installation would continue to be supplied entirely by energy produced off of Fort Bliss.

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SECTION 3.0
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section of the EA describes the natural and human environment that exists within the project area and the potential impacts of the Proposed Action Alternative as outlined in Section 2.0 of this document. Only those resources that have the potential to be affected by any of the alternatives considered are described, as per CEQ guidance (40 CFR 1501.7[3]). Locations and resources with no potential to be affected need not be analyzed. The effects from the Proposed Action Alternative include impacts from construction, operation, and maintenance of renewable energy sources at four known locations throughout Fort Bliss. This includes all areas and lands that might be affected; and may change depending on how the natural, cultural, and socioeconomic resources they contain or support are affected.

Impacts (consequence or effect) can be either beneficial or adverse, and can be either directly related to the action or indirectly caused by the action. Direct impacts are those effects that are caused by the action and occur at the same time and place (40 CFR 1508.8[a]). Indirect impacts are those effects that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR 1508.8[b]). As discussed in this section, the No Action and Proposed Action Alternatives may create temporary (lasting the duration of construction), short-term (up to 3 years), long-term (greater than 3 years), or permanent impacts or effects.

Impacts on each resource can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. For the purpose of this analysis, the intensity of impacts will be classified as negligible, minor, moderate, or major. The intensity thresholds are defined as follows:

- Negligible: A resource would not be affected or the effects would be at or below the level of detection, and changes would not result in any measurable or perceptible consequences.
- Minor: Effects on a resource would be detectable, although the effects would be localized, small, and of little consequence to the sustainability of the resource. Mitigation measures, if needed to offset adverse effects, would be simple and achievable.
- Moderate: Effects on a resource would be readily detectable, long-term, localized, and measurable. Mitigation measures, if needed to offset adverse effects, would be extensive and likely achievable.
- Major: Effects on a resource would be obvious, long-term, and would have substantial consequences on a regional scale. Extensive mitigation measures to offset the adverse effects would be required and success of the mitigation measures would not be guaranteed.

In accordance with NEPA and the CEQ regulations implementing NEPA, the analysis of environmental conditions only addresses those areas and environmental resources with the potential to be affected by either of the alternatives, the No Action Alternative and Proposed Action Alternative. More specifically, the EA examines the potential for direct, indirect, adverse, or beneficial impacts. The EA also assesses whether such impacts are likely to be long-term, short-term, permanent, or cumulative.

A Table of Valued Environmental Components (VEC) (Table 3-1) was used to determine which resources would potentially be affected by the Proposed Action. These resources are discussed in detail in the EA and include air quality, airspace, biological resources, cultural resources, energy demand, hazardous materials, health and safety, land use, noise, radio frequency and spectrum use, socioeconomics and environmental justice, soils, traffic and transportation, and water resources.

A more detailed discussion and the impacts on the resources described above were programmatically evaluated in the *Fort Bliss, Texas and New Mexico Mission and Master Plan Final Supplemental Programmatic Environmental Impact Statement* (SEIS), for which a Record of Decision (ROD) was signed 30 April 2007 and the *Fort Bliss Army Growth and Force Structure Realignment Final Environmental Impact Statement* (GFS EIS), for which a ROD was signed 8 June 2010. These documents are herein incorporated by reference and can be found at https://www.bliss.army.mil. The impact of the Proposed Action Alternative on these resources will not significantly vary from these analyses.

3.1 Air Quality

3.1.1 Affected Environment

The USEPA established National Ambient Air Quality Standards (NAAQS) for specific pollutants determined to be of concern with respect to the health and welfare of the general public (USEPA 2010a). Ambient air quality standards are classified as either "primary" or "secondary." The major pollutants of concern, or criteria pollutants, are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns (PM-10), particulate matter less than 2.5 microns (PM-2.5), and lead. NAAQS represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect the public health and welfare.

Areas that do not meet NAAQS standards are called non-attainment areas; areas that meet both primary and secondary standards are known as attainment areas. The Federal Conformity Final Rule (40 CFR Parts 51 and 93) specifies criteria or requirements for conformity determinations for Federal projects. The Federal Conformity Rule was first promulgated in 1993 by the USEPA, following the passage of Amendments to the Clean Air Act in 1990. The rule mandates that a conformity analysis must be performed when a Federal action generates air pollutants in a region that has been designated a non-attainment or maintenance area for one or more NAAQS.

A conformity analysis is the process used to determine whether a Federal action meets the requirements of the General Conformity Rule. It requires the responsible Federal agency to evaluate the nature of a proposed action and associated air pollutant emissions, and calculate emissions as a result of the proposed action. If the emissions exceed established limits, known as *de minimis* thresholds, the proponent is required to implement appropriate mitigation measures.

Federal and most states' agencies segregate air sheds by county boundaries. In other words, the USEPA, New Mexico Environmental Department (NMED), and Texas Commission on Environmental Quality (TCEQ) monitor air emissions by county. The four proposed project sites

Table 3-1. Summary of Valued Environmental Components Analysis

Resource	No Action Alternative	Proposed Action Alternative
Air Quality, Greenhouse Gases (GHG), and Climate Change	No direct impacts on air quality or GHG and climate change would occur. However, Fort Bliss would not meet Federal energy mandates and would continue to rely on fossil fuels for energy which generate air emissions.	Temporary and minor increases in air pollution would occur from the use of construction equipment (combustion emissions) and the disturbance of soils (fugitive dust) during construction of the PVs. The air emissions from the proposed operational activities do not exceed Federal *de minimis* thresholds. The impacts on air quality, GHG and climate change from the implementation of this alternative would be minor. Beneficial indirect impacts would also occur through the reduction of GHG and air emissions associated with generation of electricity from El Paso Electric's (EPE) fossil fuel burning plants.
Airspace	No impacts on airspace operations would occur.	There would be no change in the airspace designation. The impacts on airspace operations would be negligible and be limited to the low potential for glare from the PV arrays.
Biological Resources	No impacts on biological resources would occur.	No Federally listed threatened or endangered species would be affected. The potential impact on biological resources as a result of the loss of vegetation and wildlife habitat would be considered long-term but minor because of the vast amounts of similar habitat and vegetation communities throughout Fort Bliss. Some Federally listed Sensitive Species and migratory birds protected under the Migratory Bird Treaty Act (MBTA) may be minimally impacted. To minimize impacts on migratory birds, all site preparation would require either a preconstruction survey for bird activity and nests would be avoided or the work would be carried out in the fall and winter months, to coincide with the non-breeding season.
Cultural Resources	No impacts on cultural resources would occur.	Surveys determined that no surface archaeological sites eligible for inclusion in the National Register of Historic Places (NRHP) would be affected at any of the four sites. Additionally, none of the proposed Solar PV sites are within the viewshed of a historic district. Therefore, no impacts on historic properties would occur at any of the four PV sites.
Energy Demand	No construction, maintenance, or operation of PVs would occur. Therefore, Fort Bliss and the Army would not meet Federal mandates or its goal of achieving secure renewable power. Additionally, due to the anticipated growth of personnel and energy-consuming facilities on Fort Bliss, the No Action Alternative could eventually require expansion of EPE's fossil fuel generation capacity.	Fort Bliss and the Army would meet its Federal mandates to reduce nonrenewable energy consumption and obtain its power needs from a secure energy source. The 73,000 MWh anticipated to be supplied by the four known PV sites would supply approximately 15% of the total energy consumed at Fort Bliss on an annual basis. By reducing Fort Bliss' reliance on outside energy sources, as well as providing Fort Bliss with a minimum of 15% of its projected electricity consumption in the near future, the implementation of the Proposed Action Alternative would have a beneficial impact on energy demands, not only for Fort Bliss, but throughout the El Paso Region.
Hazardous Materials and Waste	There would be no increase in the use and generation of hazardous materials and wastes on Fort Bliss.	A limited amount of potentially hazardous materials and waste would be used or generated at the proposed solar renewable energy source (PV) sites from maintenance and operational activities, including petroleum, oil, and lubricants (POL). Any hazardous wastes generated as part of this project would be disposed or recycled according to the Installation Hazardous Waste Management Plan. Impacts from hazardous materials and waste would occur as a result of this alternative; however, those impacts would be minor.
Health and Safety	No impacts on health and safety would occur.	All proposed PV sites would be surveyed for unexploded ordnance (UXO) prior to ground disturbance. None of the sites are within known dudded or munitions impact areas. Therefore, negligible to minor impacts on health and safety would be expected as a result of this alternative.
Land Use	No changes in land use would occur.	Land use would change from training to facilities and from relatively semi-disturbed desert lands to PV solar array farms. This loss of training lands or degradation of a natural area would be minimal in comparison to the amount of similar lands available within the region and on Fort Bliss.
Noise	No change in the noise environment would occur.	The implementation of this alternative would result in minimal impacts on the noise environment within Fort Bliss since the PV arrays operate in a silent mode. There are no nearby sensitive noise receptors and noise impacts from construction and maintenance activities would be temporary and considered minor.
Radio Frequency and Spectrum Use	No changes to radio frequency or spectrum use would occur.	The proposed equipment to be used for the PV surveys would meet or exceed requirements established by the Federal Communication Commission and MIL-STD-461F. Negligible to minor impacts on radio frequency or spectrum use would occur.
Socioeconomics	Detrimental socioeconomic impacts would be minor since the projects would not be built, however energy consumption at Fort Bliss would continue to grow. Energy to meet this demand would have to be generated elsewhere, shifting the potential socioeconomic impacts elsewhere.	Implementation of the Proposed Action Alternative could provide a beneficial impact on the local economies due to minimal increases in revenues for local business as a result of construction activities. Most of the increase in workforce and revenue would be temporary. However, there would be some residual work required for long term operation and maintenance of the solar PV facilities. Fort Bliss currently receives a 20% discount on power purchased from EPE as mandated by state law, which is subsidized by the rest of the EPE rate base customers. As Fort Bliss purchases less power from EPE, the remaining EPE customers will see a reduction in their overall electric bill resulting from a decrease in the subsidy they pay.
Environmental Justice and Protection of Children	No impacts on environmental justice or protection of children would occur.	No disproportionate health or environmental effects on minorities or low-income populations or communities would occur as a result of the Proposed Action Alternative, as none are located near the proposed PV sites.
Soils	No impacts on soils would occur.	No special or prime farmland soils are located at the four PV sites. Approximately 432 acres of typical Chihuahuan Desert soils would be developed for the solar arrays and this amount of soil would be disturbed as part of the Proposed Action. These impacts are considered long-term, but would not result in major impacts on the soil resources of the region based on the overall availability of the same type desert soils within and outside of Fort Bliss.

Table 3-1, continued

Resource	No Action Alternative	Proposed Action Alternative
Traffic and Transportation	No changes for traffic and transportation resources would occur.	Traffic would increase slightly on the main highways during construction of the PV arrays. However, this is expected to only occur during the delivery and removal of construction equipment (not expected to exceed 6-months per PV site). Maintenance and ongoing operations of the PV arrays would not impact traffic or transportation within Fort Bliss or the region because passenger transport vehicles would be used and only periodically (approximately 1 to 2 times per month, depending on climatic conditions).
Water Resources	No impacts on surface water would occur. No direct impacts on groundwater would occur; however, the continued use of fossil fuels to supply electricity to Fort Bliss would continue to deplete the groundwater supply in the region.	No Federally regulated waters of the U.S. would be affected, as none are located near any of the four PV sites. Groundwater impacts would be negligible due to the small amount of water (approximately 0.2 acre-feet per year) needed to clean and wash the proposed PV arrays.

at Fort Bliss are located in two counties in New Mexico and one in Texas. Table 3-2 presents the counties in which Fort Bliss is located and the counties' attainment status for NAAQS.

Table 3-2. Fort Bliss Counties and NAAQS Status

Known Project Sites	County	NAAQS Attainment Status
IBCT	El Paso	Non-attainment for PM-10 is limited to the city limits of El Paso and maintenance for CO is limited to the downtown area of El Paso
McGregor Range Camp and Oro Grande Range Camp	Otero	In attainment for all NAAQS
Doña Ana Range Camp	Doña Ana	Non-attainment for PM-10 is limited to the city limits of Anthony, NM

Source: USEPA 2010b

Greenhouse Gases and Climate Change

Global climate change refers to a change in the average weather on the earth. GHG are gases that trap heat in the atmosphere. They include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases including chlorofluorocarbons (CFC) and hydrochlorofluorocarbons (HFC), and halons, as well as ground-level O_3 (California Energy Commission 2007). The major GHG-producing sectors in society include transportation, utilities (e.g., coal and gas power plants), industry/manufacturing, agriculture, and residential (California Energy Commission 2007).

3.1.2 Environmental Consequences

3.1.2.1 No Action Alternative

The No Action Alternative would not result in any direct impacts on air quality; however, there would be indirect impacts due to the continued reliance on fossil fuels for the production of electricity. One of the important environmental benefits of the Proposed Action Alternative is the reduction of air pollution associated with the use of PV panels.

The No Action Alternative would not create a major impact on air quality, but would not assist Fort Bliss in meeting Federal energy mandates for increasing use of renewable energy, lowering GHG emissions, and reducing the Army's reliance on fossil fuels.

3.1.2.2 Proposed Action Alternative

Temporary and minor increases in air pollution would occur from the use of construction equipment (combustion emissions) and the disturbance of soils (fugitive dust) during construction of the solar arrays. Construction workers would temporarily increase the combustion emissions in the air shed during their commute to and from the project area. Emissions from delivery trucks would also contribute to the overall air emission budget. Operational air emissions refer to air emissions that may occur after the solar panels have been installed, and that would include employee commuter vehicles traveling to the project site during the work-week. Air emissions were calculated for fugitive dust emissions during construction, as well as during operation of the solar panels, and are included in Appendix B.

Based upon the calculations, PM-10 air emissions from the proposed operational activities do not exceed Federal *de minimis* thresholds. As there are no violations of air quality standards and no

conflicts with the state implementation plans, the impacts on air quality in El Paso, Doña Ana, and Otero counties from the implementation of the Proposed Action Alternative would be minor.

The use of PV panels to generate electricity reduces dependence on fossil fuels that emit GHG, and would decrease emissions at the power plants, resulting in an indirect positive effect on air quality and climate change. By implementing the Proposed Action Alternative, Fort Bliss and the Army would be able to reduce indirect (Scope 2) GHG emissions, based on power consumption.

3.2 Airspace

3.2.1 Affected Environment

The Army manages airspace in accordance with DoD Directive 5030.19, *Responsibilities on Federal Aviation and National Airspace System Matters*. The Army implements these requirements through AR 95-2, *Air Traffic Control, Airspace, Airfields, Flight Activities, and Navigational Aids*. Airspace over the Orogrande and Doña Ana Range Camp sites is restricted for military use and designated as Special Use Airspace (SUA) R5107A. There are no military airspace restrictions over the McGregor Range Camp site or IBCT site. Use of military airspace on Fort Bliss is scheduled through the Directorate of Plans, Training, Mobilization and Security (DPTMS), McGregor Base Camp - Range Operations.

3.2.2 Environmental Consequences

3.2.2.1 No Action Alternative

No impacts on airspace operations would occur because no construction would take place.

3.2.2.2 Proposed Action Alternative

There would be no change in the airspace designation. Power lines would be placed overhead adjacent to existing roadways or buried underground to the greatest extent possible. The impact on airspace operations would be negligible and be limited to the low potential for glare from the PV panels.

3.3 Biological Resources

3.3.1 Affected Environment

The U.S. Fish and Wildlife Service (USFWS), under the Endangered Species Act (ESA) of 1973, the New Mexico Wildlife Conservation Act of 1978, and the Texas Parks and Wildlife Code list various species of flora and fauna that are known to occur, or have the potential to occur, on Fort Bliss as Threatened, Endangered, or Species of Concern. Additionally, Locally Important Natural Resources (LINR) have been identified for protection by Fort Bliss. These include black gramma grasslands, sand sagebrush communities, shinnery oak islands, arroyo-riparian drainages, and playa lakes (Army 2010). A description of biological resources and information on habitat and occurrences can be found in the SEIS, GFS EIS and the *Fort Bliss Integrated Natural Resources Management Plan, November 2001* (INRMP) (Army 2001). The INRMP is herein incorporated by reference, and can be found at https://www.bliss.army.mil.

Fort Bliss is located in the northern portion of the Chihuahuan Desert Biome (Brown 1994). The lower elevations of this biome (i.e., areas potentially suitable for PV panels placement on Fort Bliss) are characterized as Chihuahuan desertscrub (Chihuahuan Desert Research Institute 2007). Creosote bush (*Larrea tridentata*) along with honey mesquite (*Prosopis glandulosa*) comprise the dominant vegetation of this desert scrubland, often covering large expanses. Other common shrubs include four-winged saltbush (*Atriplex canescens*), soaptree yucca (*Yucca elata*), lechuguilla (*Agave lechugilla*), sotol (*Dasilyron wheeleri*), tarbush (*Flourensia cernua*), crown of thorns (*Koeberlinia spinosa*), and ocotillo (*Fouquiera splendens*). Vegetation communities are diverse within Fort Bliss, as landscapes can change from shrub-dominated communities to grassland swales within a short distance. Vegetation composition and dominance varies greatly and is dictated by differences in soil features, topography, and water availability. Fort Bliss exhibits a wide range of these factors.

The terrain at the proposed sites is relatively flat with some gentle rolling hills. The sites are characterized as typical Chihuahuan desertscrub vegetation communities and consist of creosote bush, honey mesquite, saltbush, sandsage (*Artemisia filifolia),* bush muhly (*Muhlenbergia porter)*, and mesa dropseed (*Sporobolus flexuosus)*.

3.3.1.1 Threatened and Endangered Species, Species of Concern, and LINR

There are 15 Federally listed species that could potentially occur within Otero and Doña Ana counties, New Mexico, and El Paso County, Texas (USFWS 2011). After review of listed species distribution, biology, and preferred habitats, it was determined that, of the 15 Federally listed species, only five have the potential to occur on Fort Bliss: Sneed's pincushion cactus (*Coryphantha sneedii* var. *sneedii*), Kuenzler hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*), Sacramento prickly poppy (*Argemone pleicantha spp. pinnatisecta)*, northern aplomado falcon (*Falco femoralis septentrionalis*), and Mexican spotted owl (*Strix occidentalis lucida*). The remaining 10 Federally listed species are not known to occur on Fort Bliss, and no suitable habitat is present. The Texas horned lizard (*Phrynosoma cornutum),* a Texas listed Threatened Species, is common throughout much of Fort Bliss.

3.3.2 Environmental Consequences

3.3.2.1 No Action Alternative

No impacts on biological resources would occur because no construction would take place.

3.3.2.2 Proposed Action Alternative

No Federally listed threatened or endangered species would be affected by the Proposed Action Alternative because no sites would be located within potential habitat for species protected under the ESA. However, the Proposed Action Alternative could occur in habitat that is utilized by common wildlife species and bird species protected under the Migratory Bird Treaty Act (MBTA) of 1918. Impacts on migratory birds would be minimal, because all site preparation would require either a preconstruction survey for bird activity and avoidance of active nests of migratory birds, or that the work be carried out in the fall and winter months, to coincide with the non-breeding/active season for these species. The proposed overhead electrical lines would be constructed in accordance with avian protection guidelines (APLIC 2006).

Approximately 423 acres of Chihuahuan desert scrub vegetation, which is the common vegetation community on Fort Bliss, would be impacted. The loss of vegetation and wildlife habitat would be considered long-term but minor because of the vast amounts of similar habitat and vegetation communities throughout Fort Bliss. To prevent the spread of noxious weeds from construction activities, a noxious weed monitoring and treatment program would be established with guidance from DPW-E biologists. Additionally, construction equipment would be cleaned of all dirt, mud, and plant debris prior to moving onto or off of the project area. Following construction, disturbed areas would be graded to match the surrounding topography and the surface left rough to facilitate re-growth of native vegetation.

3.4 Cultural Resources

3.4.1 Affected Environment

Cultural resources are important because of their association or linkage to past events, historically important persons, design and construction values, and for their ability to yield important information about history. Fort Bliss manages cultural resources associated with all prehistoric and historic periods recognized in south central NM and western Texas. The *Fort Bliss Texas and New Mexico, Mission and Master Plan, Programmatic Environmental Impact Statement* (U.S. Army 2000) describes in detail the cultural history of Native Americans and post-contact inhabitants in the region. The *Integrated Cultural Resources Management Plan* (ICRMP) for Fort Bliss (U.S. Army 2008) also contains detailed information about the history of Fort Bliss. Both documents are incorporated herein by reference and can be found at https://www.bliss.army.mil.

Cultural resources are regulated at Fort Bliss under the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. fl470, et. seq.), the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, the Archeological Resources Protection Act of 1979, and other statutes. Pursuant to Army Regulation AR 200-1, the GC at Fort Bliss is responsible for managing the cultural resources on the installation in compliance with the NHPA and the Programmatic Agreement (PA) entered into by the Fort Bliss GC, the Texas State Historic Preservation Officer (SHPO), the New Mexico SHPO, and the Advisory Council on Historic Preservation for the Management of Historic Properties on Fort Bliss.

Archaeological surveys carried out within and in areas immediately adjacent to the proposed PV panel sites have resulted in the following:

- IBCT – Numerous archaeological sites have been identified within the IBCT site, but all have been determined ineligible for the National Register of Historic Places (NRHP). The proposed site, however, is located within the vicinity of several sites that have been determined to be eligible for the NRHP.
- McGregor Range Camp – Three archaeological sites have been identified within the footprint of the proposed site (Burt 2012). These sites were determined ineligible for the NRHP in consultation with the New Mexico SHPO on April 5, 2012.
- Doña Ana Range Camp – Archeological surveys have concluded that no surface cultural resources exist within the proposed project site.

- Orogrande Range Camp – This area was originally surveyed in 1986 and one archeological site was discovered (Carmichael 1986). The site was reevaluated in 2002 and no evidence of the site was found and it was presumed destroyed or eroded (Church, et al. 2002). Fort Bliss recommended the site is ineligible for inclusion in the NRHP and received concurrence from the New Mexico SHPO in 2005.

3.4.2 Environmental Consequences

3.4.2.1 No Action Alternative

No impacts on cultural resources would occur because no construction would take place.

3.4.2.2 Proposed Action Alternative

It is unlikely that construction of the Proposed Action would result in adverse impacts on any significant historic properties. The environmental consequences of the Proposed Action on cultural resources include:

- IBCT – No surface archaeological sites eligible for inclusion in the NRHP have been identified within the proposed project area. During the siting phase, the proposed site footprint was adjusted to avoid impacts on nearby NHRP eligible properties.
- McGregor Range Camp – No surface archaeological sites eligible for inclusion in the NRHP have been identified within the proposed project area.
- Doña Ana Range Camp – No surface archaeological sites eligible for inclusion in the NRHP have been identified within the proposed project area.
- Orogrande Range Camp – No surface archaeological sites eligible for inclusion in the NRHP have been identified within the proposed project area.

Final siting of any access roads, utility lines, and pole placements would be reviewed by DPW-E archaeologist prior to construction. If any sub-surface cultural resources were encountered during construction at any of the proposed sites, the potential impacts would be properly addressed per Fort Bliss' PA with New Mexico and Texas SHPO. Any discovery of possible human remains would be treated in accordance with the NAGPRA and the Standard Operations Procedures (SOP) set out in the ICRMP.

Ongoing consultation by Fort Bliss with the Federal-recognized tribes expressing interest at the proposed project locations has not revealed any resources of interest to the tribes. None of the proposed project locations are within the viewshed of a historic district.

3.5 Energy Demand

3.5.1 Affected Environment

Fort Bliss receives its energy from EPE. The net installed energy generation resources owned by EPE were approximately 1,643 MW in 2010. This includes the use of power sources outside the El Paso region. Within the El Paso region, EPE owns approximately 900 MW of local generation (EPE 2011).

In 2010, the base load for energy usage on Fort Bliss was approximately 30 to 40 MW, with a peak load of 65 MW during heavy usage times, such as during the heat of the summer. The

projected electrical consumption for Fort Bliss in 2015 is an 80 MW base load, 130 MW peak load, and 500,000 MWh annual energy consumption (Tomlinson 2011b).

3.5.2 Environmental Consequences

3.5.2.1 No Action Alternative

No construction, maintenance, or operation of PV panels would occur. Therefore, Fort Bliss and the Army would not meet Federal mandates or the goal of achieving secure renewable energy. Additionally, due to the anticipated growth of Fort Bliss through personnel and energy-consuming facilities, the No Action Alternative could eventually require expansion of EPE's fossil fuel generation capacity.

3.5.2.2 Proposed Action Alternative

Fort Bliss and the Army would meet Federal mandates to reduce nonrenewable energy consumption and obtain a secure energy source. With a 2015 projected energy use of 500,000 MWh, the 73,000 MWh anticipated to be supplied by the proposed PV sites would supply approximately 15% of the total energy consumed at Fort Bliss on an annual basis. By reducing Fort Bliss' reliance on outside energy sources, as well as providing Fort Bliss with a minimum of 15% of its projected energy consumption in the near future, the implementation of the Proposed Action Alternative would have a beneficial impact on energy demands, not only from Fort Bliss, but throughout the El Paso Region.

3.6 Hazardous Materials and Waste

3.6.1 Affected Environment

Hazardous materials are substances that cause human physical or health hazards (29 CFR 1910.1200). Materials that are physically hazardous include combustible and flammable substances, compressed gases, and oxidizers. Health hazards are associated with materials that cause acute or chronic reactions, including toxic agents, carcinogens, and irritants. Hazardous materials are regulated in Texas and New Mexico by a combination of mandated laws promulgated by the USEPA, TCEQ, and NMED. In addition to the mandates established by these agencies, Fort Bliss manages hazardous materials under the Installation Hazardous Waste Management Plan. Hazardous materials that could be present during implementation of the Proposed Action Alternative include petroleum, oil, and lubricants (POL) used for operation of heavy equipment. These POL would be stored at a secure location with proper cleanup equipment readily available in case of a spill.

3.6.2 Environmental Consequences

3.6.2.1 No Action Alternative

No direct impacts from hazardous materials and waste would occur because no construction would occur.

3.6.2.2 Proposed Action Alternative

Heavy equipment would be used to construct and install the PV panels and would require the use of POL. All hazardous and regulated wastes and substances generated during implementation of the Proposed Action Alternative would be collected, characterized, labeled, stored, transported, and disposed of in accordance with all Federal, state, and local regulations, including proper

waste manifesting procedures. All other hazardous and regulated materials or substances would be handled according to materials safety data sheet instructions and would not affect water, soils, vegetation, wildlife, or the safety of military personnel or Fort Bliss staff. Therefore, hazardous and regulated materials and substances would not impact the public, groundwater, or general environment.

The potential impacts of the handling and disposal of hazardous and regulated materials and substances during project implementation would be minor when BMPs are implemented. BMPs would be implemented as standard operating procedures during all construction activities, including proper handling, storage, and/or disposal of hazardous and/or regulated materials. To minimize potential impacts from hazardous and regulated materials, all fuels, waste oils, and solvents would be collected and stored in tanks or drums within a secondary containment system that consist of an impervious floor and bermed sidewalls capable of containing the volume of the largest container stored therein. The refueling of machinery would be completed following accepted guidelines, and all vehicles would have drip pans during storage to contain minor spills and drips. Although it would be unlikely for a major spill to occur, any spill of a reportable quantity would be contained immediately within an earthen dike, and the application of an absorbent (e.g., granular, pillow, sock) would be used to absorb and contain the spill. Any major reportable spill of a hazardous or regulated substance would be reported immediately to on-site environmental personnel, who would notify appropriate Federal and state agencies.

Herbicide application for the control of invasive and exotic species within the PV panel sites would occur under the Proposed Action Alternative. Exposure to herbicides could pose a minor health and safety risk to those that are immediately involved with the application of the herbicide. However, all proper personal protection equipment and strict adherence to manufacture's guidelines for the use of the chemicals would occur, therefore minimizing the potential for adverse impacts.

3.7 Health and Safety

3.7.1 Affected Environment

Federal, state, and Fort Bliss guidelines, rules, and regulations are in place to protect personnel throughout the installation. Safety information and analysis is found in literature published by Fort Bliss, such as Fort Bliss Regulation 385-63 and AR 385-10, Army Safety Program. Health programs are promoted through U.S. Army Public Health Command and Medical Command. Various Fort Bliss procedures have also been established to meet health and safety requirements. Health hazards throughout the Installation could include exposure to Unexploded Ordinance (UXO), dehydration and heat illness, venomous animals, or vehicle accidents.

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

No impacts on health and safety would occur because no construction activities would occur.

3.7.2.2 Proposed Action Alternative

During construction of the PV panels, all applicable Occupational Safety and Health Administration (OSHA) rules and regulations would be followed by Fort Bliss pursuant to AR

385-10, Army Safety Program, and by project contractors. Heavy equipment operation areas and trenching locations would be secured to prevent inadvertent public access. The PV panels would be enclosed by perimeter fencing and public access would not be allowed without approval by Fort Bliss.

The Proposed Action Alternative is located in military training areas, and as such, there is a small potential of encountering UXO during construction. Prior to site preparation work, each site would be surveyed for UXO. Detected UXO would be handled by explosive ordnance disposal personnel, as per approved procedures at Fort Bliss. None of the PV panel sites are within known duded or munitions impact areas. Therefore, negligible to minor impacts on health and safety would be expected as a result of the Proposed Action Alternative.

Based upon a study of solar refraction from flat plate photovoltaic modules (Black and Veatch 2010) conducted at Nellis Air Force Base, it was determined that in a worst case scenario there would be a slight potential for an after image or flash glare resulting from reflected sunlight. This after image or flash glare is similar to the potential for flash glare due to water and less than that due to weathered, white concrete and snow. It would be expected that pilots would typically mitigate glare using glare shields and sunglasses; these typically reduce radiation by approximately 80% and would make any reflected sunlight from solar panels minor.

3.8 Land Use

3.8.1 Affected Environment

The McGregor Range Camp site is located in New Mexico on public land that has been withdrawn from the public domain for military use through the Military Lands Withdrawl Act of 1999 (PL-106-65). As such, the land is co-managed by the BLM and Fort Bliss for military, recreation, and other uses. The Doña Ana Range Camp and Orogrande Range Camp sites are also located in New Mexico on withdrawn public lands; however, these sites are on indefinitely withdrawn lands and are completely managed by Fort Bliss. The Doña Ana Range has been withdrawn from public domain until the Army does not require its use through Public Land Order 833. The IBCT site is located in Texas on Army fee-owned land and is managed entirely by Fort Bliss.

The PV panel sites described in the Proposed Action Alternative are located in areas of relatively undisturbed land, which are adjacent to existing facilities and encampments, classified by Fort Bliss as Land Use Category A (Army 2010). Category A allows off-road and on-road vehicle maneuvering for all types of vehicles and equipment, including both tracked and wheeled vehicles; dismounted (foot traffic) maneuvering and training; aircraft operations; mission support facilities; and other activities and uses. Category A also allows non-military, public use in designated areas, provided such use does not conflict with military uses or pose safety risks to the public. Non-military use includes public recreation such as hunting, hiking, and bird watching. Public recreation use is controlled through access permits by Fort Bliss Range Operations to ensure safety and use compatibility with military activities. The IBCT, Doña Ana Range Camp, and Orogrande Range Camp sites are located in the designated Recreational Use Area.

3.8.2 Environmental Consequences

3.8.2.1 No Action Alternative

No land use changes would occur as a result of the construction, maintenance, or operation of PV panels because no PV panels would be installed.

3.8.2.2 Proposed Action Alternative

Land use would be impacted by the construction, use, and maintenance of the components of the Proposed Action Alternative. The implementation of the Proposed Action Alternative would change land use from relatively undisturbed desert lands to PV panel sites. However, the loss or degradation of these lands is minimal in comparison to the amount of similar lands available within the region and on Fort Bliss. For example, the estimated total known impacts would be 423 acres (total acreage of all proposed sites), while the total acreage of similar lands within Fort Bliss is over 500,000 acres. Therefore, the Proposed Action Alternative is consistent with land use plans on Fort Bliss and would not affect those resources that are required for, support, or benefit current land use. Thus, the Proposed Action Alternative would have negligible impacts on land use.

3.9 Noise

3.9.1 Affected Environment

Noise is generally described as unwanted sound, which can be based either on objective impacts (i.e., hearing loss, damage to structures, etc.) or subjective judgments (e.g., community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately 3 dB, and the threshold of discomfort or pain is around 120 dB.

Noise is common throughout Fort Bliss from gunfire, ordnance detonations, missile and rocket launches, aircraft and ground vehicles, and other sources. Although there are no civilian sensitive noise receptors near any of the four known sites, the sites are located near military buildings. However, these sites are situated deep in the confines of Fort Bliss, and personnel stationed at the sites are accustomed to noise-generating events.

3.9.2 Environmental Consequence

3.9.2.1 No Action Alternative

The implementation of the No Action Alternative would not change ambient noise quality in the region.

3.9.2.2 Proposed Action Alternative

No noise generated by either construction or operational activities would leave Fort Bliss; therefore, no impacts on noise as it relates to the general public would occur. Within Fort Bliss, noise generated by the construction and operational activities would be intermittent and temporary. The implementation of this alternative would result in negligible impacts on the noise environment within Fort Bliss since the PV panels would operate in silent mode and there are no sensitive noise receptors near any of the proposed sites.

3.10 Radio Frequency and Spectrum Use

3.10.1 Affected Environment

Communication systems interference includes negative impacts on radar, navigation aids, and infrared instruments. Radar interference occurs when objects are placed too close to a radar antenna and reflect or block the transmissions of signals between the antenna and receiver. Impacts on infrared communications can occur because solar panels could retain heat beyond dusk and the heat they release can be picked up by infrared communications in aircraft, causing an unexpected signal.

3.10.2 Environmental Consequences

3.10.2.1 No Action Alternative

No impacts on radio frequency and spectrum use would occur because no construction activities would occur.

3.10.2.2 Proposed Action Alternative

The currently available equipment used in PV panels meets or exceeds requirements of the Federal Communication Commission (Enphase Energy 2008) and MIL-STD-461F (DoD 2007) for electromagnetic emissions, and does not constitute an aircraft operational hazard. Additionally, due to their low profiles, most PV panels typically represent little risk of interfering with radar transmissions (Federal Aviation Administration 2010). No major impacts on radio frequency or spectrum use would occur if the Proposed Action Alternative was implemented.

3.11 Socioeconomics

3.11.1 Affected Environment

Socioeconomics in the region of influence (ROI) for the proposed project were discussed in detail in the 2007 *SEIS* and the 2010 *GFS EIS,* and those discussions are herein incorporated by reference (Army 2007, 2010). The ROI is defined as the geographic area where the majority of any potential direct and indirect socioeconomic effects of actions on Fort Bliss are likely to occur (Army 2010).

3.11.2 Environmental Consequences

3.11.2.1 No Action Alternative

No direct impacts on socioeconomics would occur, as no construction activities would take place.

3.11.2.2 Proposed Action Alternative

Implementation of the Proposed Action Alternative could provide a beneficial impact on the local economies due to minimal increases in revenues for local business as a result of construction activities and materials obtained. Most of the increase in workforce and revenue; however, would be temporary, lasting only as long as construction. However there would be some residual work required for long term operation and maintenance of the solar PV facilities. Fort Bliss currently receives a 20% discount on power purchased from EPE as mandated by state law. This discount is subsidized by the rest of the EPE rate base customers. As Fort Bliss purchases less power from EPE, the remaining EPE customers will see a reduction in their

overall electric bill resulting from a decrease in the subsidy they pay. An increase in the rates paid by EPE customers is not expected to occur specifically as a result of this action; however any proposed rate changes by EPE would be subject to review and approval of the Public Utilities Commission.

3.12 Environmental Justice and Protection of Children

3.12.1 Affected Environment

EO 12898, Environmental Justice, was signed by President Clinton in February 1994. This action requires all Federal agencies to identify and address disproportionately high and adverse effects of programs, policies, and activities on minority and low-income populations. The ROI for the proposed project has a high minority percentage (approximately 77 percent); however, all activities would be located within Fort Bliss where no minority populations exist.

EO 13045, Protection of Children, requires each Federal agency "to identify and assess environmental health risks and safety risks that may disproportionately affect children" and "ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." This EO was prompted by the recognition that children, still undergoing physiological growth and development, are more sensitive to adverse environmental health and safety risks than adults. All activities would be within the boundaries of Fort Bliss, in remote areas located away from neighborhoods, parks, or places that could potentially create a risk to children.

3.12.2 Environmental Consequences

3.12.2.1 No Action Alternative

No impacts on environmental justice or protection of children would occur because no construction activities would take place.

3.12.2.2 Proposed Action Alternative

No disproportionate health or environmental effects on minorities or low-income populations or communities would occur as a result of the Proposed Action Alternative, as none are located near the proposed PV sites. Additionally, since there are no communities near any of the proposed Solar PV sites, no impacts on children would occur.

3.13 Soils

3.13.1 Affected Environment

Fort Bliss lies within the Basin and Range physiographic province, a region covering much of the western U.S., consisting of prominent north-south-trending mountain ranges separated by expansive, sediment-filled basins. McGregor and Orogrande range camps are located on Holocene (younger than 10,000 years BP) aeolian (wind-deposited) sand dunes and sand sheets in the Tularosa Basin. Underlying the Holocene sediments are older basin-fill gravels, sands, and finer sediments. The IBCT site is also in a similar geologic setting, but in the southern extension of the Tularosa Basin, called the Hueco Basin. Doña Ana Range Camp is situated on the margins of a Quaternary piedmont alluvial fan comprised of coarser materials (gravels,

pebbles, etc.) eroding from the nearby Organ Mountains, mixed with young aeolian sands from the Tularosa Basin.

Soil mapping units and other soil data for Fort Bliss are found in the *Soil Survey of Fort Bliss Military Reservation, New Mexico and Texas*. There are 10 soil associations comprised of 63 individual soil series mapped on Fort Bliss (United States Department of Agriculture [USDA] 2004).

The soils at the IBCT site are mapped as McNew-Copia-Foxtrot Association. The site is located in the Copia soil, predominantly loamy fine sand formed into wind-deposited dunes anchored by shrub vegetation (coppice dunes). Slopes are 1-3%. These soils are excessively drained, and have moderately rapid permeability (water infiltration) (USDA 2004).

The soils at the Orogrande Range Camp site are mapped as Copia-Patriot complex and Pendero fine sand. The Copia-Patrio complex soils are found on 2-5% slopes, are well-drained to excessively drained, and have a high proportion of sand on the surface. The Pendero fine sand soils are found on 2-5% slopes, are excessively drained, and have a high proportion of sand on the surface (USDA 2004).

The soils at the McGregor Range Camp site are mapped as Copia-Nations complex. The site is comprised mainly of the Copia soil, a loamy fine sand formed into coppice dunes with slopes of 1-3%. These soils are excessively drained, and exhibit moderately rapid permeability (USDA 2004).

The soils in the Doña Ana Range Camp site are mapped as Piquin very gravelly sandy loam. These soils are found on 5-15% slopes on alluvial fans of the southern Organ Mountains. The soils typically contain a calcic (calcium carbonate) horizon and are somewhat excessively drained, and have moderately rapid permeability (USDA 2004).

3.13.2 Environmental Consequences

3.13.2.1 No Action Alternative

No ground-disturbing actions as a result of the construction of PV panels would occur; therefore, no impacts on soils would occur.

3.13.2.2 Proposed Action Alternative

Ground disturbance (approximately 423 acres) would be necessary to construct the PV arrays and would directly impact soils at any of the proposed sites. Long-term direct impacts would result from the disturbance of surface and near-surface soil horizons through heavy machinery and vehicle traverses associated with the construction of the PV panels at each location. Although these impacts are considered long-term, they would not result in major impacts based upon the minimal amount of soils affected versus the overall area within the study area (over 1 million acres within Fort Bliss).

Temporary indirect impacts would consist of possible soil erosion during construction activities; however, these impacts would be negligible to minor with the use of erosion control measures and the short duration of the construction process. Development of the Solar PV sites would

require BMPs following Fort Bliss SWPPP guidance to control temporary fugitive dust and erosion during clearing and construction activities (Army 2011). The use of the BMPs such as the silt fences, water bars, gabions, and re-vegetation of any denuded soils would dramatically reduce potential erosion impacts.

3.14 Traffic and Transportation

3.14.1 Affected Environment

Primary access to the PV panel sites would be achieved through the use of U.S. Highway 54, New Mexico Highway 213, and Loop 375, which are all public-maintained and civilian-used roadways. Secondary access, not only to the proposed sites, but throughout the interior of Fort Bliss, would be achieved through the use of unimproved roads restricted to military or official use with occasional use by civilians for recreational purposes. It should be noted that civilians would have to obtain the proper permits, training, and clearance prior to use of any roads within Fort Bliss' interior.

3.14.2 Environmental Consequences

3.14.2.1 No Action Alternative

No impacts on traffic or transportation would occur, as no construction activities would take place.

3.14.2.2 Proposed Action Alternative

Traffic may become slightly heavier on the main or Fort Bliss access highways as the construction of the PV panels is occurring. However, this is expected to only occur during the delivery of PV panel components and delivery and removal of construction equipment, which, depending on the type and amount of technology used, could range from 6 months to a year. Maintenance and ongoing operations of the PV panels would not impact traffic or transportation within Fort Bliss or the region because passenger transport vehicles would be used, and only periodically. Therefore, the potential impacts on traffic and transportation as a result of the Proposed Action Alternative would be negligible and temporary.

3.15 Water Resources

3.15.1 Affected Environment

3.15.1.1 Groundwater

Fort Bliss is located primarily in the Hueco and Tularosa Basins. The Hueco Bolson is an intermontane basin incised by the Rio Grande Valley. The part of the basin north of the Rio Grande is referred to as the Upper Hueco Bolson. The principal area of recharge to the Bolson is along the eastern edge of the Franklin and Organ Mountains (Army 2010). It is estimated that the total annual recharge of the Hueco Bolson is approximately 8,560 ac-ft/yr (Army 2010). The Doña Ana Range Camp and the IBCT sites are located in the Hueco Bolson.

The Tularosa Basin is a large, closed basin with surface drainages to playas and salt flats in New Mexico. The groundwater in the Tularosa Basin is primarily saline and, except for a few livestock wells, is unsuitable for development. Two freshwater aquifers, however, are found within the Tularosa Basin on Fort Bliss, Soledad Canyon Aquifer in the Organ Mountains and an

livestock wells, is unsuitable for development. Two freshwater aquifers, however, are found within the Tularosa Basin on Fort Bliss, Soledad Canyon Aquifer in the Organ Mountains and an alluvial aquifer at the mouth of Grapevine Canyon in the Sacramento Mountains (Army 2010). The recharge for the Tularosa Basin is mountain-front recharge from storm event runoff in areas adjacent to the Organ and Sacramento Mountains. The annual recharge to the basin from the mountains totals approximately 8,960 ac-ft/yr. The McGregor Range Camp and the Orogrande Range Camp sites are located in the Tularosa Basin.

The water for the Doña Ana Range Camp site would come from two elevated storage tanks, 150,000-gallon and 200,000-gallon capacity, which are filled from two groundwater production wells. Orogrande Range Camp site water would come from the White Sands Missile Range (WSMR) public water system through a Memorandum of Understanding (MOU) with Fort Bliss. The WSMR public water system stores its water in three ground storage tanks with 50,000-, 150,000-, and 200,000-gallon storage capacities. Water used at the McGregor Range Camp site would come from El Paso Water Utilities, and is stored in two 250,000-gallon elevated tanks (USACE 2010). The IBCT site would obtain water from two Fort Bliss well fields, Tobin and Pike. Additionally, Biggs Army Airfield has two wells to help support this function with a combined capacity of 22.9 million gallons per day (Army 2007).

3.15.1.2 Surface Water

No Federally regulated wetlands, floodplains, arroyo-riparian drainages, or playa lakes as defined by the USACE under Section 404 of the Clean Water Act (CWA) of 1972 are located within any of the proposed PV panel sites.

3.15.2 Environmental Consequences

3.15.2.1 No Action Alternative

No construction or installation of PV panels would occur; therefore, no direct impacts on water resources would occur. However, indirect adverse impacts on groundwater would occur through the continued use of non-renewable energy sources (i.e., EPE energy generation), and groundwater within the El Paso region would continue to be used for cooling and other energy generating processes, which would continue to reduce its availability within the region.

3.15.2.2 Proposed Action Alternative

Groundwater would be used for dust suppression during the construction of the PV panel sites. Impacts associated with the use of water for dust suppression would be minimal and temporary, lasting only during construction activities. Water used for washing and cleaning of the PV panels, which is approximately 0.007 ac-ft/yr/MW, would be obtained from the variety of sources described previously. Based on the use of 0.007 ac-ft/yr/MW, washing and cleaning of all of the PV panels to be installed would amount to the usage of approximately 0.2 ac-ft/yr (0.007 ac-ft/yr/MW X 28 MW). Therefore, it is expected that approximately 0.2 ac-ft/yr of groundwater from within the Hueco Bolson and Tularosa Basin would be used for washing and cleaning of the PV panels. The use of 0.2 ac-ft/yr represents approximately less than 0.0001 percent of the annual recharge received between the two groundwater sources. Due to the minimal amount of water needed as a result of the Proposed Action Alternative, any impacts related to groundwater are considered long-term but negligible.

No Federally regulated waters of the U.S. would be impacted, as none are located near any of the PV panel sites. Therefore, no impacts would occur on surface waters. A SWPPP following Fort Bliss SWPPP guidance would be developed outlining the BMPs and other measures to be undertaken to prevent stormwater runoff during and following construction (Army 2011). The stormwater drainage system for any of the PV panel sites would comply with Section 438 of the EISA.

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SECTION 4.0
CUMULATIVE IMPACTS

4.0 CUMULATIVE IMPACTS

Cumulative impacts are defined as the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Although the Proposed Action Alternative is not specifically addressed in the SEIS and GFS EIS, the cumulative impact on the natural and human environment from construction of training facilities and support infrastructure on Doña Ana Range, McGregor Range, and the South Training Areas is covered by these documents. The Proposed Action Alternative will not significantly change that analysis.

The continued development of infrastructure on Fort Bliss and in surrounding areas could have cumulative impacts on nearby non-military land uses. The SEIS and GFS EIS identified several projects that would result in continued development and use of lands on and surrounding Fort Bliss. Development of infrastructure on the Fort Bliss and in surrounding areas would continue to result in increased noise, loss and degradation of soils, vegetative communities and wildlife habitat, increased surface water runoff with accelerated erosion and sedimentation, and could allow for the introduction and expansion of invasive species. Although the construction and operation of the four PV panel sites would contribute to these adverse effects, the cumulative effects of these actions would be minimal. Much of the undeveloped land on Fort Bliss and surrounding areas is already partially degraded as a result of past and current uses (e.g., grazing, urban development, military training activities). Much of the land on Fort Bliss and in surrounding areas is characterized by development associated with the City of El Paso and Fort Bliss Cantonment Area, by undeveloped areas generally associated with mountain ranges, or by degraded vegetation communities.

In general, opportunities for avoiding, minimizing, or mitigating cumulative impacts related to the proposed actions have been incorporated by design or through the management processes to address the direct and indirect impacts identified in the SEIS and GFS EIS. They include such measures as siting and consolidating facilities to reduce the area affected; ensuring land use compatibility in the Real Property Master Plan; energy-efficient facility design; executing a PA for historic properties; implementing projects in the INRMP; promoting a sustainable range and training base through the Integrated Training Area Management program; and maintaining Stormwater Management, Spill Prevention, Control, and Countermeasures, and Pollution Prevention plans. Fort Bliss has an Environmental Management System to monitor environmental compliance and waste reduction metrics and to provide data for adaptive management programs in the future. In addition, an adaptive noise management program would be used to limit the cumulative impacts of noise associated with the Proposed Action.

Cumulative beneficial impacts on Fort Bliss would result from the Proposed Action Alternative, in that a greater portion of future energy use on the Installation would be from renewable energy, reducing the Installation's demand on other energy sources. Air quality benefits would occur by reducing Fort Bliss' indirect (Scope 2) GHGs based on power consumption.

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SECTION 5.0
SUMMARY OF MITIGATION MEASURES

5.0 SUMMARY OF MITIGATION MEASURES

The following is a summary of the mitigation measures identified under the Proposed Action Alternative:

- To minimize impacts on migratory birds, all site preparation would require either a preconstruction survey for bird activity and avoidance of active nests of migratory birds, or that the work be carried out in the fall and winter months to coincide with the non-breeding season for these species.
- To prevent the spread of noxious weeds from construction activities, a noxious weed monitoring and treatment program would be established by the Proponent with guidance from DPW-E biologists. Additionally, construction equipment would be cleaned of all dirt, mud, and plant debris prior to moving onto or off of the project area. Following construction, disturbed areas not used would be graded to match the surrounding topography and the surface left rough to facilitate re-growth of native vegetation.
- If any sub-surface cultural resources are encountered during the construction of the PV panels, they would be properly addressed per the PA. Any discovery of possible human remains would be treated in accordance with the NAGPRA and the SOPs set out in the ICRMP.
- Fuel for the equipment would be transported and stored on-site in designated trucks. Secondary containment for parking and fuel trucks would be utilized. Drip pans would be provided for stationary equipment to capture any POL accidentally spilled during construction and operation activities or leaks from the equipment. The Spill Prevention, Control, and Countermeasures Plan (SPCCP) and Installation Spill Contingency Plan would be followed for any POL spills. Solid waste would be separated into recyclable and non-recyclable, and collected on-site in appropriate containers and disposed of at an approved disposal facility for the type of waste.
- A SWPPP and BMPs following Fort Bliss SWPPP Guidance would be developed and implemented to control storm water runoff, erosion, and temporary fugitive dust.

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SECTION 6.0
ACRONYMS AND ABBREVIATIONS

6.0 ACRONYMS AND ABBREVIATIONS

%	percent
ac-ft	acre-feet
AC	alternating current
APLIC	Avian Power Line Interaction Committee
Army	Department of the Army
BLM	Bureau of Land Management
BMPs	Best Management Practices
CO	carbon monoxide
CO_2	carbon dioxide
C	Celsius
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFC	chlorofluorocarbons
CH^4	methane
CPV	Concentrating Solar Photovoltaic
CWA	Clean Water Act
DC	direct current
DoD	Department of Defense
DOE	Department of Energy
DPTMS	Directorate of Plans, Training, Mobilization and Security
DPW-E	Directorate of Public Works-Environmental Division
DS	Dish Stirling
dB	decibel
EA	Environmental Assessment
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EO	Executive Order
EPAct	Energy Policy Act of 2005
EPE	El Paso Electric
ESA	Endangered Species Act
FNSI	Finding of No Significant Impact
Fort Bliss	Fort Bliss Military Reservation
FY	fiscal year
GC	Garrison Commander
GFS EIS	Growth and Force Structure Realignment EIS
GHG	greenhouse gas
GSRC	Gulf South Research Corporation
HFC	hydrochlorofluorocarbons
IBCT	Infantry Brigade Combat Team
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
kW	kilowatt
LINR	Locally Important Natural Resources
MBTA	Migratory Bird Treaty Act

1	MIL-STD	Military Standard
2	MW	megawatt
3	MWh	megawatt-hour
4	MOU	Memorandum of Understanding
5	N_2O	nitrous oxide
6	NAAQS	National Ambient Air Quality Standards
7	NAGPRA	Native American Graves Protection and Repatriation Act
8	NDAA	National Defense Authority Act of 2007
9	NEPA	National Environmental Policy Act
10	NESC	National Electric Safety Code
11	NHPA	National Historic Preservation Act
12	NOI	Notice of Intent
13	NM	New Mexico
14	NMED	New Mexico Environmental Department
15	NRHP	National Register of Historic Places
16	NPDES	National Pollutant Discharge Elimination System
17	NO_2	nitrogen dioxide
18	NOI	Notice of Intent
19	OSHA	Occupational Safety and Health Administration
20	POL	petroleum, oils, and lubricants
21	PCS	Power Conditioning System
22	PA	Programmatic Agreement
23	PL	Public Law
24	PM-10	particulate matter measuring less than 10 microns
25	PM-2.5	particulate matter measuring less than 2.5 microns
26	PV	photovoltaic
27	ROD	Record of Decision
28	ROI	Region of Influence
29	SEIS	Supplemental Environmental Impact Statement
30	SHPO	State Historic Preservation Officer
31	SOPs	Standard Operating Procedures
32	SPCCP	Spill Prevention, Control, and Countermeasures Plan
33	SUA	Special Use Airspace
34	SWPPP	Stormwater Pollution Prevention Plan
35	SO^2	sulphur dioxide
36	TCEQ	Texas Council on Environmental Quality
37	UXO	unexploded ordnance
38	USC	United States Code
39	USACE	U.S. Army Corps of Engineers
40	USDA	U.S. Department of Agriculture
41	USEPA	U.S. Environmental Protection Agency
42	USFWS	U.S. Fish and Wildlife Service
43	VEC	Valued Environmental Components
44	WTE	Waste to Energy
45	WSMR	White Sands Missile Range
46	yr	year

SECTION 7.0
REFERENCES

7.0 REFERENCES

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SECTION 8.0
LIST OF PREPARERS

8.0 LIST OF PREPARERS

The following people were primarily responsible for preparing this Environmental Assessment.

Name	Agency/Organization	Discipline/ Expertise	Experience	Role in Preparing EA
Eric Webb, Ph.D	Gulf South Research Corporation	Oceanography/Coastal Sciences	20 years natural resources and NEPA Studies	EA review and comment; Meetings and coordination
Chris Ingram	Gulf South Research Corporation	Biology/Ecology	34 years EA/EIS Studies	EA Review
Josh McEnany	Gulf South Research Corporation	Forestry/Natural Resources Management	11 years Natural Resources and NEPA studies	Project Manager and EA Preparation
David Gates	Gulf South Research Corporation	Natural Resources	1 year natural resources	Soils, Groundwater, Surface Water
Steve Kolian	Gulf South Research Corporation	Environmental Science	14 years natural resources	Noise, Air Quality
Chris Cothron	Gulf South Research Corporation	GIS/Graphics	2 years GIS/graphics experience	GIS analysis and graphics
Mark Walker	Gulf South Research Corporation	Forestry/Natural Resource Management	30 years natural resources and NEPA studies	EA review and comment
John Barrera	Fort Bliss Directorate of Public Works Environmental Division	NEPA Program Manager	20 years NEPA studies	Fort Bliss Project Manager; EA review and comment
John Kipp	Fort Bliss Environmental Division, NEPA Planner	Soil science, Geomorphology	25 years earth science and NEPA studies	Fort Bliss Project Manager; EA review and comment

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APPENDIX A
INTERAGENCY AND PUBLIC COORDINATION

Libraries

El Paso Main Library
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Alamogordo, NM 88310

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City of El Paso
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El Paso, Texas 79901-1196

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100 N. Stanton
El Paso, TX 79960

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY GARRISON COMMAND
ENVIRONMENTAL DIVISION, CONSERVATION BRANCH
IMWE-BLS-PWE
FORT BLISS, TEXAS 79916-6816

March 9, 2012

94085

REPLY TO
ATTENTION OF:

IMWE-BLS-PWE

RECEIVED
MAR 12 2012
HISTORIC PRESERVATION DIVISION

Ms. Jan V. Biella, RPA
Interim State Historic Preservation Officer
State of New Mexico Office of Cultural Affairs
Historic Preservation Division
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe, NM 87501

Dear Ms. Biella:

Please find enclosed a copy of the final report entitled "National Register of Historic Places (NRHP) Evaluation of Three Sites for the Solar Energy Footprint at McGregor Range, Fort Bliss, Otero County, New Mexico" as well as the LA forms and NIAF form for Fort Bliss project 1215. The NMCRIS activity number for this project is 122909.

Fort Bliss DPW-E conducted an in-house evaluation of three previously recorded archaeological sites in a proposed Renewable Solar Energy footprint just outside of the McGregor Base Camp. These sites had been previously recorded and evaluated as part of Fort Bliss project 9701 and were recommend ineligible for inclusion in the NRHP. However, these sites were never submitted for consultation with the SHPO. Fort Bliss reevaluated these sites during this project. As a result of this project LA 95824 (FB 4869), LA 95826 (FB 4871), and LA 95827 (FB 4872) do not meet the eligibility thresholds established in the Fort Bliss Significance and Research Standards and accordingly are still recommended ineligible for conclusion in the NRHP.

Fort Bliss seeks your concurrence on our determination of eligibility for these sites. If you have any questions, concerns etc., please do not hesitate to contact Senior Archaeologist Brian Knight at (915) 568-6746 or email at brian.d.knight.civ@mail.mil.

Sincerely,

Brian Knight, RPA
Chief, Conservation Branch

Enclosures

Concur with recommendations as proposed.

for NM State Historic Preservation Officer 5-April-2012

APPENDIX B
AIR QUALITY CALCULATIONS

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	1	300	8	130	312000
Diesel Road Compactors	1	100	8	15	12000
Diesel Dump Truck	1	300	8	15	36000
Diesel Excavator	1	300	8	15	36000
Diesel Hole Trenchers	1	175	8	60	84000
Diesel Bore/Drill Rigs	1	300	8	60	144000
Diesel Cement & Mortar Mixers	1	300	8	60	144000
Diesel Cranes	1	175	8	130	182000
Diesel Graders	3	300	8	15	108000
Diesel Tractors/Loaders/Backhoes	1	100	8	90	72000
Diesel Bulldozers	1	300	8	15	36000
Diesel Front-End Loaders	1	300	8	30	72000
Diesel Forklifts	2	100	8	130	208000
Diesel Generator Set	2	40	8	130	83200

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bulldozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front-End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Forklifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.151	0.712	1.888	0.141	0.138	0.254	184.290
Diesel Road Paver	0.005	0.020	0.065	0.004	0.004	0.010	7.091
Diesel Dump Truck	0.017	0.082	0.218	0.016	0.016	0.029	21.264
Diesel Excavator	0.013	0.052	0.182	0.013	0.012	0.029	21.276
Diesel Hole Cleaners\Trenchers	0.047	0.226	0.538	0.043	0.041	0.069	49.598
Diesel Bore/Drill Rigs	0.095	0.363	1.135	0.079	0.078	0.116	84.057
Diesel Cement & Mortar Mixers	0.097	0.368	1.155	0.076	0.075	0.116	84.057
Diesel Cranes	0.088	0.261	1.147	0.068	0.066	0.146	106.339
Diesel Graders	0.042	0.162	0.563	0.039	0.038	0.088	63.828
Diesel Tractors/Loaders/Backhoes	0.147	0.651	0.573	0.109	0.106	0.075	54.835
Diesel Bulldozers	0.014	0.055	0.189	0.013	0.013	0.029	21.276
Diesel Front-End Loaders	0.030	0.123	0.397	0.028	0.027	0.059	42.544
Diesel Aerial Lifts	0.454	1.779	1.962	0.319	0.309	0.218	158.342
Diesel Generator Set	0.111	0.345	0.547	0.067	0.065	0.074	53.847
Total Emissions	**1.312**	**5.198**	**10.558**	**1.015**	**0.987**	**1.313**	**952.645**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION

Assumptions for Combustion Emissions									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	160	20	20	0.29	0.34	0.63
CO	12.4	15.7	60	160	20	20	2.62	3.32	5.95
NOx	0.95	1.22	60	160	20	20	0.20	0.26	0.46
PM-10	0.0052	0.0065	60	160	20	20	0.00	0.00	0.00
PM 2.5	0.0049	0.006	60	160	20	20	0.00	0.00	0.00
CO2	369	511	60	160	20	20	78.07	108.12	186.19

Heavy Duty Trucks Delivery Supply Trucks to Construction Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	160	2	2	0.01	0.01	0.02
CO	1.32	3.21	60	160	2	2	0.03	0.07	0.10
NOx	4.97	12.6	60	160	2	2	0.11	0.27	0.37
PM-10	0.12	0.33	60	160	2	2	0.00	0.01	0.01
PM 2.5	0.13	0.36	60	160	2	2	0.00	0.01	0.01
CO2	536	536	60	160	2	2	11.34	11.34	22.68
Daily Commute New Staff Associated with Proposed Action									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of Cars	Number of trucks	Total Emissions cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	240	2	2	0.04	0.05	0.09
CO	12.4	15.7	60	240	2	2	0.39	0.50	0.89
NOx	0.95	1.22	60	240	2	2	0.03	0.04	0.07
PM-10	0.0052	0.0065	60	240	2	2	0.00	0.00	0.00
PM 2.5	0.0049	0.006	60	240	2	2	0.00	0.00	0.00
CO2	369	511	60	240	2	2	11.71	16.22	27.93

Truck Emission Factor Source: MOBILE6.2 USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway.

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION

Conversion factor:	gms to tons
	0.000001102

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html

CARBON EQUIVALENTS

Construction Commuters	Conversion	Emissions CO2 tons/yr	Total CO2
VOCs	25	15.71	
NOx	311	0.46	
Total		16.17	202.36

Delivery Trucks	Conversion	Emissions CO2 tons/yr	Total CO2
VOCs	25	0.44	
NOx	311	115.62	
Total		116.06	138.74

Daily Commute New Staff	Conversion	Emissions CO2 tons/yr	Total CO2
VOCs	25	2.36	
NOx	311	21.42	
Total		23.78	51.70

CALCULATION SHEET-FUGITIVE DUST-CONSTRUCTION

Assumptions for Combustion Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006

PM2.5 Emissions

PM2.5 Multiplier	0.10	(10% of PM10 emissions assumed to be PM2.5)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM10 and PM2.5 emissions)	EPA 2001; EPA 2006

Project Assumptions

Construction Area (0.19 ton PM10/acre-month)

			Conversion Factors	
Duration of Soil Disturbance in Proje	6	months	0.000022957	acres per feet
Length	0	miles	5280	feet per mile
Length (converted)	0	feet		
Width	0	feet		
Area	80.00	acres		

Staging Areas

Duration of Construction Project	6	months
Length		miles
Length (converted)		feet
Width		feet
Area	2.00	acres

	Project Emissions (tons/year)			
	PM10 uncontrolled	PM10 controlled	PM2.5 uncontrolled	PM2.5 controlled
Construction Area (0.19 ton PM10/ac	91.20	45.60	9.12	4.56
Staging Areas	0.38	0.19	0.04	0.02
Total	**91.58**	**45.79**	**9.16**	**4.58**

References:

USEPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

USEPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.*Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Assumptions for Combustion Emissions

General Construction Activities Emission Factor

0.19 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM10/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM10/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions from Construction Operations, calculated the 0.19 ton PM10/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM10/acre-month) and 75% of the average emission factor (0.11 ton PM10/acre-month).

The 0.19 ton PM10/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM10/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District and the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM10/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM2.5 Multiplier **0.10**

PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM10 and PM2.5 **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas. Wetting controls will be applied during project construction (EPA 2006).

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

PM-10 EMISSION CALCULATIONS FOR UNPAVED ROADS

Assumptions for Combustion Emissions

Unpaved Surfaces at Industrial Sites

Source: AP-42, 13.2.2 Unpaved Surfaces
Equation: $E = k\ (s/12)^a * (W/3)^b$

Units	PM-2.5	PM-10	Case Scenario
lb/VMT	0.02	0.23	Low
lb/VMT	0.32	3.15	High

VMT=Vehicle Miles Traveled

Unpaved Surfaces at Public Roads Dominated by Light Duty Vehicles

Equation: $E = \frac{k\ (s/12)^a * (S/30)^d}{(M/0.5)^c}$

Units	PM-2.5	PM-10	Case Scenario	Average PM-2.5	Average PM-10
lb/VMT	0.45	4.50	Low	0.2	6.3
lb/VMT	0.02	8.02	High		

Calculation:

	Assumptions					
Miles of travel per day in project area	PM-2.5/lbs/day	PM-10/lbs/day	PM-2.5/tons/year	PM-10/tons/year	Dust Control Efficiency (%)	**PM-10 tons/year (controled)**
20	5	125	0.9	22.8	71%	**6.63**

PM-10 EMISSION CALCULATIONS FOR UNPAVED ROADS

k=	Industrial Roads			Public Roads		
	PM-2.5	PM-10	PM-30	PM-2.5	PM-10	PM-30
	0.15	1.5	4.9	0.18	1.8	6

Source: 13.2.2-2

a=	Industrial Roads			Public Roads		
	PM-2.5	PM-10	PM-30	PM-2.5	PM-10	PM-30
	0.9	0.9	0.7	1	1	1

Source: 13.2.2-2

b=	Industrial Roads			Public Roads		
	PM-2.5	PM-10	PM-30	PM-2.5	PM-10	PM-30
	0.45	0.45	0.45			

Source: 13.2.2-2

c=	Industrial Roads			Public Roads		
	PM-2.5	PM-10	PM-30	PM-2.5	PM-10	PM-30
				0.2	0.2	0.3

Source: 13.2.2-2

d=	Industrial Roads			Public Roads		
	PM-2.5	PM-10	PM-30	PM-2.5	PM-10	PM-30
				0.5	0.5	0.3

Source: 13.2.2-2

E= size-specific emission factor (lb/VMT)

PM-10 EMISSION CALCULATIONS FOR UNPAVED ROADS

s= surface material silt content (%)			Industrial Roads		Public Roads	
			Low	High	Low	High
Source Table 13.2.2.-3			1.8	25.2	1.8	35

W= mean vehicle weight (tons)			Industrial Roads		Public Roads	
			Low	High	Low	High
Source Table 13.2.2.-3			2	290	1.5	3

M= surface material moisture content (%)			Industrial Roads		Public Roads	
			Low	High	Low	High
Source Table 13.2.2.-3			0.03	13	0.03	13

S = mean vehicle speed (mph)			Industrial Roads		Public Roads	
			Low	High	Low	High
Source Table 13.2.2.-3			5	43	10	55

C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (lb/VMT)	PM -2.5	PM-10
	0.00036	0.00047

Control Efficiency of Dust Suppressants

Application (gal/square yard)	Average Control Efficency %
0.073	62%
0.11	68%
0.15	74%
0.18	80%
Median	71%

Source; AP 42 Table 13.2-2-5

CALCULATION SHEET-SUMMARY OF EMISSIONS

Assumptions for Combustion Emissions									
Emission Source	VOC	CO	NOx	PM-10	PM-2.5	SO2	CO2	CO2 Equivalents	Total CO2
Combustion Emissions	1.31	5.20	10.56	1.02	0.99	1.31	952.64	3316.48	4269.12
Construction Site-Fugitive PM-10	NA	NA	NA	45.79	4.58	NA	NA	NA	NA
Construction Workers Commuter & Trucking	0.65	6.04	0.83	0.01	0.01	NA	186.19	274.56	460.76
Total emissions-CONSTRUCTION	**1.96**	**11.24**	**11.39**	**46.82**	**5.58**	**1.31**	**1139**	**3591**	**4730**
Ongoing emissions from commuters	**0.09**	**0.89**	**0.07**	**0.00**	**0.00**	**NA**	27.93	70.38	98.31
Emissions from Unpaved Roads	NA	NA	NA	**6.63**	**0.86**	NA	NA	NA	NA
Total Operational Emissions	**0.09**	**0.89**	**0.07**	**6.63**	**0.86**	**0.00**	**27.93**	**70.38**	**98.31**
De minimis Threshold (1)	100	100	100	70	100	100	NA	NA	25,000

1. Note that Dona Ana and El Paso County is a moderate non-attainment area for PM-10 and El Paso County is a maintenance area for CO (USEPA 2010b).

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html