Draft Environmental Impact Statement for the

IMPLEMENTATION OF ENERGY, WATER, AND SOLID WASTE SUSTAINABILITY INITIATIVES

at Fort Bliss, Texas & New Mexico

April 2013

Photo Credit: US Army

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DRAFT
ENVIRONMENTAL IMPACT STATEMENT

Implementation of Energy, Water, and Solid Waste Sustainability Initiatives

Fort Bliss, Texas and New Mexico

April 2013

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IMPLEMENTATION OF ENERGY, WATER, AND SOLID WASTE SUSTAINABILITY INITIATIVES AT FORT BLISS, TEXAS AND NEW MEXICO

DRAFT ENVIRONMENTAL IMPACT STATEMENT

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DRAFT ENVIRONMENTAL IMPACT STATEMENT

Lead Agency: Department of the Army

Cooperating Agency: U.S. Air Force (Holloman Air Force Base)

Title to Proposed Action: Implementation of Energy, Water, and Solid Waste Sustainability Initiatives at Fort Bliss, Texas and New Mexico, Draft Environmental Impact Statement

Affected Jurisdictions: El Paso County, Texas, and Doña Ana County and Otero Counties, New Mexico

Review and Comment: Written comments should be forwarded to: Mr. John Kipp, Attn: FB Net Zero EIS, IMBL-PWE; Building 624, South Taylor Road, Fort Bliss, TX 79916-6812, and electronic comments should be submitted on the project website at: http://ftblissnetzeroeis.net/index.html or to: john.m.kipp6.civ@mail.mil. The document is available online at: http://ftblissnetzeroeis.net/index.html or https://www.bliss.army.mil/DPW/Environmental/EISDocuments2.html.

Document Designation: Draft Environmental Impact Statement

Abstract:

This environmental impact statement (EIS) for the implementation of energy, water, and solid waste sustainability initiatives at Fort Bliss evaluates the Proposed Action for meeting the Army's Net Zero goals, which include the implementation of conservation policies and procedures, as well as the construction of new facilities to reclaim water and generate renewable energy. The Army's Proposed Action would support Fort Bliss' goal of becoming a Net Zero installation for energy, water, and solid waste and also would facilitate compliance with various laws and executive orders regarding energy conservation and greenhouse gas emission reductions. The Proposed Action is needed to increase Fort Bliss' energy and water security and to meet legislative requirements, executive orders, and policy requiring increased energy, water, and waste efficiency. The development of Net Zero plans would also guide the installation's sustainability efforts for many years to come, as the installation plans for increased energy efficiency, reduced energy and water use, and greater efficiency in processing and reuse of solid waste. Seven alternatives were evaluated in this EIS including the No Action Alternative. The action alternatives include Alternative 2, implementation of conservation[1] policies and procedures; Alternative 3, construction of a water reclamation pipeline; Alternative 4, construction and operation of a waste-to-energy plant; Alternative 5, construction and operation of a geothermal energy facility; Alternative 6,

[1] In the context of this document, conservation refers to reduced energy and water use and greater levels of waste stream reduction and repurposing.

construction of dry-cooled concentrating solar power technology, and Alternative 7, the implementation of other renewable energy technologies and projects that are compatible with installation planning criteria. Actions discussed as part of Alternative 2 that implement conservation policy and procedures would be implemented at Fort Bliss as part of all action alternatives. This EIS evaluates the potential environmental impacts associated with implementation of each alternative. It also evaluates the action's cumulative impacts in combination with other past, present, and reasonably foreseeable future actions. Mitigation measures are described to minimize adverse impacts.

EXECUTIVE SUMMARY

INTRODUCTION

Fort Bliss has prepared this draft environmental impact statement (EIS) to examine the potential environmental effects of implementing Net Zero initiatives for energy, water, and waste resources in accordance with the National Environmental Policy Act of 1969 (NEPA), the regulations of the President's Council on Environmental Quality, and the United States (U.S.) Department of the Army (Army) Regulation 200-1 and 32 Code of Federal Regulations §651, *Environmental Analysis of Army Actions*. The Army has prepared a Final Programmatic Environmental Assessment to broadly evaluate the implementation of Net Zero.

On 19 April 2011, the Army approved the Fort Bliss proposal to begin planning Net Zero implementation. As part of the approved proposal, Fort Bliss would plan to implement Army Net Zero goals by 2020. These initiatives are designed to increase installation sustainability at Fort Bliss and foster regional coordination to conserve energy and water, while reducing waste production. Implementation of these sustainability initiatives would require considerable changes in installation policy, tenant operations, individual behavior, and new infrastructure.

PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to fully implement the Army's Net Zero energy, water, and waste goals to ensure that the installation's critical missions can be sustained into the future. The Army's goal is to implement the Net Zero Program at Fort Bliss by 2020. By implementing Net Zero at Fort Bliss, the installation would exceed federal energy, water, and waste mandates, while achieving enhanced security, increased efficiency, and reduced operating costs, all while improving installation sustainability. In achieving Net Zero goals, the Army intends to promote progress toward realizing the following objectives:

- Comply with mid-to long-term government mandates and goals regarding renewable energy use and greenhouse gas (GHG) emission reduction
- Enhance the energy security of Fort Bliss to support critical operations
- Integrate renewable energy development activities with natural and cultural resource management requirements
- Better position the installation for compliance with long-term renewable energy and GHG-emission reduction mandates
- Reduce land required for landfills and increase waste stream efficiency

- Preserve water resources to support an enduring mission at Fort Bliss and demonstrate commitment to the local community by conserving such resources

The Army faces significant near- and long-term threats (e.g., natural disasters, climate change, and sabotage) that can affect its access to energy and water resources in the quantity, quality, and cost needed to carry out its national defense mission. The Proposed Action for Net Zero would allow Fort Bliss to meet its needs to:

- Better insulate itself from potential disruptions to its energy supply due to vulnerable energy infrastructure and logistical mechanisms that add risk to its missions
- Be better prepared to address both short- and long-term variations in water supply and quality (due to drought conditions and increased water usage by the community) and reduce reliance on water infrastructure susceptible to disruptions and logistical mechanisms that add risk to its missions
- Preserve raw materials for future use and minimize solid waste generation
- Reduce operating costs to help maintain mission operations during periods of constrained fiscal resources, access to natural resources, or uncertain future constraints
- Reduce the demand for services provided by off-installation service providers (e.g., utility companies) to extend Fort Bliss' ability to continue operations during potential service interruptions

The Army currently derives less than 2.1 percent of its energy from renewable energy sources, and it must more than triple this amount of electricity derived from renewable sources in 2013 to meet the requirements of the Energy Policy Act of 2005 (EPAct 2005). As an installation, Fort Bliss currently derives less than 5 percent of its energy from renewable sources.

With regard to water usage, Fort Bliss is in an area of Texas and New Mexico that has experienced extreme drought in recent years. A continuation of current policies and practices for water usage at Fort Bliss would not contribute to ensuring the sustainability of the water resource in the region.

Currently, Fort Bliss recycles or reuses approximately 25 percent of its solid waste stream and disposes of the remainder in landfills. While the amount of waste recycled or diverted has more than tripled in the last 3 years (from 8 percent in 2009), Fort Bliss recognizes that much of the waste currently going to landfill can be reduced, re-purposed, recycled, and re-used to increase efficiency of operations. The sanitary landfill on Fort Bliss land currently receives small amounts of waste but the large majority is conveyed off-site, primarily to the Greater El Paso Landfill in Clint, Texas.

Net Zero

Fort Bliss' vision is to appropriately manage the installation operations, material, and natural and cultural resources with a goal of achieving Net Zero status. Currently, the Army faces significant threats to its energy and water supply requirements, both home and abroad. Addressing energy security and sustainability is operationally necessary, financially prudent, and essential to mission accomplishment. The goal is to manage Fort Bliss' energy and water resources on a Net Zero basis, including reducing and repurposing solid waste. In doing so, Fort Bliss would improve the installation's long-term sustainability through anticipated cost reductions, while improving mission capability, quality of life, relationships with local communities, and the preservation of options for the Army's future. Fort Bliss recognizes the need to improve efficiencies in energy, water, and waste management for the benefit of current and future missions and has initiated planning efforts to implement "Net Zero" sustainability goals.

The Army Net Zero approach comprises five interrelated steps: reduction, re-purpose, recycling and composting, energy recovery, and disposal.

- Reduction includes maximizing energy efficiency in existing facilities, implementing water conservation practices, and eliminating generation of unnecessary waste.
- Re-purposing involves diverting energy, water, or waste to a secondary purpose with limited processes.
- Recycling or composting involves management of the solid waste stream, development of closed loop systems to reclaim water, or cogeneration where two forms of energy (heat and electricity) are created from one source.
- Energy recovery can occur from converting unusable waste to energy, renewable energy, or geothermal water sources.
- Disposal is the final step and last resort after the last drop of water, the last bit of thermal energy and all other waste mitigation strategies have been fully exercised (U.S. Army 2010a).

Energy and Water Security

Energy and water security are concepts that are increasingly viewed as essential to ensuring and protecting the long-term viability of installation operations. Safe and reliable access to energy and water are critical to virtually all activities on Army installations. The Army has increasingly recognized the threats to its installations and operations posed by the increasing costs of centrally distributed, over-burdened, utility-provided energy grids, as well as the vulnerabilities posed by potential disruption of energy and water to installations. Many of these challenges were directly addressed by the 2010 Quadrennial Defense Review, which cited the need for Department of Defense (DoD) installations to "assure access to reliable supplies of energy and water to meet operational needs" (DoD 2010). The

current state of dependence on fossil fuels and a vulnerable electric transmission and distribution grid and public water supplies jeopardizes the security of the installation and its critical training and operational missions. Increasing installation energy and water security to protect future operations is a central tenet of the Net Zero concept and of *The US Army Energy Strategy for Installations*, signed 8 July 2005, which states the importance of integrating Army energy and water use improvements with a broad focus on sustainability.

Legislative Requirements, Executive Orders and Policy Requiring Increasing Energy, Water, and Waste Efficiency

In addition to increasing installation efficiency, reducing resource consumption, and improving energy security, the Army and Fort Bliss must meet the requirements of numerous federal statutes, executive orders, and mandates that require changes in our nation's energy consumption and production and reduction in greenhouse gas (GHG) emissions. The Army and Fort Bliss must strive to attain the energy targets outlined in EPAct 2005, which requires that in fiscal years (FY) 2010–2012, 5.0 percent of the total electricity consumed by the federal government shall come from renewable energy sources. The required percentage of electricity consumed from renewable sources rises to at least 7.5 percent in FY 2013. Under Executive Order 13423, at least 50 percent of the renewable energy used must come from "new renewable sources" placed in service after 1 January 1999. In addition, Executive Order 13423 requires federal agencies to reduce GHG emissions through reduction of energy intensity by 3 percent annually through FY 2015 or by 30 percent by 2015. Along with these requirements, the National Defense Authorization Act of 2007 requires that the DoD produce or procure not less than 25 percent of the total quantity of electric energy it consumes within its facilities and in its activities during FY 2025 and each fiscal year thereafter from renewable energy sources. Numerous other statutes and requirements also create a framework that increases the need for the Army to take action.

PROPOSED ACTION

The Army's Proposed Action is to implement Net Zero energy, water, and waste goals by 2020 at Fort Bliss, Texas, while meeting energy mandates for renewable energy production and GHG emissions reduction. In doing so, the Army will increase Fort Bliss' energy and water security and ensure the future military mission for generations to come. The Proposed Action consists of multiple, related, and interconnected proposed projects to implement Net Zero goals, comply with federal and Army energy mandates, and meet the Army's energy and water security objectives. Figure ES-1 shows potential project areas.

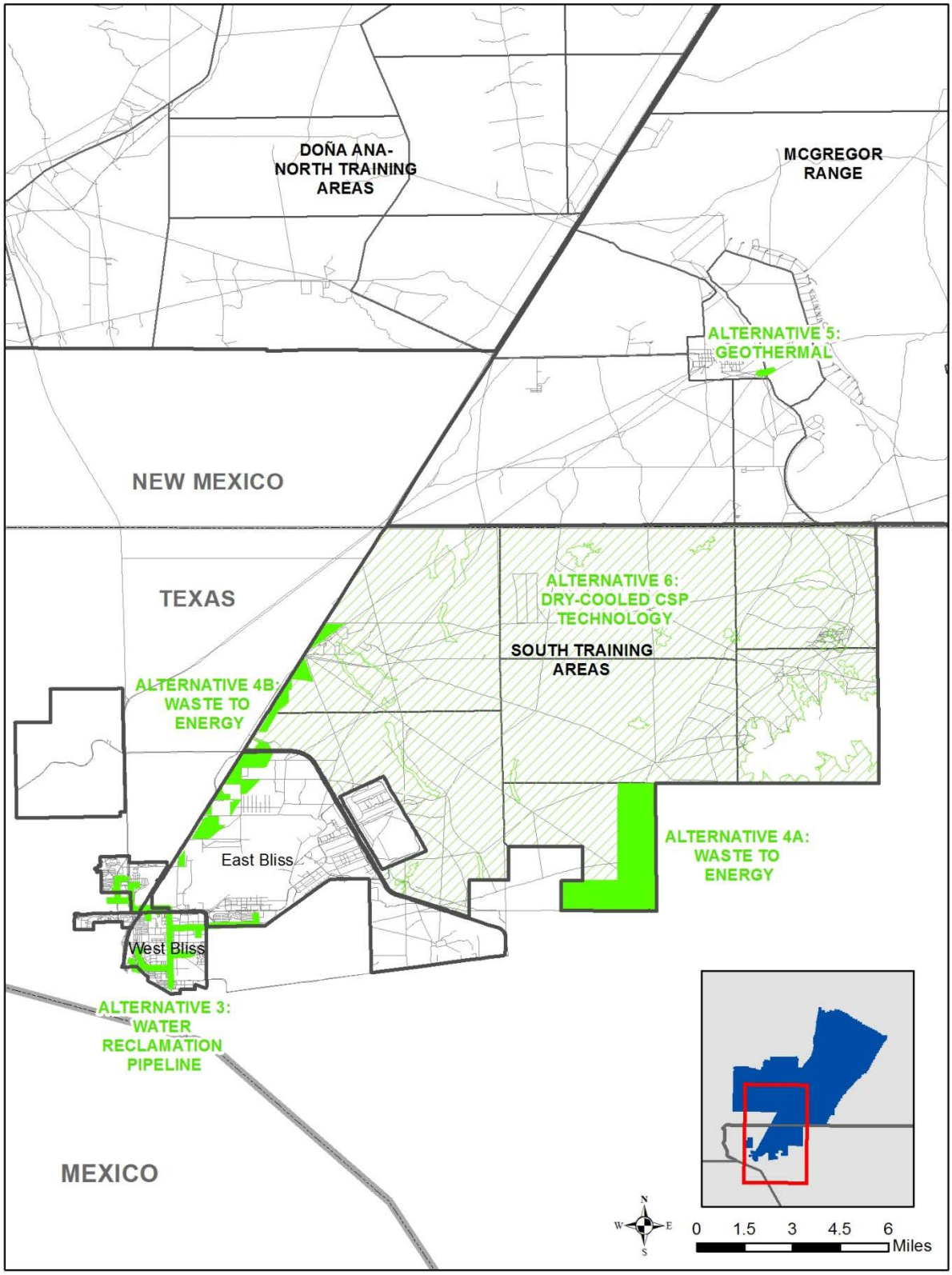

Figure ES-1. Proposed Fort Bliss Net Zero Project Locations

Proposed Energy Actions

The following Proposed Actions have been identified as potential energy actions for implementation at Fort Bliss:

- Reduction through behavior change, followed by maximizing energy efficiency and conservation
- Cogeneration, heat energy recovery, energy storage, and re-use
- Renewable/alternative energy infrastructure development (including construction, electrical tie-in, and facility operation and maintenance)

Proposed Water Actions

The following Proposed Actions have been identified as potential actions for implementation at Fort Bliss for Net Zero water:

- Reduction through behavior change, followed by maximizing water efficiency and conservation:
- Implementation of water repurpose/recycle/recovery measures:

Proposed Waste Actions

Fort Bliss' Proposed Action for Net Zero waste would be to:

- Assess baseline conditions
- Expand or augment existing installation policies to reduce consumption and demand where possible
- Reduce through modification of purchasing practices by:
- Implement re-purposing actions to divert waste to a secondary purpose with limited processes
- Divert waste by recycling and composting to increase solid waste diversion rates through more aggressive recycling and/or composting
- Recover energy from waste that cannot be cost-effectively avoided, re-purposed, recycled, or composted through use as feedstock in a waste-to-energy (WTE) plant

ALTERNATIVES

Fort Bliss conducted a rigorous screening process to determine which technologies and installation sites are available to support implementation of the Net Zero initiative. In order to be considered a viable alternative and carried forward for analysis, the alternative must meet the following screening criteria:

- Mission compatibility
- Electrical tie-in potential (renewable energy)
- Energy/water projects located on-installation or directly adjacent to provide enhanced energy and water security
- Geophysical factors
- Cultural and environmental factors
- Safety and unexploded ordnance
- Water use intensity

Seven alternatives were carried forward for analysis in this EIS. These alternatives include the No Action Alternative and six action alternatives. A more detailed discussion of each screening criteria and how it was applied can be found in section 2.2 of the Draft EIS.

Alternative 1 – No Action

Under the No Action Alternative, Fort Bliss would not pursue additional Net Zero initiatives to accelerate reduction of energy, water, and waste consumption beyond those policies and procedures that are currently in place. The increasing costs of centralized utility-provided energy and the potential disruption of installation energy and water supplies would continue to be threats to the Army and installation operations. The failure to implement Net Zero initiatives would make it less likely that federal mandates, goals, and policies pertaining to renewable energy production, energy use, water conservation, and waste reduction would be met. This alternative would hinder Fort Bliss' energy, water, and waste programs to meet future demands and would not provide the Army with needed information to assist other installations in improving their respective programs.

Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement policies, procedures, best management practices, and actions described under the Proposed Action with the exception of the construction of large-scale, renewable energy projects or the water reclamation pipeline. Alternative 2 would also include actions related to Net Zero communities and would include small-scale, renewable energy projects.

Actions discussed as part of Alternative 2 that implement conservation policy and procedures would be implemented as part of all action alternatives.

Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, Fort Bliss would pursue the construction and use of a water reclamation pipeline ("purple pipe") to provide Fort Bliss with reclaimed water for installation secondary uses including landscaping, golf course irrigation, central cooling towers, and central wash facility for cleaning tactical vehicles returning from training in the field (Figure ES-1). The purple pipe would connect to a conduit pipe from the city of El Paso's waste-water treatment plant. Construction of the purple pipe would involve trenching approximately 23.7 miles of pipe.

Alternative 4 – Waste-to-Energy Plant

Under Alternative 4, Fort Bliss would work with the City of El Paso to pursue a land transfer and agreements with a private energy development firm for the construction and operation of a WTE plant located along the installation boundary to reduce landfill waste and provide the installation with a consistent source of electrical power. Under Alternative 4A, the facility would be sited along the border of the South Training Areas (STA), and under Alternative 4B, it would be located adjacent to Railroad Drive (Figure ES-1). Several types of WTE technologies are under consideration and could include but are not limited to mass-burn incineration, gasification, pyrolysis, or anaerobic digestion.

The facility would receive waste from both Fort Bliss and the city of El Paso. Approximately 1,100 tons of municipal solid waste would be transported to the WTE plant each day by 67 to 100 trucks. The WTE plant capacity would be up to 45 megawatts (MW) and would be sited on approximately 30 to 40 acres. The plant would require the construction of approximately 6 miles of new access roads and 14 miles of electric transmission lines. Ash by-products would be disposed of in a suitable non-Army landfill.

Alternative 5 – Geothermal Energy Facility

Under Alternative 5, Fort Bliss would work with private energy development firms to construct and operate a geothermal facility for the production of energy and/or hot water to supply the McGregor Range Camp in New Mexico. Geothermal power plants use steam produced from reservoirs of hot water found a few miles or more below the earth's surface to produce electricity. The steam rotates a turbine that activates a generator, which produces electricity.

The exact geothermal technology that would be used for electricity generation under this alternative has not yet been determined because studies on the geothermal resource are currently ongoing. This alternative would involve the construction of up to a 20-MW facility and associated infrastructure on 0.2 acre to 1.1 acres by Davis Dome in New Mexico (Figure ES-1). As preliminary information has

shown temperatures of approximately 91 degrees Celsius (195 degrees Fahrenheit), concentrating solar thermal technology could be used in association with the geothermal energy facility to maximize generation efficiency by increasing the temperatures of the geothermal resource. Construction of associated infrastructure includes approximately 2 miles of transmission lines production and re-injection wells, pipelines to the power plant from the wells, and parking spaces.

Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Under Alternative 6, Fort Bliss would develop a 50-MW dry-cooled concentrating solar power (CSP) parabolic trough facility on up to 300 acres of land in the STA. CSP is designed to convert the sun's energy to heat and then use that heat to produce electricity. A parabolic trough system is a CSP line-focus system that concentrates solar energy along a line-shaped receiver, typically an oil-filled pipe positioned at the focus of parabolic-shaped reflectors. To produce heat, all CSP technologies use direct normal insolation; that is, sunlight that directly strikes the reflecting/concentrating surface, rather than global sunlight. Thus, for optimal performance, the reflective surfaces of CSP technologies must track the sun (keeping the sun's incident rays perpendicular to the reflecting surface), and reflectors and/or concentrators must exhibit good optical characteristics. Parabolic trough CSP systems typically use a heat-transfer fluid (usually synthetic oil) to transfer the heat generated at the solar collectors to a heat exchanger where steam is produced to drive a conventional steam turbine generator.

Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and Appendix B, *Alternative 7 Environmental Screening Criteria*. Currently, there are no specific alternatives for the siting and development of wind energy resources on Fort Bliss. However, the potential future development of wind resources along with other site and mission compatible renewable energy technologies is included as part of Alternative 7. Additionally, power produced from renewable energy systems can fluctuate over the course of a day and may require the use of combined cycle natural gas turbines for generating a consistent amount of energy flowing into the electrical grid.

The implementation of Alternative 7 would allow the installation to adaptively select future, compatible footprints and best technologies to increase the installation's energy security, reduce GHG emissions, and increase the percentage of energy consumed that is derived from renewable energy sources. The Army would conduct the appropriate level of follow-on NEPA analysis for future development projects identified under this alternative.

ENVIRONMENTAL CONSEQUENCES

This EIS presents the existing environment and the potential environmental consequences that could occur with the implementation of the No Action or action alternatives. Table ES-1 summarizes the environmental impacts associated with each alternative for each resource topic evaluated in this EIS.

Table ES-1. Summary of Environmental Consequences for Alternatives

Resource	Alternative 1: No Action	Alternative 2: Conservation Policies and Procedures	Alternative 3: Water Reclamation Pipeline	Alternative 4: WTE Plant	Alternative 5: Geothermal Energy Facility	Alternative 6: Dry-cooled CSP Technology	Alternative 7: Implement Additional Renewable Energy Development at Compatible Sites	Alternatives Combined
Air Quality	Beneficial impacts from existing policies and programs to reduce GHGs, including planned renewable energy projects. Some reductions in GHG emissions would be realized; however, Fort Bliss would likely not fully meet its GHG reduction mandates.	Beneficial impacts as a result of reduction in energy consumption and corresponding decrease in pollution-emitting equipment.	Less than significant impacts due to construction-related emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Significant but mitigable impacts from WTE plant operational emissions. Less than significant impacts from mobile operational sources. Less than significant impacts from construction-related emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Less than significant impacts from construction and operation emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Less than significant impacts from construction and operation emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Less than significant impacts from construction and operation emissions.	Beneficial impacts as a result of reduction in energy consumption and corresponding decrease in pollution-emitting equipment and from replacement of fossil fuel energy production with renewable energy sources. Significant but mitigable impacts from WTE plant operational emissions. Less than significant impacts from construction and operation of geothermal facility and dry-cooled CSP.
Airspace	No impacts	No impacts	No impacts	Negligible impacts as WTE facility in both 4A and 4B footprints would be located in compliance with all FAA height and distance requirements relating to the proximity of the boiler stacks to Biggs AAF and El Paso International Airport.	Less than significant impacts from CST glare-potential. No impacts from construction and operation of the geothermal energy facility.	Less than significant impacts from CSP glare-potential.	Less than significant impacts if implemented following screening and environmental criteria.	Less than significant impacts from CSP glare-potential.
Biological Resources	No impacts	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from construction-related ground disturbance and noise. Less than significant impact to migratory birds and bats from operation of small-scale wind turbines.	Significant but mitigable impacts to vegetation from irrigation with reclaimed water. Less than significant impacts to wildlife and sensitive species resulting from construction-related ground disturbance and noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Significant but mitigable impacts to vegetation from irrigation with reclaimed water. Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise. Less than significant impact to migratory birds and bats from operation of small-scale wind turbines.
Cultural Resources	No Impacts	Less than significant impacts to cultural resources resulting from potential modifications to historic architectural resources. Section 106 process would be completed prior to implementation of construction.	Significant but mitigable impacts to parade-ground vegetation from irrigation with reclaimed water. Less than significant impacts to cultural resources from the pipeline construction. Section 106 process would be completed prior to construction.	Less than significant impacts to archeological sites from possible disturbance from construction. Section 106 process would be completed prior to construction.	Less than significant impacts to cultural resources, resulting from construction disturbance and dependent on an archaeological survey. Section 106 process would be completed prior to construction.	Less than significant impacts to cultural resources resulting from construction disturbance. Section 106 process would be completed prior to construction.	Less than significant impacts to cultural resources resulting from construction disturbance. Section 106 process would be completed prior to construction.	Similar to that discussed for Alternatives 2 through 7. Significant but mitigable impacts to parade-ground vegetation from irrigation with reclaimed water. Less than significant impacts to cultural resources from construction. Section 106 process would be completed prior to construction.
Energy Demand and Generation	No Impacts. No beneficial impacts would be realized from reduced Fort Bliss energy demand through Net Zero implementation.	Beneficial impacts to energy demand from reduced energy demand resulting from implementation of conservation policies and procedures.	Negligible impacts	Beneficial impacts toward increased energy security as a result of renewable energy generation adjacent to the Installation boundary and its contribution to meet Net Zero energy goals.	Beneficial impacts to energy generation due to increased onsite renewable energy generation. However, implemented alone would not generate enough renewable energy to meet Net Zero energy goals.	Beneficial impacts to energy generation due to increased on-site renewable energy generation. However, implemented alone would not generate enough onsite renewable energy to meet Net Zero energy goals.	Development would be compatible with environmental screening criteria; however, impacts are not fully characterized at this time. Additional NEPA would be completed to fully characterize impacts.	Beneficial impacts to energy generation due to increased renewable energy generation. Would accommodate the existing base and peak load and the 2015 base load but not the 2015 peak load.

Resource	Alternative 1: No Action	Alternative 2: Conservation Policies and Procedures	Alternative 3: Water Reclamation Pipeline	Alternative 4: WTE Plant	Alternative 5: Geothermal Energy Facility	Alternative 6: Dry-cooled CSP Technology	Alternative 7: Implement Additional Renewable Energy Development at Compatible Sites	Alternatives Combined
Geology and Soils	No Impacts	Negligible impacts to soils from ground disturbance.	Less than significant impacts to soils, resulting from construction-related ground disturbance, soil removal, increased erosion potential, and reclaimed water irrigation. No impacts to geologic features.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and no impacts to geologic features.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and less than significant impacts to geologic features from the construction of the wells.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and no impacts to geologic features.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and less than significant impacts to geologic features from construction.	Significant impacts to soils, resulting from combined construction-related ground disturbance and increased erosion potential.
Hazardous Waste, Hazardous Materials, and Safety	No Impacts	Beneficial impacts from the reduction in waste generation.	Less than significant impacts from the potential for minor petroleum leaks from construction equipment.	Less than significant impacts from the potential for leaks and spill of chemicals and petroleum products from the operation of all facilities. Less than significant impacts from handling and disposal of ash.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.
Land Use	No Impacts	Negligible impacts from small changes to land use.	Minor impacts resulting from construction and the small alteration of existing land use.	Less than significant impacts due to alteration of existing land use from construction.	Less than significant impacts due to alteration of existing land use from construction.	Significant impacts from the conversion of training land to developed land. Less than significant impacts due to alteration of existing land use from construction.	Less than significant impacts due to alteration of existing land use from construction.	Significant impacts from the conversion of training land to developed land. Less than significant impacts due to alteration of existing land use from construction.
Noise	No Impacts	Negligible Impacts	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction and operation of the WTE plant.	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction and operation under each alternative.
Socioeconomics and Environmental Justice	No Impacts	Beneficial impacts to economic growth associated with the procurement of goods and services. Potential less than significant impacts to the local economy from increased utility rates	Beneficial impacts to economic growth associated with the procurement of goods and services. Negligible impacts to housing, government and emergency services, and utilities. No impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth associated with the procurement of goods and services and facility operation and to housing. Less than significant impacts to government and emergency services, and utilities. Adverse, but not disproportionate, impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth associated with the procurement of goods and services and to housing. Less than significant impacts to government and emergency services, and utilities. No impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth associated with the procurement of goods and services and to housing. Less than significant impacts to government and emergency services, and utilities. No impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth or housing could occur depending on the scale and type of future renewable energy sources. Less than significant impacts to government and emergency services and utilities are expected and no impacts to environmental justice or protection of children are expected.	Beneficial impacts to economic growth associated with the procurement of goods and services and to housing. Less than significant impacts to government and emergency services, and utilities. Adverse, but not disproportionate, impacts to environmental justice and the protection of children.
Water Resources	No Impacts. No beneficial impacts to water resources and aquifer recharge would be realized from implementation of Net Zero water goals.	Beneficial impacts to surface water and groundwater supply sources from the implementation of conservation policies and procedures.	Beneficial impacts from the reuse of wastewater for secondary purposes. Less than significant impacts to surface and groundwater from construction.	Less than significant impacts to surface and groundwater from construction and water requirements for the operation of the WTE plant. Potential for significant impacts to water resources under Alternative 4B if water supply was primarily from potable water.	Beneficial impacts could occur to water demand from a lower water use generation source due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and potential for contamination of groundwater from facility operation.	Beneficial impacts could occur to water demand from a lower water use generation source due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and water requirements associated with facility operation.	Beneficial impacts could occur to water demand from a lower water use generation source due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and facility operation.	Beneficial impacts could occur to water demand from a lower water use generation sources due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and potential for contamination of groundwater from facility operation.
Transportation and Traffic	No Impacts	No Impacts	Less than significant impacts from construction traffic.	Significant but mitigable impacts from construction traffic. Less than significant impacts from operational employee and truck traffic associated with the WTE plant operation.	Less than significant impacts from construction traffic and no impacts from traffic associated with facility operation.	Less than significant impacts from construction traffic and traffic associated with facility operation.	Less than significant impacts from construction traffic and traffic associated with facility operation.	Significant but mitigable impacts from construction traffic under Alternative 4. Less than significant impacts from construction traffic and traffic associated with facility operation under Alternatives 3, 5, and 6.

Notes: AAF = Army Airfield, CSP = concentrating solar power, CST = concentrating solar thermal, GHG = greenhouse gas, NEPA = National Environmental Policy Act, WTE = waste-to-energy

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1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

Fort Bliss has prepared this draft environmental impact statement (EIS) to examine the potential environmental effects of implementing Net Zero initiatives for energy, water, and waste resources in accordance with the National Environmental Policy Act of 1969 (NEPA), the regulations of the President's Council on Environmental Quality (CEQ), and the United States (U.S.) Department of the Army (Army) Regulation 200-1, and 32 Code of Federal Regulations (CFR) §651, *Environmental Analysis of Army Actions*. The Army has prepared a Final Programmatic Environmental Assessment to broadly evaluate the implementation of Net Zero.[2]

On 19 April 2011, the Army approved the Fort Bliss proposal to begin planning Net Zero implementation. As part of the approved proposal, Fort Bliss would plan to implement Army Net Zero goals by 2020.[3] Implementation of these sustainability initiatives would require considerable changes in installation policy, tenant operations, individual behavior, and new infrastructure. Because of a potential for significant adverse environmental impacts associated with the implementation of the Army's Proposed Action at Fort Bliss, the Army is completing this EIS to fully evaluate and involve the public as it pursues the suite of policy changes and other actions that would make Fort Bliss a Net Zero installation.

The EIS is a public document used to determine and evaluate the potential environmental consequences of proposed projects, identify mitigation measures to lessen or eliminate adverse effects, and examine feasible alternatives to the projects. The intended audience of the EIS is Army decision-makers, interested government agencies and non-government organizations, tribes, and the public. The effects analyses in this report are based on a variety of sources and the best available information at the time of preparation. The information contained in this EIS will be reviewed and considered by the Army prior to the final decision on how to proceed with the implementation of the Proposed Action, if at all.

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[2] See the Army's website at: http://www.army.mil/article/85344/Programmatic_Environmental_Assessment_for_Implementation_of_the_Net_Zero_Program/.

[3] See the Army's website at: http://army-energy.hqda.pentagon.mil/netzero/.

1.2 Study Area

Fort Bliss is a critical, multi-mission, Army installation located on approximately 1.12 million acres in Texas and New Mexico (Figure 1-1). Fort Bliss is the Army's second-largest installation and consists of East Bliss, West Bliss, and the Fort Bliss Training Center (FBTC). East Bliss includes Biggs Army Airfield (Biggs AAF) and the Brigade Combat Team (BCT) and Infantry Brigade Combat Team (IBCT) areas. West Bliss includes the Main Post, William Beaumont Army Medical Center (WBAMC), and Logan Heights. The FBTC has three large geographic segments: the South Training Areas (STA), the Doña Ana Range-North Training Areas (NTA), and McGregor Range. Fort Bliss was first established in 1849. Fort Bliss is currently home to the 1st Armored Division whose primary mission in the twenty-first century has been to support the training of heavy brigades and preparing troops for deployment.

Because of its location within Texas and New Mexico, Fort Bliss falls within the regulatory area of both the Public Utility Commission of Texas and the New Mexico Public Regulation Commission. El Paso Electric Company (EPEC) is the main provider of generation, transmission, and distribution to Fort Bliss and the region. Fort Bliss is located within the Western Interconnection power grid and the area of the Western Electricity Coordinating Council, which is the regional entity responsible for coordinating and promoting bulk electric system reliability in that interconnection.

1.3 Project Background

Fort Bliss' vision is to appropriately manage the installation operations, material, and natural and cultural resources with a goal of achieving Net Zero status (defined later in this section). Currently, the Army faces significant challenges in meeting its energy and water supply requirements, both home and abroad. Addressing energy security and sustainability is operationally necessary, financially prudent, and essential to mission accomplishment. The goal is to manage Fort Bliss' energy and water resources on a Net Zero basis including reducing and repurposing solid wastes. In doing so, Fort Bliss would improve the installation's long-term sustainability through anticipated cost reductions, while improving mission capability, quality of life, relationships with local communities, and the preservation of options for the Army's future. Fort Bliss recognizes the need to improve efficiencies in energy, water, and waste management for the benefit of current and future missions and has initiated planning efforts to implement "Net Zero" sustainability goals as defined by the Army.

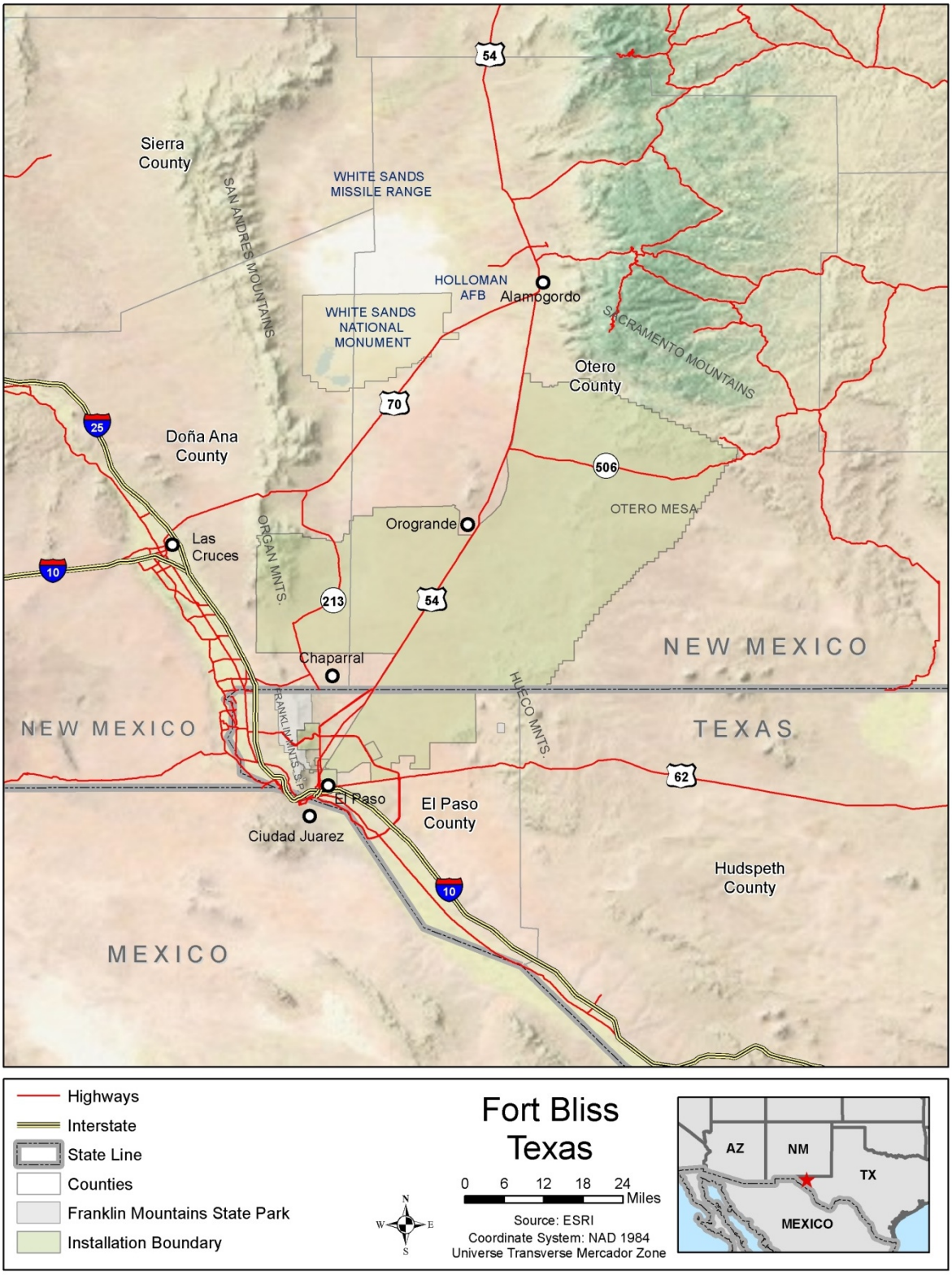

Figure 1-1. Fort Bliss Location

1.3.1 Net Zero Definitions and Approach

The Army defines Net Zero energy, water, and waste as follows:

- Energy – A Net Zero energy installation is an installation that produces as much energy onsite as it uses over the course of a year. To achieve this goal, an installation must first implement aggressive conservation and efficiency efforts, while benchmarking energy consumption to identify further opportunities. The next step is to utilize waste energy or to "re-purpose" energy. Boiler stack exhaust, building exhausts, or other thermal energy streams can all be utilized for a secondary purpose. Co-generation can recover heat from the electricity generation process for increased overall energy efficiency. The balance of energy needs can then be reduced and met by renewable energy project implementation.

- Water – A Net Zero water installation limits the consumption of freshwater resources and returns water back to the same watershed, so as not to deplete the groundwater and surface water resources of that region in quantity or quality over the course of a year. The Net Zero water strategy balances water availability and use to ensure sustainable water supply for years to come. This concept is of increasing importance because scarcity of clean potable water is quickly becoming a serious issue at many military installations and in many countries around the world. The continued draw-down of major aquifers results in substantial problems for future generations. Strategies, such as harvesting rain water and recycling discharge water for reuse, can reduce the need for municipal water, exported sewage, or storm water. Water can be reclaimed for additional appropriate compatible uses before treatment is required. To achieve Net Zero water status at an installation, efforts begin with conservation followed by efficiency in use and improved integrity of distribution systems. Water is re- purposed by utilizing grey water generated from sources such as showers, sinks, and laundries and by capturing precipitation and storm water runoff for onsite use. Wastewater can be treated and reclaimed for other uses or recharged into groundwater aquifers.

- Waste – A Net Zero waste installation is an installation that reduces, reuses, and recovers waste streams, converting them to resource values with zero landfill requirements over the course of a year. The components of Net Zero solid waste start with reducing the amount of waste generated, re-purposing waste, maximizing recycling of waste stream to reclaim recyclable and compostable materials, recovery to generate energy as a by-product of waste reduction, with disposal being non-existent. Every day, more recycling strategies are developed moving beyond metals, paper, and cardboard to include mattresses, glass, plastics, batteries, computer printers, and motor oil. Strategies include reducing the waste stream when purchasing items, reducing the volume of

packaging, reusing as much as possible, and recycling the rest. A true cradle-to-cradle strategy considers the end state at the time the purchase decision is made. A Net Zero waste strategy greatly reduces the need for landfills, protects human health, optimizes use of limited resources, and keeps the environment clean.

The Army Net Zero approach comprises five interrelated steps: reduction, re-purpose, recycling and composting, energy recovery, and disposal (Figure 1-2). Each step is a link towards achieving Net Zero status. Reduction includes maximizing energy efficiency in existing facilities, implementing water conservation practices, and eliminating generation of unnecessary waste. Re-purposing involves diverting energy, water, or waste to a secondary purpose with limited processes. Recycling or composting involves management of the solid waste stream, development of closed loop systems to reclaim water, or cogeneration where two forms of energy (heat and electricity) are created from one source. Energy recovery can occur from converting unusable waste to energy, renewable energy, or geothermal water sources. Disposal is the final step and last resort after the last drop of water, the last bit of thermal energy and all other waste mitigation strategies have been fully exercised (U.S. Army 2010a).

Figure 1-2. The Net Zero Process Hierarchy

The Net Zero vision is a holistic approach to addressing energy, water, and waste at Army installations. The Net Zero vision ensures that sustainable practices will be instilled and managed throughout the appropriate levels of the Army, while also maximizing operational capability, resource availability, and well-being of Soldiers, families, and civilians.

1.3.2 Energy and Water Security

Energy and water security are concepts that are increasingly viewed as essential to ensuring and protecting the long-term viability of installation operations. Safe and reliable access to energy and water are critical to virtually all activities on Army installations. The Army has increasingly recognized the threats to its installations and operations posed by the increasing costs of centrally distributed, over-burdened, utility-provided energy grids, as well as the vulnerabilities posed by potential disruption of military installation energy and water supplies. Many of 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 water to meet operational needs” (DoD

2010). The current state of dependence on fossil fuels and a vulnerable electric power and transmission grid and public water supplies jeopardizes the security of the installation and its critical training and operational missions. Increasing installation energy and water security to protect future operations is a central tenet of the Net Zero concept and of *The US Army Energy Strategy for Installations*, signed 8 July 2005, which states the importance of integrating Army energy and water use improvements with a broad focus on sustainability (Office of Deputy Under Secretary of Defense [ODUSD] 2005a). Implementation of the Net Zero initiative at Fort Bliss would help reduce consumption, conserve resources, and increase efficiencies in resource usage while protecting future operations. The implementation of Net Zero would also help the Army to achieve the five major initiatives of the Energy Strategy for Installations (ODUSD 2005a), which include:

- Eliminating energy waste in existing facilities
- Increasing energy efficiency in renovation and new construction
- Reducing dependence on fossil fuels
- Conserving water resources
- Improving energy security

1.3.3 Legislative Requirements, Executive Orders and Policy Requiring Increasing Energy, Water, and Waste Efficiency

In addition to increasing installation efficiency, reducing resource consumption, and improving energy security, the Army and Fort Bliss must meet the requirements of numerous federal statutes, executive orders, and mandates that require changes in our nation's energy consumption and production and reduction in greenhouse gas (GHG) emissions. The Army and Fort Bliss must strive to attain the energy targets outlined in the Energy Policy Act of 2005 (EPAct 2005), which requires that in fiscal years (FY) 2010–2012, 5.0 percent of the total electricity consumed by the federal government shall come from renewable energy sources. The required percentage of electricity consumed from renewable sources rises to at least 7.5 percent in FY 2013. Under Executive Order 13423, at least 50 percent of the renewable energy used must come from "new renewable sources" placed in service after 1 January 1999. In addition, Executive Order 13423 requires federal agencies to reduce GHG emissions through reduction of energy intensity[4] by 3 percent annually through FY 2015 or by 30 percent by 2015. Along with these requirements, the National Defense Authorization Act of 2007 requires that the DoD produce or procure

[4] Energy intensity means energy consumption per square foot of building space, including industrial or laboratory facilities.

not less than 25 percent of the total quantity of electric energy it consumes within its activities during FY 2025 and each FY thereafter from renewable energy sources. Numerous other statutes and requirements also create a framework that increases the need for the Army to take action. A list of these is included in Table 1-1.

Table 1-1. Summary of Legislation and Executive Orders Affecting Energy, Water Consumption, and Waste Generation

Federal Mandate	Net Zero Area	Performance Target
Energy Policy Act of 2005	Electricity use for federal government from renewable sources	At least 3% of total electricity consumption (FY 2007–2009), 5% (FY 2010–2012), 7.5% (FY 2013+)
Executive Order 13423	Energy use in federal buildings	Reduce 3% per year for 30% total by FY 2015 (FY 2003 baseline)
	Total consumption from renewable sources	At least 50% of required annual renewable energy consumed from “new” renewable sources
	Fleet vehicle alternative fuel use	Increase by 10% annually to reach 100% (FY 2005 baseline)
Energy Independence and Security Act of 2007	Total consumption from renewable sources	25% by FY 2025—“Sense of Congress”
	Hot water in new/renovated federal buildings from solar power	30% by FY 2015 if life-cycle is cost-effective
	Fossil fuel use in new/renovated federal buildings	Reduce 55% by FY 2010; 100% by FY 2030
Executive Order 13514	GHG emission reduction	DoD Goal: Reduce Scope 1 and 2 GHGs by 34% by FY 2020 DoD Goal: Reduce Scope 3 GHG emissions by 13.5% by FY 2020
	Net Zero buildings	All new buildings that enter design in FY 2020 and after achieve Net Zero energy by FY 2030
	Water consumption	Reduce consumption by 2% annually for 26% total by FY 2020 (FY 2007 baseline)
	Waste minimization	Divert at least 50% of solid waste and 50% of construction and demolition waste by FY 2015
National Defense Authorization Act of 2007	Renewable fuels use	Directs the Secretary of Defense to consider renewable fuels in aviation, maritime, and ground transportation fleets.
	Facility renewable energy use	Produce or procure 25% of the total quantity of facility energy needs, including thermal energy, from renewable sources starting in FY 2025

Notes: DoD = Department of Defense, FY = fiscal year, GHG = greenhouse gas

1.4 Purpose and Need for Action

The purpose of the Proposed Action is to fully implement the Army's Net Zero energy, water, and waste goals to ensure that the installation's critical missions can be sustained into the future. The Army's goal is to implement the Net Zero Program at Fort Bliss by 2020. By implementing Net Zero at Fort Bliss, the installation would exceed federal energy, water, and waste mandates, while achieving enhanced security, increased efficiency, and reduced operating cost, all while improving installation sustainability. Implementation of Net Zero at Fort Bliss would ensure a holistic and long-term approach is in place to support an enduring mission at Fort Bliss that, in turn, supports DoD, Army, and other federal government goals and objectives for increasing use of renewable energy, lowering GHG emissions, and reducing the Army's reliance on fossil fuels. In achieving Net Zero goals, the Army intends to promote progress toward realizing the following objectives:

- Comply with mid- to long-term government mandates and goals regarding renewable energy use and GHG-emission reduction
- Enhance the energy security of Fort Bliss to support critical operations
- Integrate renewable energy development activities with natural and cultural resource management requirements
- Better position the installation for compliance with long-term renewable energy and GHG-emission reduction mandates
- Reduce land required for landfills and increase waste stream efficiency
- Preserve water resources to support an enduring mission at Fort Bliss and demonstrate commitment to the local community by conserving such resources

In working toward these objectives, the Army and Fort Bliss would support implementation of goals, strategies, mandates, and directives outlined in the 2010 QDR; Executive Orders 13514 and 13423; EPAct 2005; Energy Independence and Security Act of 2007 (EISA); Office of the Secretary of Defense Policy – DoD Instruction 4170.11 (DoD 2009); DoD Energy Manager's Handbook (ODUSD 2005b); Army Regulation 420-1, *Army Facilities Management* (U.S. Army 2009a); and the *Army Energy and*

Water Campaign Plan (U.S. Army 2007a).[5] These documents highlight and address the need to increase the production and use of power derived from renewable energy sources.

The Army faces significant near-term and long-term threats (e.g., natural disasters, climate change, and sabotage) that can affect its access to energy and water resources in the quantity, quality, and cost needed to carry out its national defense mission. The Proposed Action for Net Zero would allow Fort Bliss to meet its needs to:

- Better insulate itself from potential disruptions to its energy supply due to vulnerable energy infrastructure and logistical mechanisms that add risk to its missions
- Be better prepared to address both short- and long-term variations in water supply and quality (due to, for example, drought conditions and increased water usage by the community) and reduce reliance on water infrastructure susceptible to disruptions and logistical mechanisms that add risk to its missions
- Preserve raw materials for future use and minimize solid waste generation
- Reduce operating costs to help maintain mission operations during periods of constrained fiscal resources, limited access to natural resources, or uncertain future constraints
- Reduce the demand for services provided by off-installation service providers (e.g., utility companies) to extend Fort Bliss' ability to continue operations during potential service interruptions

1.4.1 Need for Net Zero Energy

The Proposed Action is needed because the Army currently derives less than 2.1 percent of its energy from renewable energy sources, and it must more than triple this amount of electricity derived from renewable sources by 2013 to meet the requirements of EPAct 2005. As an installation, Fort Bliss currently derives less than 5 percent of its energy from renewable sources. In addition, Fort Bliss is far from achieving optimal energy performance from its facilities, which can be retro-fitted and enhanced to reduce energy consumption.

Fort Bliss energy use in FY 2011 includes energy use in buildings, facilities, and exterior lighting, as reported in utility bills from EPEC, Amerigas, and other propane suppliers, and Texas Gas Service

[5] See the Army's Energy Program website for access to these documents: http://army-energy.hqda.pentagon.mil/.

Company (Table 1-2). Figure 1-3 illustrates the composition of energy sources at Fort Bliss. All energy use on East and West Bliss and the training areas is included in the baseline. The energy baseline does not include energy use at privatized installation housing.

Table 1-2. Fort Bliss FY 2011 Energy Baseline

Energy Source	Site Energy Use (Variable Units)	Site Energy Use (MMBtu)
El Paso Electric Co.	257,255,000 kWh	877,754
Various suppliers of propane	164,202 gallons	15,681
Texas Gas Service Co.	606,344 kcf	625,141
Total		1,518,576

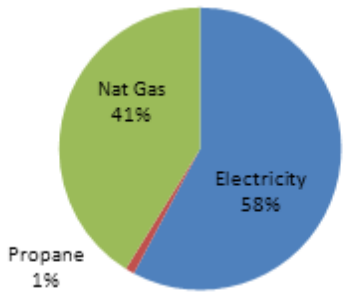

Figure 1-3. Energy Source Composition at Fort Bliss

Note: kcf = thousand cubic feet, kWh = kilowatt-hours, MMBTU = million British thermal unit

Energy use has grown in recent years along with the square footage of buildings at Fort Bliss. The building area grew from approximately 10 million ft^2 in 2005 to 21.8 million ft^2 in 2011 and is expected to increase another 3 million ft^2 by 2020. Figure 1-4 shows the actual and projected energy use as it corresponds to the growing building area from 2010 to 2020. The energy intensity of buildings is expected to decrease largely because of the efficiency of the new buildings constructed between 2008 and 2014, but also because of energy efficiency measures being implemented in older buildings.

To achieve net zero energy by 2020, Fort Bliss planned toward FY 2020 energy use estimates. In Figure 1-4, 3 percent annual growth from the 2011 baseline was assumed for forecasting electrical and thermal (natural gas and propane) consumption. Total building area in thousand square feet was provided by Fort Bliss Directorate of Public Works (DPW) Master Planning's Real Property Planning and Analysis System. The total 2020 electric and thermal delivered energy required is estimated as shown in Table 1-3.

A continuation of current policies and practices for energy usage at Fort Bliss would not lead to replacement of fossil fuel-based energy with renewable energy sources nor would it lead to an enhancement of energy security. In implementing the Net Zero initiatives, Fort Bliss would be an active participant and regional leader in ensuring the sustainability of energy resources not just for the installation but also for the surrounding community while improving energy security for the installation's critical mission activities.

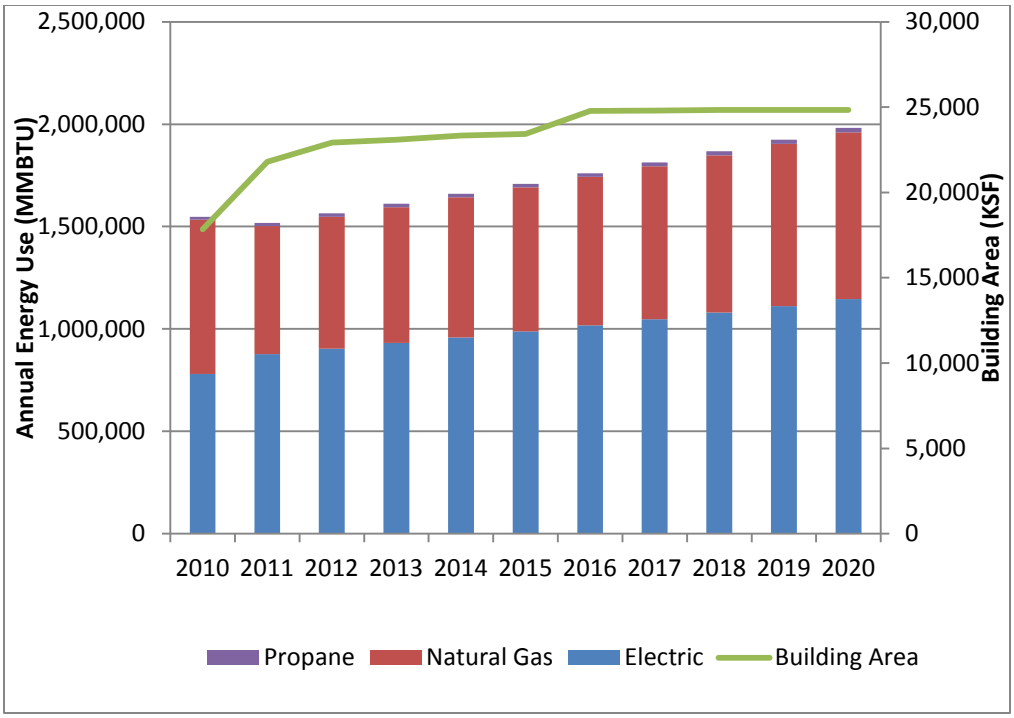

Figure 1-4. Projected future energy use at Fort Bliss

Table 1-3. Projected 2020 Fort Bliss Electric and Thermal Energy Requirements

Energy Source	Energy (Variable Units)	Energy (MMBtu)
Electric	335,659,425 kWh	1,145,270
Propane	214,246 gallons	20,460
Natural gas	791,141 kcf	815,667
Thermal	836,127 MMBtu	836,127
Total		1,981,397

Note: kcf = thousand cubic feet, kWh = kilowatt-hours, MMBTU = million British thermal units

1.4.2 Need for Net Zero Water

Fort Bliss is in an area of Texas and New Mexico that has experienced extreme drought in recent years. Water is a scarce commodity at the installation, and water conservation plans are in place (U.S. Army 2010b). Military water use is only about 3 percent as large as the municipal use in the El Paso-Ciudad Juarez area (U.S. Army 2010b). El Paso obtained an average of 24 percent of its water supply from the Rio Grande as of 2002, and the remainder from the Hueco Bolson and Mesilla Bolson aquifers. Substantial growth is occurring in the area with the factories on the Mexican side of the border, and these factories and general urban growth in the area are increasing demand for water. El Paso is expected to

grow from 700,000 in 2009 to more than 1.5 million by 2050, and Ciudad Juarez from 1.4 million in 2009 to more than 3.5 million in 2050 (Jenicek et al. 2009). There are places where both aquifers are overdrawn (The Watercourse 2001). It has been estimated that Fort Bliss' main water supply, the Hueco Bolson Aquifer, is capable of providing an adequate water supply for 70 years, but that the aquifer is a non-renewable resource given current withdrawal rates (Jenicek et al. 2009). Implementation of Net Zero would forestall the need for Fort Bliss to import water. Upstream demands on the Rio Grande and on other waters in New Mexico also affect availability of water at Fort Bliss, with growing populations in Albuquerque and other New Mexico towns, and increased interest in drawing from the Rio Grande (Jenicek et al. 2009).

In 2011, Fort Bliss produced 68 percent of its own water and purchased 32 percent from El Paso Water Utility (EPWU). In 2011, 2.16 billion gallons of potable water were supplied to Fort Bliss, with an additional 320 million gallons of nonpotable freshwater used to irrigate the two golf courses. Estimated end-use demand totals were approximately 1.72 billion gallons annually, however, indicating a discrepancy between reported supply and demand of 30 percent (approximately 761 million gallons). The large unknown water use is likely composed of multiple miscellaneous water-consuming processes such as fire system testing, West Bliss line flushing, and underestimated or unaccounted for irrigation, as well as improper metering or a lack of meter reporting. Nearly half of all the water use on site is for irrigation, by far the largest user of water (Figure 1-5). On-post irrigation represents between 210 and 274 million gallons of water consumption annually. Golf course irrigation is approximately 320 million gallons annually, and family housing irrigation water use ranges between 233 and 363 million gallons annually. The annual distribution system losses were estimated at 128 million gallons, or 7.4 percent of reported end uses.

Fort Bliss' on-site wells draw from three well fields: Tobin, Pike, and Biggs. Each well field contains multiple wells. Fort Bliss has rights to water drawn from its wells, and the cost of this water is limited to the pumping, distribution, and treatment. When necessary, Fort Bliss supplements its on-site water supply with purchased water from the EPWU. These two water sources meet all of the water needs at Fort Bliss except irrigation of the two on-site golf courses—these have their own dedicated, nonpotable water supply.

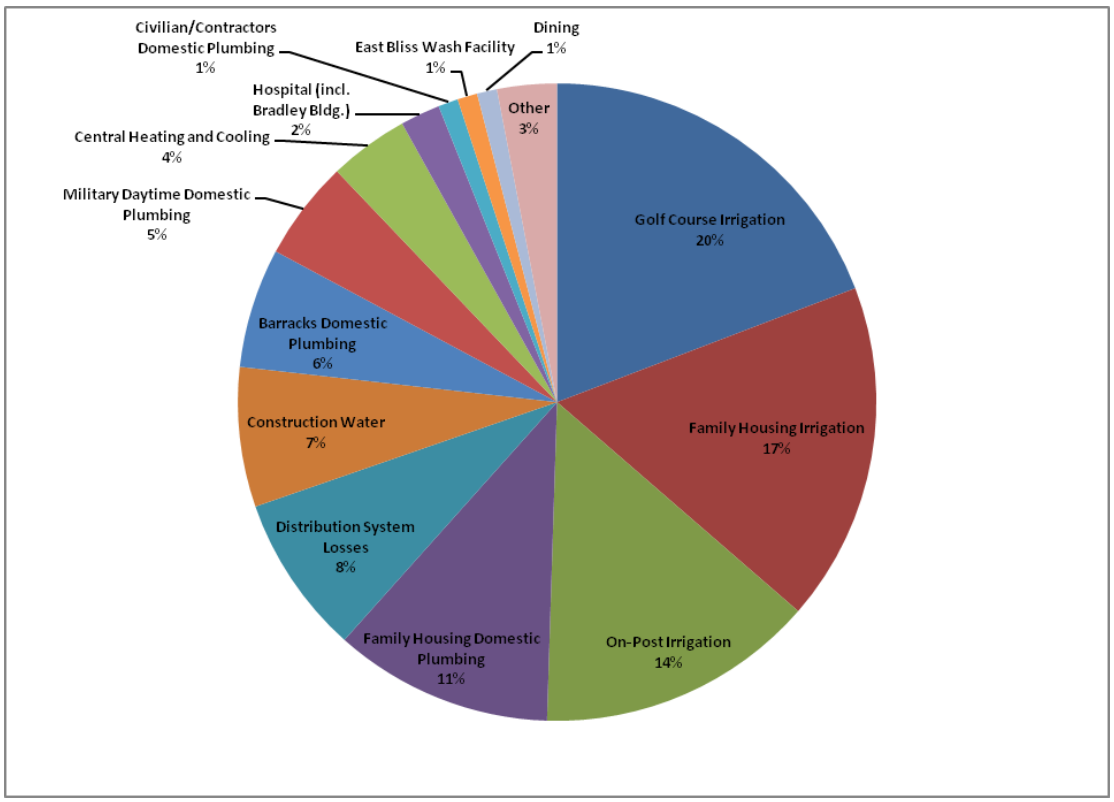

Figure 1-5. Fort Bliss annual water consumption by end use

With the exception of range wastewater that is directed to on-site oxidation ponds, Fort Bliss discharges most of its wastewater to the EPWU wastewater system. It is routed to the EPWU Haskell waste-water treatment plant (WWTP), where it is treated and discharged either to the Rio Grande or to the American Canal, where it is used for agricultural purposes in the Lower Valley. Five main lift stations account for more than 99 percent of total sewer water pumped, and 15 smaller units make up the remainder. In 2011, approximately 1.37 billion gallons of sewer water were pumped with this system. This represents approximately 80 percent of reported end uses of water and 55 percent of total water supplied to Fort Bliss.

A continuation of current policies and practices for water usage at Fort Bliss would not contribute to ensuring the sustainability of the water resource in the region. Fort Bliss draws upon water resources in the El Paso region and implementation of Net Zero water initiatives would help ensure that more water is re-directed for recharge of El Paso's aquifers, which would benefit regional water resources. In implementing the Net Zero initiatives, Fort Bliss would be an active participant and regional leader in ensuring the sustainability of water resources not just for the installation but also for the surrounding community.

1.4.3 Need for Net Zero Waste

In FY 2009/2010, Fort Bliss recycled 3,470 tons and disposed of 14,113 tons of solid waste generated at the installation. Thus, Fort Bliss recycled 19.7 percent of the total solid waste generated at the installation during FY 2009/2010. Currently, the recycling program at Fort Bliss includes single stream, range brass, electronics, untreated wood, hazardous materials, used oil, and battery recycling and yard waste mulching (R.W. Beck 2011). Currently, Fort Bliss recycles or reuses approximately 25 percent of its solid waste stream and disposes of the remainder in landfills. The Fort Bliss municipal solid waste (MSW) landfill is nearing capacity, which has necessitated off-installation landfilling of solid waste. If Fort Bliss was able to recover all of the single-stream recyclables it would increase the diversion rate at the installation from 19.7 percent to 39.6 percent. If Fort Bliss captures the maximum amount of potential material from its single-stream program, it has the potential to generate between approximately $51,500 and $283,000 in revenue, depending on material markets (R.W. Beck 2011). While the amount of waste recycled or diverted has more than tripled in the last 3 years (from 8 percent in 2009), Fort Bliss recognizes that much of the waste currently going to landfill can be reduced, re-purposed, recycled, and re-used to increase efficiency of operations.

The total volume of waste generated by Fort Bliss is projected to increase proportionally with growth, resulting in increased disposal costs. For example, there will be an increase in the number of waste disposal vehicle trips to and from off-installation landfills. The distance to the Clint Landfill, currently the primary off-installation disposal site, is approximately 50 miles round-trip. Off-installation disposal has already resulted in increased vehicle fuel use with accompanying GHG emissions, the substantial increase of waste disposal fees incurred by Fort Bliss, and associated increased traffic volumes on local roadways. The implementation of Net Zero waste initiatives would reduce waste disposal in landfills, increase recycling and material reuse, and limit negative effects associated with off-installation disposal.

1.5 Decision to be Made

The Army decision to be made is whether to execute the proposed sustainability initiatives for energy, water, and waste resources at Fort Bliss and, if so, which alternatives to pursue. The Proposed Action consists of a number of projects, some of which can be implemented in conjunction with one another. Projects proposed to implement Net Zero goals will comply with federal and Army energy mandates and will meet Fort Bliss' energy and water security objectives. Chapter 2 discusses the specific projects or technologies (Proposed Action alternatives) that may be implemented to help Fort Bliss meet Net Zero goals. As part of Net Zero implementation at Fort Bliss, one or a combination of the Proposed Action alternatives may be chosen. The final decision of which alternatives to be implemented will be covered within the Record of Decision (ROD). It will identify the Army's preferred alternative and identify

mitigation measures that are essential to the reduction of identified adverse impacts. It is important to note that for most action alternatives, implementation would ultimately be financed, constructed, and operated by private developers. In making the decision, the Army will select among the seven alternatives described in Chapter 2. While this EIS attempts to analyze all of the alternatives in as much detail as possible, additional project specific NEPA may be necessary for most of the alternatives as design concepts are finalized to ensure a full understanding of environmental impacts and required mitigations.

1.6 Scope of Environmental Analysis

This EIS identifies, documents, and evaluates the potential environmental effects of proposed sustainability initiatives at Fort Bliss in accordance with NEPA implementing regulations issued by the CEQ (40 CFR §§1500–1508) and the Army (32 CFR §651). The purpose of the EIS is to inform decision makers and the public of the potential environmental consequences of the Proposed Action and alternatives along with associated mitigation. To understand the environmental consequences of the decision to be made, the EIS qualitatively and quantitatively evaluates the environmental impacts of implementation of potential policy changes, facilities construction and operation, or other actions on Fort Bliss associated with the sustainability initiative alternatives analyzed. Under NEPA, the analysis of environmental conditions only addresses those areas, or region of influence (ROI), and environmental resources with the potential to be affected by the Proposed Action or alternatives. Locations and resources with no potential to be affected are not analyzed. The ROI, which includes all areas and lands that might be affected, may vary by resource.

The Army's NEPA regulation calls for the environmental analysis to be proportionate to the nature and scope of the action, the complexity and level of anticipated effects on important resources, and the capacity of Army decisions to influence those effects in a productive, meaningful way from the standpoint of environmental quality. Project footprints, construction activities and timeframes, and facility design features for each of the proposed alternatives have been identified to the fullest extent possible at this time. In the absence of specific information, the analysis conservatively estimated the environmental impacts of the Proposed Action and addressed potential broad-level environmental impacts.

For this Proposed Action, some project footprints and design features may be modified through the consultation and design process. If this type of change occurs, the Army would conduct the appropriate supplemental NEPA evaluations to determine and disclose any change in potential environmental impacts. The associated agency consultation, coordination, and permitting/plan development and submittals will also take place if the changes warrant such actions. CEQ regulations address "tiering" for subsequent narrower analyses that will rely on and incorporate the information as provided in this EIS.

Tiered analysis, if necessary, will focus on specific project details and more narrow and specific environmental issues.

1.7 Related Environmental Documents

The following environmental documents are related to the scope of the Proposed Action evaluated in this EIS:

Programmatic Environmental Assessment Army Net Zero Installations

The Final Programmatic Environmental Assessment analyzes the potential environmental impacts of implementing Net Zero at Army installations world-wide (U.S. Army 2012a). The Net Zero program would require Army installations to evaluate the feasibility of and then implement to the maximum extent practicable and fiscally responsible: 1) producing as much renewable energy on the installation as it uses annually; 2) limiting the consumption of freshwater resources and returning water back to the same watershed so as not to deplete the groundwater and surface water resources of that region in quantity or quality; and 3) reducing, reusing, and recovering waste streams and converting them to resource value with zero solid waste disposed in landfills. This document can be accessed at: http://usarmy.vo.llnwd.net/e2/c/downloads/259794.pdf.

Environmental Assessment for Solar Photovoltaic Facilities on the Training Ranges, Fort Bliss, Texas and New Mexico

Fort Bliss proposes to construct, operate, and maintain proven photovoltaic (PV) arrays on the training areas to supply power to the Range Camps and the IBCT area. Fort Bliss proposes to use solar energy to meet the federal government's requirements that continue to focus on more renewable energy resources. It is estimated that the Proposed Action Alternative would generate 73,000 megawatt-hours (MWh) per year, which would supply approximately 15 percent of the total energy consumed by Fort Bliss on an annual basis. Several renewable power source alternatives were considered during the initial planning. Three types of solar energy technologies were identified: PV, 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.

Fort Bliss identified four specific training area locations for the PV arrays. The four sites are identified as the IBCT site, Orogrande Range Camp site, McGregor Range Camp site, and Doña Ana Range Camp site.

1.8 Cooperating Agency

The U.S. Air Force (Holloman Air Force Base [AFB]) is a cooperating agency on this Draft EIS as defined in 40 CFR §1501.6. Holloman AFB uses the Centennial Bombing Range, consisting of

approximately 21 square kilometers (5,200 acres) on Otero Mesa South of Highway 506 (occupying portions of Training Areas 17 and 21), for air-to-ground engagement training. In addition, military fighter aircraft stationed or on temporary duty at Holloman AFB use the upper extents of Fort Bliss' airspace to train in aerial combat.

1.9 Public Involvement

Public involvement is a critical and essential component of the NEPA process. The CEQ and Army NEPA regulations provide several opportunities for the public to participate in this process. These opportunities include a public scoping process that is initiated with publication in the Federal Register of a Notice of Intent (NOI) to prepare an EIS, a minimum 45-day public review period for the Draft EIS, and publication of the Final EIS, accompanied by a 30-day mandatory waiting period before a final decision can be made and a ROD issued.

1.9.1 General Public Involvement Process

The Army invites public participation in the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, and members of the public having a potential interest in the Proposed Action, including minority, low-income, and/or disadvantaged groups, are urged to participate in the decision making process. The term "public" is used within the NOI to describe individuals who reside in communities near the project proposal area or who might be interested or affected by the Proposed Action; "stakeholders" may include municipal, township, and county elected and appointed officials; tribal, state, county and local government officials and administrative personnel whose official duties include responsibility for activities or components of the affected environment related to the Proposed Action; members and officials of identifiable interest groups of local or national scope that may have an interest in the environmental effects of the Proposed Action. Public participation opportunities with respect to this EIS and decision making on the Proposed Action are guided by Army NEPA regulation, which requires the preparation and implementation of a Public Involvement Plan to guide the public and stakeholder involvement process throughout the EIS process.

1.9.2 Notice of Intent

An NOI to prepare this EIS was published in the Federal Register on 8 February 2012 (Appendix A). The NOI announced the intent to hold public scoping meetings and included a summary of the proposed project and alternatives, points of contact for obtaining information, and instructions on how to submit public comments.

1.9.3 Scoping Process

1.9.3.1 Public and Agency Scoping Announcements

Publication of the NOI began a 30-day scoping period from 8 February 2012 to 12 March 2012. The Army used the scoping period to determine the scope of issues to be addressed in the EIS and identify significant issues related to the Proposed Action. As part of the scoping process, Fort Bliss held three public scoping meetings. Public notices of these meetings were published on 7 February 2012 in the El Paso Times, El Diario de El Paso, Las Cruces Sun, and the Alamogordo Daily News to coincide with the Army's publication of the NOI in the Federal Register on 8 February 2012. The notice also appeared on 8 and 9 February 2012 in the Alamogordo Daily News. The scoping notice was also posted on the Fort Bliss public affairs website (www.bliss.army.mil/PAO/releases.html) and the Fort Bliss project website (www.ftblissnetzeroeis.net).

Fort Bliss mailed letters on 16 February 2012 to a number of federal, state, and local agencies to inform them of the public scoping meetings to be held on 28 and 29 February 2012 and 1 March 2012 and to solicit their input on the project and issues of concern. A list of agencies notified is provided in Chapter 8.

1.9.3.2 Public Scoping Meetings

Three public scoping open house meetings were held on 28 and 29 February 2012 and 1 March 2012. The meeting on 28 February 2012 was held at the Ramada Palms de Las Cruces, Mesilla Room, in Las Cruces, New Mexico, from 6:00 p.m. to 8:00 p.m. The meeting on 29 February 2012 was held at the Otero County Administration Building in Alamogordo, New Mexico, from 6:00 p.m. to 8:00 p.m. The final meeting on 1 March 2012 was held at the Chapin High School cafeteria in El Paso, Texas, from 6:00 p.m. to 8:00 p.m. A court reporter recorded the presentation, and although the court reporter was available to take public comments during the meetings, no oral public comments were made during any of the meetings. A Spanish translator was available to aid Spanish speakers at all public meetings and a Spanish text version of the brochure also was made available.

1.9.3.3 Scoping Comments

Public Comments

A total of 10 comments were received from members of the public during the public scoping period. Nine of the comments were received via email and one comment was received at the public meeting in Alamogordo, New Mexico. Each of the public comments was read and considered in developing this document and potential concerns or recommendations were identified and addressed in this document.

One commenter voiced concern about Alternative 4 and the proposed waste-to-energy (WTE) plant, its proximity to the existing petroleum storage tanks, and the possible volatile nature of the combustion associated with the proposed WTE and petroleum tanks. The commenter also voiced concern about the development of wind energy and the possible effects on air traffic control, both civilian and military. The primary concern was that the wind turbines would create radar interference, possibly leading to false or incorrect information.

Another commenter questioned why the military housing area by Fred Wilson/Gateway South and Gateway North was not considered for participation in the extension of the purple pipe. The commenter also raised concerns about dust issues from activity at the tank trails near the proposed concentrating solar power (CSP) location, and the possible health effects on nearby residents and the potential loss of energy generated.

Several meeting attendees represented the renewable energy industry. Comments from industry included recommendations to use particular types of technology or specific terminology associated with the Army's proposed alternatives. Another commenter recommended the use of conversion as opposed to incineration for the WTE plant. A commenter requested that the term “grey water” be removed from Alternative 3 because it does not accurately describe the proposed water reuse and instead be replaced with the term *reclaimed* or *purple pipe*. The commenter recommended that the use of “grey water” be added as a procedure under Alternative 2.

A commenter voiced support for the use of geothermal energy and recommended consulting Nicholas Koch, of the Equitable Green Group. The commenter also recommended that Fort Bliss examine the possibility of having Net Zero housing throughout the installation.

One commenter requested that Fort Bliss coordinate with existing utility providers and address current utility contracts primarily with EPWU. The commenter also requested that the document address Balfour Beatty Communities (Balfour Beatty) geothermal cooling systems and requested that meter water be used in all individual housing.

In addition, to public comments received, comments received by Holloman AFB discussed the concerns over the use of wind turbines in the McGregor Range and that their use could provide physical and spectrum interference to the flying training mission and would degrade or prevent low level flying training in the area. Holloman AFB recommended that wind farm not be implemented in the training use areas.

Agency Comments

A total of four comments were received from federal, state and local agencies. The National Park Service, by email dated 5 March 2012 indicated that it has no comments at the present time. In a letter dated 29 February 2012, the International Boundary and Water Commission did not have any comments on the Proposed Action and stated that the action was outside of its jurisdiction.

The New Mexico Department of Game and Fish (NMDGF) by a letter on 7 March 2012 expressed concern about the effects on migratory birds from the development of wind energy resources at the McGregor Range and requested that the Draft EIS identify potential adverse impacts to these birds as a result of this wind energy development. The NMDGF also expressed concern about possible habitat fragmentation caused by the wind, solar, and geothermal alternatives. The NMDGF also requested that the analyses include any potential adverse effects from transmission corridors and trenching. It provided a list of wildlife of concern for both Doña Ana and Otero counties and a report discussing the impacts of wind energy development on wildlife as well as trenching project and power line guidelines.

The U.S. Fish and Wildlife Service (USFWS), by email dated 15 March 2012 recommended that the project adhere to all other stated rules as under the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act, requiring construction periods to be limited and surveys to be conducted in construction areas. The USFWS also recommended constructing all electrical transmission lines using state-of-the-art electrocution deterrent retrofitting equipment, developing an Avian and Bat Protection Plan, and conducting a thorough evaluation of impacts to endangered, threatened, candidate species and proposed and species of concern in the Proposed Action areas, with special concern given to the northern aplomado falcon and Kuenlzer hedgehog cactus. Other requests by the USFWS included avoidance of impacts to Swainson’s hawks, red-tailed hawks, and golden eagles and lessening habitat fragmentation resulting from road construction by minimizing construction and using best management practices (BMPs).

Since the receipt of the concerns during the scoping period regarding wind energy development, the Army has removed the specific alternative contained within this EIS to develop wind on McGregor Range. Fort Bliss has re-evaluated the specific wind alternative and determined that wind in the proposed training areas would not be compatible with large-scale maneuver exercises that will be conducted at Fort Bliss in the future. The wind alternative is not compatible with the alternative screening criteria contained in this EIS and is therefore not being carried forward for further analysis.

1.9.4 Public Review and Comment Process

The Notice of Availability (NOA) for the DEIS was published in the Federal Register and in the El Paso Times, El Diario de El Paso, Las Cruces Sun, and the Alamogordo Daily News. The publication of the NOA initiates a 45-day comment period, during which the Army invites the general public, local governments, state agencies, and other federal agencies to submit written comments or suggestions concerning the analyses and alternatives addressed in the DEIS. Copies of the Draft EIS are available for public review at libraries in the region and on the Fort Bliss and project websites at: http://ftblissnetzeroeis.net/index.html or https://www.bliss.army.mil/DPW/Environmental/EISDocuments2.html. Fort Bliss will hold public meetings during the public comment period. Individuals and organizations on the Distribution List were sent letters of notification for the public meetings, and notices were placed in the above-mentioned newspapers.

Written comments should be forwarded to: Mr. John Kipp, Attn: FB Net Zero EIS, IMBL-PWE; Building 624, South Taylor Road, Fort Bliss, TX 79916-6812, and electronic comments should be submitted on the project website at: http://ftblissnetzeroeis.net/index.html or to: john.m.kipp6.civ@mail.mil.

1.9.5 Final Steps in the NEPA Process

Following the close of the public comment period on the Draft EIS, the following steps will occur in the NEPA process:

- Prepare a Final EIS – Following the 45-day Draft EIS public comment period, a Final EIS will be prepared. This document will be a revision of the Draft EIS that includes consideration of all public and agency comments and the Army's responses and provides the decision makers with a comprehensive review of the alternatives, their environmental impacts, and mitigation measures to minimize adverse impacts. A NOA of the Final EIS will be published in the Federal Register, area newspapers, and on the Fort Bliss and project web sites. Announcements will also be mailed to the project Distribution List. The NOA publication will be followed by a minimum 30-day waiting period before a ROD would be signed.
- Issue a ROD – The final step in the NEPA process is the ROD. It identifies which alternative has been selected by the decision makers and which measures will be carried out by the Army to reduce any adverse impacts to the environment. A NOA of the ROD will be published in the Federal Register, area newspapers, and on the Fort Bliss and project websites. Announcements will also be mailed to the parties on the project Distribution List.

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2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Army's Proposed Action is to implement Net Zero energy, water, and waste goals by 2020 at Fort Bliss, while meeting energy mandates for renewable energy production and GHG emissions reduction as described in Chapter 1. In doing so, the Army would increase Fort Bliss' energy and water security and ensure the future military mission for generations to come.

The Proposed Action consists of multiple, related, and interconnected proposed projects that may be necessary to implement Net Zero goals, comply with federal and Army energy mandates, and meet the Army's energy and water security objectives. Figure 2-1 shows potential project areas that are included in this analysis. Not all projects discussed in this EIS would be implemented to the full extent discussed in this document. Technological advancements, legislative changes, and other factors may drive certain changes to the proposed projects discussed in the alternatives section. However, this document has been prepared to address potential projects that may move forward in the mid- to long-term (next 3 to 8 years) time frame. The document also programmatically evaluates potential development for future renewable energy, water, and waste technologies.

The Proposed Action is viewed primarily as a mission-enhancing and environmentally-beneficial endeavor designed to increase installation sustainability. The implementation of the Proposed Action would enhance the overall sustainability and security of Fort Bliss. The implementation of the Proposed Action includes the projects and advancements in energy, water, and waste resource management as discussed in Sections 2.1.1 through 2.1.3.

2.1.1 Proposed Energy Actions

Fort Bliss' proposed energy actions were selected to meet the goals of the Army's Net Zero energy program, which seeks to have each installation produce as much renewable energy on the installation as it uses annually. The first step would be to reduce energy demand in the most cost-effective manner by changing behavior and maximizing energy efficiency and conservation in existing facilities. The installation must look for opportunities to divert energy to a secondary purpose with limited processes, such as using boiler stack exhaust, building exhaust, or other thermal energy streams for a secondary

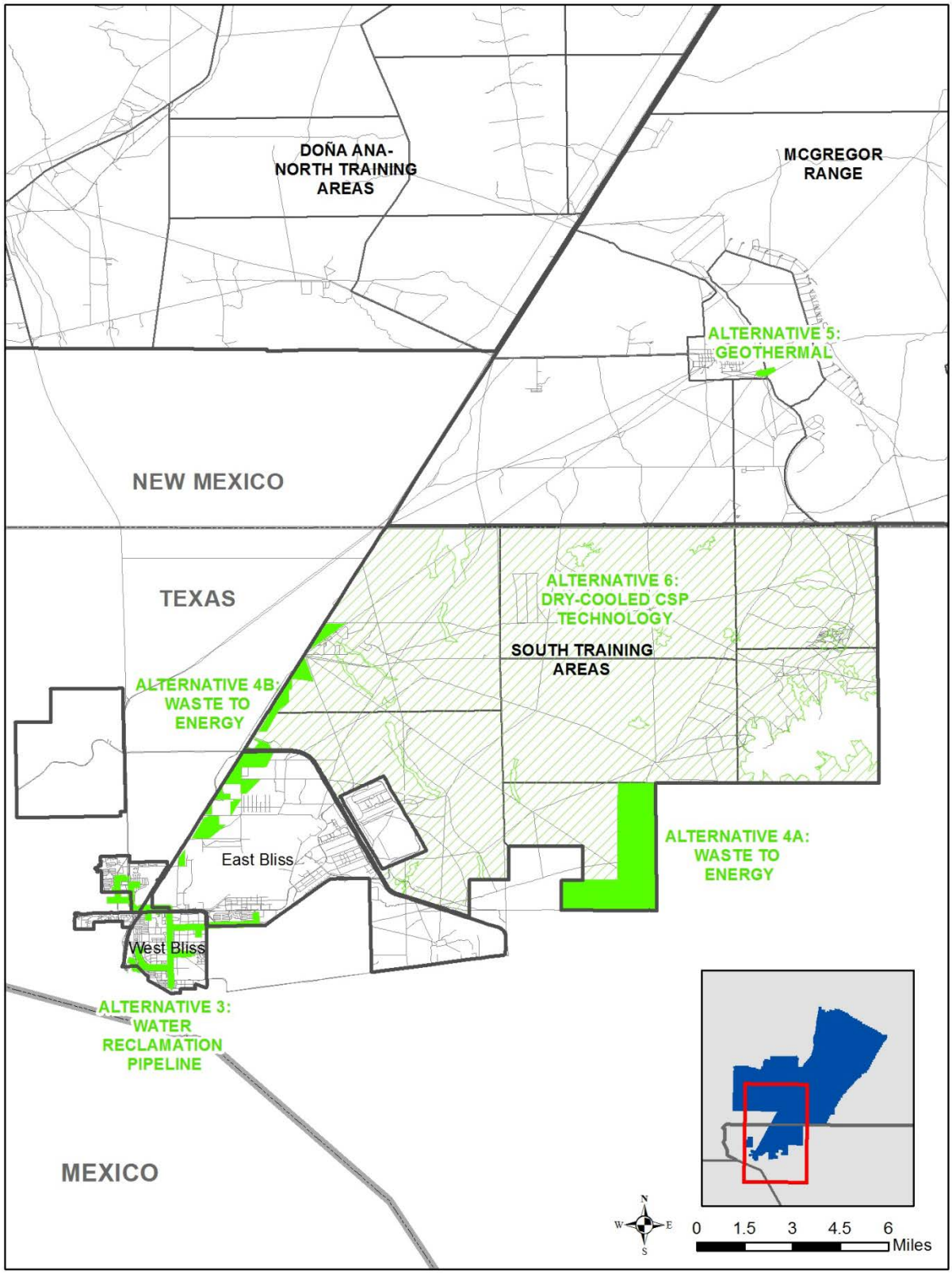

Figure 2-1. Proposed Fort Bliss Net Zero Project Locations

purpose. Next, the installation should explore converting unusable waste to energy and determine whether cogeneration (where two forms of energy, heat, and electricity are created from one source) is feasible. The final step and last resort after the last bit of energy capture has been fully exercised would be to develop options for generation of renewable energy.

The following Proposed Actions have been identified as potential energy actions for implementation at Fort Bliss:

- Reduction through behavior change, followed by maximizing energy efficiency and conservation, including:
  - Assessment of baseline energy efficiency of installation infrastructure (e.g., energy audits) and vehicle fleets.
  - Reduced consumption for both tactical and non-tactical (Garrison) operations.
  - Energy awareness campaigns, training programs, and use of mock billing to change behavior.
  - Building and grid metering, which typically involves the installation of electric and natural gas digital meters equipped with remote metering capability or automatic meter reading at buildings and facilities. Grid metering of the distribution system could include installation of master meters or meters at substations to enhance energy and utilities management on all utility feeds servicing Fort Bliss. Energy-use metering is an essential component of the energy management program and can provide an energy manager the information that is necessary to effectively track and manage energy use. Metering allows for the identification of energy waste and can result in savings of both energy and dollars (ODUSD 2005b).
  - Establishment of microgrids, including islanded microgrid operations that constitute the ability to operate all or part of an installation independently of the larger electrical grid. All power required for operations would be produced on the installation and generation plus loads would be controlled on the installation.
  - Building renovations and technology upgrades to increase efficiency of power usage; for example, replacing conventional lighting with energy-efficient models (e.g., compact fluorescent lights and light-emitting diodes) and installing dimmers, motion detectors, and timers; replacing aging/inefficient heating, ventilation, and air conditioning (HVAC) systems with more energy-efficient HVAC equipment; replacing aging appliances and office equipment with Energy Star-rated equipment; replacing aging process equipment with more energy-efficient models; improving the building envelope (e.g., replacing older building windows with energy-efficient windows and increasing the amount or R-factor of insulation in walls and roofs).

- Acquisition of lower energy using systems (tactical and non-tactical), such as those described previously for building renovations and technology upgrades.
- Transportation and fleet upgrades and innovations (e.g., continued upgrade of the fleet to plug-in hybrid electric vehicles, all-electric vehicles, or General Services Administration fleet electric trucks including battery storage upgrades, and the acquisition and installation of associated electric vehicle infrastructure, such as on-board/off-board chargers and electric vehicle supply equipment).
- Installation policy changes on transportation (e.g., increased telecommuting and Soldier incentives).

- Cogeneration, heat energy recovery, energy storage and re-use.
  - Methane recovery from existing or former landfills
  - Recapture of heat energy for water heating
  - Batteries to extend the generation of solar technologies
- Renewable/alternative energy infrastructure development (including construction, electrical tie-in, and facility operation and maintenance. At Fort Bliss, the following technologies may be pursued to implement the Proposed Action and are described in more detail in Section 2.3.
  - Construction and operation of a WTE plant
  - Development of a geothermal resource that could produce energy or heating with associated construction and operation of facilities. It is not known at this time if the geothermal resource could produce energy
  - Concentrating solar technologies (air-cooled) and other solar technologies
  - Construction of wind turbines

Renewable energy development would involve three main phases: construction, electrical tie-in, and operation and maintenance. Descriptions of the proposed technologies are provided in the alternatives descriptions in Section 2.3.

1. Construction – In Phase 1, it is anticipated that site grading would occur across the entire construction footprint of the site to obtain proper grade (in most cases less than 2 percent maximum grade). To the greatest extent possible, existing vegetation would be left in place and mowed or brush-hogged as needed. Access and maintenance roads would be sited and constructed from existing roads. Additional disturbance may also occur at borrow-pits, staging areas, and other sites not in direct proximity to the facility site.

2. Electrical Tie-in – To achieve electrical tie-in of the renewable energy site to the substation, the transmission lines may or may not be constructed parallel to an existing right-of-way. It is likely that projects would use separate corridors and separate aboveground transmission lines (due to increased complexity, impacts, and costs).
3. Operation and Maintenance – Renewable energy technology alternatives would have impacts from operation and routine maintenance activities. Such activities might include taking equipment offline for repairs and regular service.

This EIS evaluates the development of several renewable and alternative energy technologies (WTE, geothermal, and concentrating solar power) that are carried forward for analysis. These technologies were determined to meet the purpose and need of the Proposed Action and the screening criteria discussed in Section 2.2. While the Army is not specifically proposing sites on Fort Bliss for wind development at this time, the EIS does programmatically evaluate its development in compatible footprints.

2.1.2 Proposed Net Zero Water Actions

Fort Bliss' proposed water actions were selected to meet the goals of the Army's Net Zero water program, which seeks to limit the consumption of freshwater resources and return water back to the same watershed so as not to deplete the groundwater and surface water resources of the region in quantity or quality. The first step would be to implement water efficiencies through improving distribution system integrity. The installation would look for opportunities to divert water to a secondary purpose with limited processes, such as using grey water generated from showers and sinks. The installation would identify opportunities to develop closed-loop systems to reclaim and/or treat water and determine whether waste water could be captured. Fort Bliss' Net Zero water target is a 50 percent reduction in water use and water use/intensity[6] by 2020, roughly doubling the current federal goals of 26 percent reduction for 2020.

The following Proposed Actions have been identified as potential actions for implementation at Fort Bliss for Net Zero water:

- Reduction through behavior change, followed by maximizing water efficiency and conservation:
  - Conduct water balance assessments (a method to determine who the water users are and how much water they use) information needed to determine a baseline of water use for an installation. These assessments would help to strengthen water management decision making.

[6] Water use/intensity refers to gallons of water use per gross square foot of building space.

- Employ education initiatives to change behavior to use water more efficiently and conserve it when it is used. These initiatives would include changes in installation policies to manage Soldier, civilian, and contractor behavior in support of Net Zero goals.
- Reduce water consumption (both tactical and non-tactical) through installation water conservation policies, incentives, and acquisition of more efficient systems and equipment.
- Install meters along the water distribution system to monitor how much the system may be leaking.
- Install meters on the facilities where the largest water uses are located.
- Install meters and/or sub-meters on all facilities and spaces within those facilities where tenant organizations are located so that tenant water use can be correctly quantified and then billed.
- Install meters at installation housing.
- Conduct leak-detection surveys of the water distribution system and replace or repair any leaking distribution system segments.
- Replace existing systems, such as bathroom fixtures, air handling units, irrigation controls.
- Acquire lower water-using systems (tactical and non-tactical): toilets and bulk purchase, composting toilets, and water-efficient wash-racks. Base camps could be test locations for systems that could possibly be deployed to conserve and recapture water.
- Include low impact development criteria in facility designs that mimic the sites' natural hydrology and that work to keep rainwater on site in order to reduce potential water needed on site.
- Replace traditional landscaping with xeriscaping or low-water-demand landscaping. Modify contracts for landscaping/grounds maintenance and watering with more stringent specifications for plant types, times for watering, and sources of water.
- Apply EISA Section 438 Green Infrastructure/Low Impact Development techniques to site development or redevelopment to mimic site's pre-development hydrology and minimize post-development stormwater runoff.
- Use closed-loop systems to reduce the freshwater demand.

• Implementation of water repurpose/recycle/recovery measures:

- Reclaim grey water from showers, dining facilities, and sinks and reuse in toilets or landscaping.
- Capture lost water/re-direct water to other uses and reuse water where possible and return it to the aquifer.

- Establish additional oxidation ponds at base camps and reuse grey water in toilets before treatment.
- Construct a water reclamation pipeline on Fort Bliss to re-purpose water from the city of El Paso for landscaping or other uses (described in more detail in Section 2.3).

2.1.3 Proposed Waste Actions

Fort Bliss' proposed waste actions were selected to meet the goals of the Army's Net Zero waste program, which seeks to reduce, reuse, and recover waste streams, converting them to resource value with zero solid waste disposed of in landfills. First, Fort Bliss would consider the waste stream when purchasing items to avoid or eliminate generation of unnecessary waste (e.g., packaging waste). Second, Fort Bliss would look for opportunities to divert waste to a secondary purpose with limited processes. Third, Fort Bliss would maximize the reclamation of recyclable and compostable materials. Fourth, Fort Bliss would pursue opportunities to convert unusable waste to energy. The final step and last step, after the last bit of thermal energy has been salvaged and all other waste mitigation strategies have been fully exercised, would be to dispose of any remaining waste in a landfill.

Fort Bliss' Proposed Action for Net Zero waste would be to:

- Assess baseline conditions
- Expand or augment existing installation policies to reduce consumption and demand where possible
- Reduce through modification of purchasing practices by:
  - Implementing policies and contracts requiring suppliers to take bulk solid waste (e.g., pallets and crates) and requiring suppliers to reduce packaging or reuse packaging.
  - Acquiring reduced waste-generating systems (tactical and non-tactical).
  - Including existing Federal Acquisition Regulations clauses for sustainable procurement, and favorably weighting those clauses when making purchases and issuing contracts. Sustainable procurement is generally defined as purchasing products, goods, and services that use materials that are less toxic or free of hazardous materials, and are recyclable or contain recycled content materials. Examples include recycled content copier/printer paper, non-toxic copier/printer inks, chlorine-free and/or non-toxic cleaning products, rechargeable batteries, re-writable CDs/DVDs, and recycled content carpets. Sustainable procurement also includes efforts to minimize or eliminate packaging waste and to switch to bulk dispensing versus using smaller or single-serving items.

- Implementing more proactive sustainable procurement actions that may include implementation of "take-back"[7] provisions in furniture and equipment purchases. Examples include modular furniture purchasing agreements that have provisions to return worn, outdated, and/or damaged components to the manufacturer/distributer or appliance purchasing agreements where the manufacturer/distributor takes possession of the old appliance when delivering the new/replacement appliance.
- Taking other actions that might include contracts or management actions to refurbish or extend the lifecycle of furniture, equipment, and other goods. Examples include barracks mattress refurbishing (versus purchase of new mattresses), extending the replacement cycle for equipment and appliances (including computers, fax machines, phones, and barracks kitchen appliances), and using replaceable carpet tiles versus wall-to-wall carpeting.

- Implement re-purposing actions to divert waste to a secondary purpose with limited processes. Examples include chipping waste wood (including damaged pallets) for use in landscaping and soil cover, grinding brick and concrete debris from building demolition for use as roadway aggregate, grinding waste drywall for use as a soil stabilizer (e.g., for trails within a training range), and recovering wood, steel, windows, fixtures or other building elements to retro-fit for use in other buildings. Other actions may include increased diversion of usable items for free redistribution to on-installation government organizations, through the servicing Defense Logistics Agency Disposal Services office, in on-installation reuse shops, or through donation to non-profit veterans organizations. Pursue business partnerships to increase the re-use of clothing, scrap wood, and mattresses and potentially implement a salvage re-use facility.

- Divert waste by recycling and composting to increase solid waste diversion rates through more aggressive recycling and/or composting, including:

  - Implementing installation policies on waste recycling and re-use (e.g., Soldier incentives)
  - Promoting and implementing education and outreach programs to increase the use of the existing single-stream and untreated wood recycling programs
  - Continue implementing the Fort Bliss Qualified Recycling Plan

[7] "Take back" refers to a manufacturer's responsibly for taking back products after their end-of-use for reuse, repair, or recycling.

- Partnering with other generators of organic waste including the City of El Paso or agricultural partners to develop a composting program and ensuring landscaping contracts for Fort Bliss use compost material
- Developing and implementing source reduction programs for film plastic, including garbage bags, and coordinating with installation custodians to reduce double-bagging and disposal of bags that are not full
- Developing and implementing source reduction programs for non-recyclable paper (e.g., installing hand dryers and removing paper towel dispensers in installation bathrooms)
- Developing and implementing a recycling program for textiles generated on the installation
- Expanding the recycling program to include glass or establish an off-installation partnership for glass recycling
- Pursuing waste infrastructure development or agreements with private industry

- Recover energy from waste that cannot be cost-effectively "avoided," re-purposed, recycled, or composted through use as feedstock in a WTE plant (described in more detail in Section 2.3.4)

2.2 Alternatives Screening Criteria

Fort Bliss conducted a rigorous screening process to determine which technologies and installation sites are available to support implementation of the Net Zero initiative. In order to be considered a viable alternative and carried forward for analysis, the alternative must meet the following screening criteria:

- Mission Compatibility – The alternative must be compatible with present and future military missions and training occurring at Fort Bliss and on other nearby military installations. Site development and operations may not adversely affect training activities.

- Electrical Tie-in Potential (Renewable Energy) – The renewable energy alternatives must be close to transmission facilities (substations). The grid infrastructure must be capable of transporting, or being upgraded to transport, electricity generated by the alternative.

- Energy/Water Projects Located On-installation or Directly Adjacent to Provide Enhanced Energy and Water Security – The alternative must have the capability to generate power or provide sustainable water to support the critical operational needs of Fort Bliss while increasing the Army's ability to secure these resources. The alternative must allow Fort Bliss to have greater control and access to its energy and water supplies while reducing the adverse impacts of external generation and distribution failures upon the installation and its mission.

- Geophysical Factors – The alternative must have topography, aspect, slope, and soils to support development of Net Zero technologies and infrastructure.
- Cultural and Environmental Factors – Proposed sites must not be in an Off Limits Area (Red Zones), have no known Native American Graves Protection and Repatriation Act (NAGPRA) issues, do not contain National Register of Historic Places (NRHP)-eligible properties where an adverse effect cannot be feasibly mitigated, and do not have known sites of importance to federally recognized tribes. Proposed sites do not have sensitive natural resources such as critical habitat or threatened and endangered species.
- Safety and Unexploded Ordnance – The alternative must be sited at locations that minimize exposure to unexploded ordnance (UXO). Sites selected must not conflict with military training activities or jeopardize the personal safety of those constructing or operating the facilities.
- Water Use Intensity – Selected technologies must minimize the use of fresh water in a manner consistent with Fort Bliss, Army, and DoD water conservation goals and applicable state water use requirements.

2.3 Alternatives

This section describes the seven alternatives carried forward for analysis in this EIS. These alternatives include the No Action Alternative and six action alternatives.

2.3.1 Alternative 1 – No Action

Under the No Action Alternative, Fort Bliss would not pursue additional Net Zero initiatives to accelerate reduction of energy, water, and waste consumption beyond those policies and procedures that are currently in place. The increasing costs of centralized utility-provided energy and the potential disruption of installation energy and water supplies would continue to be threats to the Army and installation operations. The failure to implement Net Zero initiatives would make it less likely that federal mandates, goals, and policies pertaining to renewable energy production, energy use, water conservation, and waste reduction would be met. This alternative would hinder Fort Bliss' energy, water, and waste programs to meet future demands and would not provide the Army with needed information to assist other installations in improving its respective programs.

2.3.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement policies, procedures, BMPs, and related actions (collectively termed "Net Zero programs") for energy, water, and waste, as specified in Sections 2.1.1 through 2.1.3. Improving conservation practices and use of more efficient technologies for energy and water would be major components of Net Zero programs. Examples of other actions included in Alternative 2 are awareness campaigns, building and grid metering, microgrids, building renovations and technology upgrades, water metering, replacement of existing systems, low impact development criteria, xeriscaping, use of permeable surfaces, and modification of procurement practices. In addition, the generation of solid waste would be reduced, and waste that is produced would be recycled and re-purposed to the greatest extent feasible. Alternative 2 may include ground-disturbing activities of 5 acres or less. Alternative 2 includes Net Zero Communities Program and small-scale, renewable energy projects as described below. Actions discussed as part of Alternative 2 that implement conservation policy and procedures would be implemented at Fort Bliss as part of all action alternatives.

2.3.2.1 Net Zero Communities Program

Housing for Soldiers and military families under a program called Net Zero Communities would employ designs or incorporate measures to maximize energy and water efficiencies, with sustainability as the goal. The program would begin as a pilot project in cooperation with Fort Bliss' RCI housing partner. Houses would be well sealed and insulated, and may be fitted with energy-efficient heat pumps for heating and cooling the interiors. Microgrid systems may be installed on individual or groups of houses or buildings to monitor and manage energy usage (Zekert and Gillem, 2012). Results from the pilot project would help guide additional Net Zero Communities developments on East and West Bliss. Establishment of Net Zero Communities would support the implementation of Net Zero goals at Fort Bliss.

An important concept of Net Zero Communities is the "livability" of a development to improve the quality-of-life of the residents. Layouts of new housing developments on the installation would be carefully planned to have amenities and shopping within walking distance and reduce the need to drive. Horizontal and vertical mixed-use residential and commercial construction would be envisioned, to include landscaping suitable to the local environment.

2.3.2.2 Small-scale, Renewable Energy Projects

Net Zero programs would be geared toward smaller, more versatile, quick-to-implement projects on individual buildings, structures, vehicles, and utility systems. Examples include installation of solar PV panels on rooftops of new buildings and installing panels atop existing buildings. Carports to provide covered parking would also be built with panels mounted on top to provide electrical power to nearby buildings and help conserve ground area for other uses. Similar structures can also be used to provide sheltered outdoor storage of materials and property that is currently staged in open yards during receiving, transshipment, and disposal. Such structures would result in improved quality of stormwater runoff and reductions in sun damage to materials while increasing renewable power generation.

Alternative 2 includes the installation of small-scale wind turbines designed and sized to power individual or clusters of buildings. The following generation capacities and dimensions are based on current technology; however, future advances could change the specifications for small-scale wind turbines. Small wind turbines would generate approximately 2.5 to 10 kilowatt (kW) of electrical power. Electricity generated would be used directly in each building or immediate area to reduce the amount needed from the main distribution grid. The turbines, having an overall blade diameter of approximately 7 to 25 feet, would be placed in suitable locations so as to not interfere with or obstruct on-going activities in the immediate area. Turbine towers would be approximately 50 to 100 feet tall and could be mounted, for example, against the outer walls of buildings. In certain instances, multiple wind turbines could be mounted on a larger individual building. Newer wind turbine designs using a vertical axis would also be included for consideration.

2.3.3 Alternative 3 – Water Reclamation Pipeline

Fort Bliss would pursue the construction and use of a water reclamation pipeline (also referred to as the purple pipe) to provide Fort Bliss with reclaimed water for the installation's secondary uses including landscaping, golf course irrigation, central cooling towers, and central wash facility for cleaning tactical vehicles returning from training in the field. The purple pipe would connect to a conduit pipe from the city of El Paso's WWTP near the Pershing Gate, and water would be distributed as depicted in Figure 2-2.

Construction of the purple pipe would involve excavating a trench for the placement of an estimated 23.7 miles of pipe. Placement of the pipe would require the excavation of a trench with a top width of approximately 7 feet, a bottom width of approximately 5 feet (the trench would be sloped for ease of construction), and a depth of approximately 7 feet.

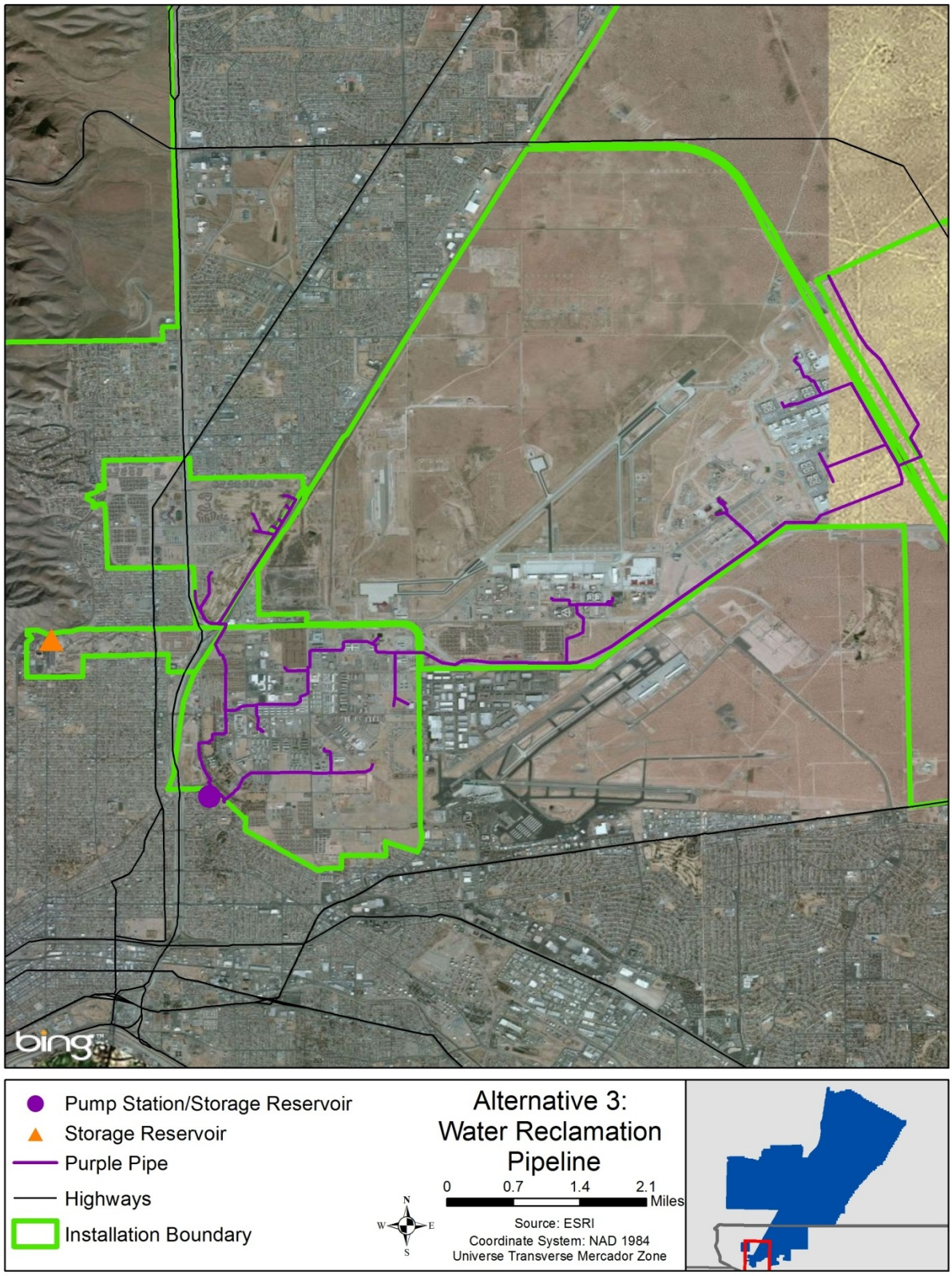

Figure 2-2. Proposed Reclaimed Water Pipeline Route on Fort Bliss under Alternative 3

Figure 2-3 shows a typical scene of installation of purple pipe in the city of El Paso. Other facilities associated with the pipeline would include a 4-million-gallon-per-day pump station and two 1.5-million-gallon storage reservoirs (Figure 2-2). EPWU would install one of these storage reservoirs (a reclaimed water tank) at the northeast corner of WBAMC (on Fort Bliss property) to primarily feed the golf course irrigation system and to connect to the Pershing Gate system forming a looped system. Fort Bliss would use these facilities as part of the operation associated with its purple pipe; however, EPWU plans to construct these facilities regardless of whether Alternative 3 is implemented at Fort Bliss. Therefore, these facilities are mentioned for informational purposes but they are not included in the environmental analysis of this alternative in Chapter 3. Construction activities would necessitate temporary road closures and the temporary closure of Pershing Gate. Design and construction of the purple pipe on Fort Bliss are estimated at approximately $18 million.

Figure 2-3. Installation of Purple Pipe in City of El Paso

It is assumed that with implementation of Alternative 3, Fort Bliss would off-take approximately 375 million gallons per year of reclaimed water from the city of El Paso. The reclaimed water would be classified as Type 1 as described in the Texas Administrative Code (30 TAC §210.33(1). Water quality attributes of Type 1 water are summarized in Table 2-1. Type 1 water is near-potable and has been treated to remove pathogens such as bacteria and other contaminants so that it is suitable for uses where the public might come into contact with the water (Texas Natural Resources Conservation Commission [TNRCC] 1997). Reclaimed water tends to contain higher concentrations of salts and nutrients than potable water. Reclaimed water from the city of El Paso ranges between 680 and 1,200 parts per million (ppm) as total dissolved salts, depending on the facility and the source for the water to be reclaimed (U.S. Environmental Protection Agency [USEPA] 2004).

Table 2-1. Type 1 Reclaimed Water Quality Attributes Compared with Drinking Water Standards

Water Quality Attribute	Measure	Comparison to Drinking Water Standards
Biochemical oxygen demand over 5-day period or carbonaceous biochemical oxygen demand over 5-day period	5 mg/l	No standards set; 1to 2 mg/l considered very clean water
Turbidity	3 NTUs	1 NTU
Fecal coliform or *E. coli*	20 CFUs/100 ml [a]	0 ppm [c] total coliform/*E. coli*
Fecal coliform or *E. coli*	75 CFUs/100 ml [b]	0
Enterococci	4 CFUs/100 ml [a]	0
Enterococci	9 CFUs/100 ml [b]	0

Source: 30 Texas Administrative Code §210.33(1)

Notes: mg/l = milligrams per liter; NTU = nephelometric turbidity unit; CFU = colony-forming unit; ml = milliliters; ppm = parts per million

[a] 30-day geometric mean

[b] Maximum single grab sample

[c] The maximum contaminant level goal for total coliform is 0. Any grab samples that tested positive for total coliform must be tested for Fecal coliform or *E. coli*. The maximum contaminant level for total coliform is no more than 5% of the samples may test positive.

2.3.4 Alternative 4 – Waste-to-Energy Plant

Fort Bliss would work with the city of El Paso and private industry to construct and operate an approximately 45-megawatt (MW) WTE plant on the perimeter of Fort Bliss' current boundary. The WTE plant would reduce landfill waste thereby extending the life of the city of El Paso's current landfill and provide the installation with a consistent source of alternative power. Two sub-alternatives are considered as part of Alternative 4. Under Alternative 4A, the facility would be sited within an identified project footprint located in the southern portion of the installation in the STA (Figure 2-4). Under Alternative 4B, the facility would be sited in a footprint adjacent to Railroad Drive (Figure 2-5). The Alternative 4B footprint is more irregular than that of Alternative 4A because of the presence of former landfills, training ranges, and surface danger zones (SDZs) in this area. Under either alternative, the land would be conveyed to the city of El Paso or a private developer.

Several types of WTE technologies are under consideration and could include but are not limited to:

- Mass-burn Incineration – This technology is the most proven, using standard combustion techniques. Collection trucks or transfer trucks deliver waste materials to the facility. The waste is tipped in a receiving area and kept at a slight negative pressure to minimize the release of odors to the surrounding areas. Large appliances or other non-combustible materials are removed, and the

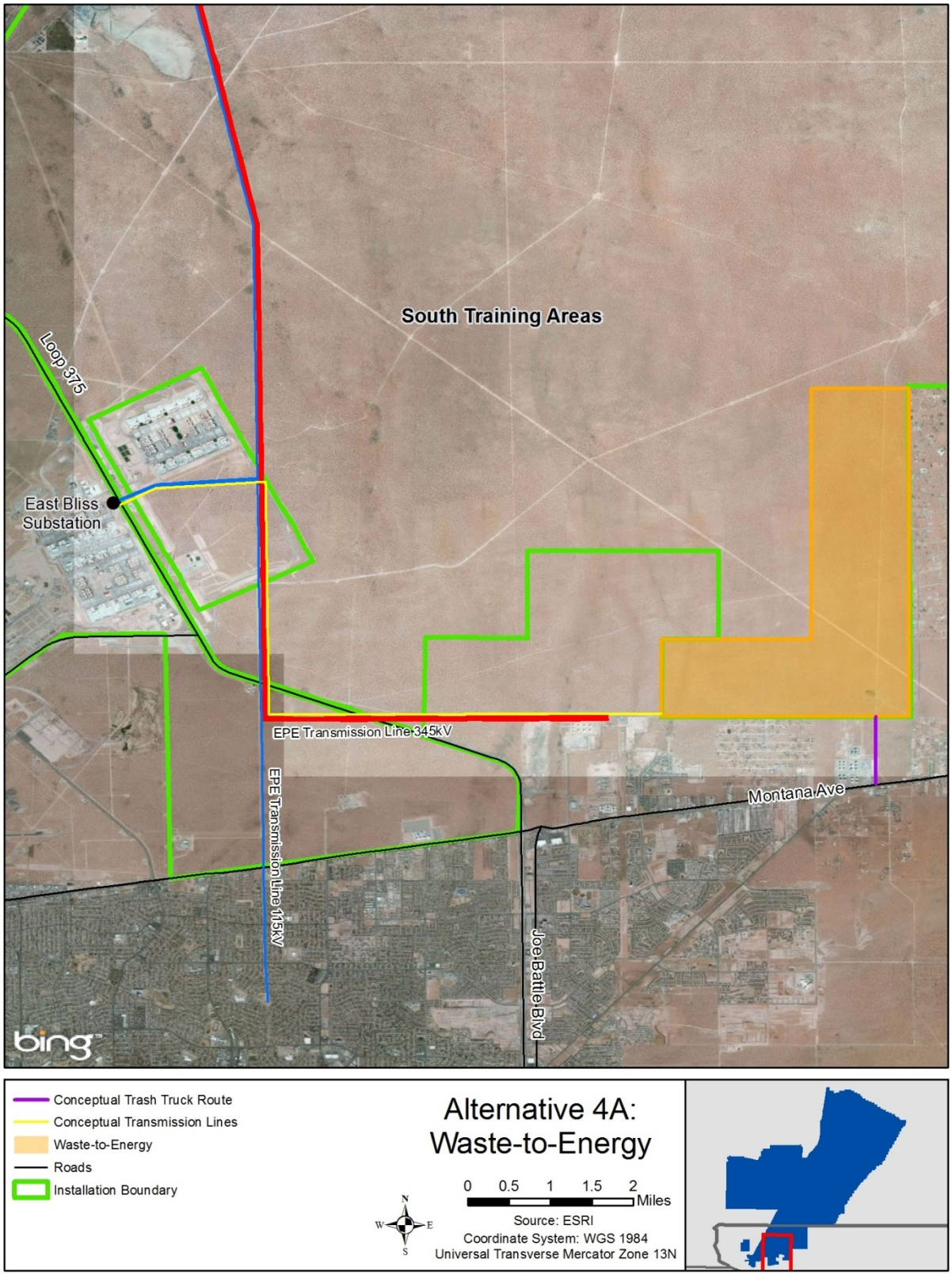

Figure 2-4. Proposed Project Footprint for the Waste-to-Energy Plant in the South Training Areas under Alternative 4A

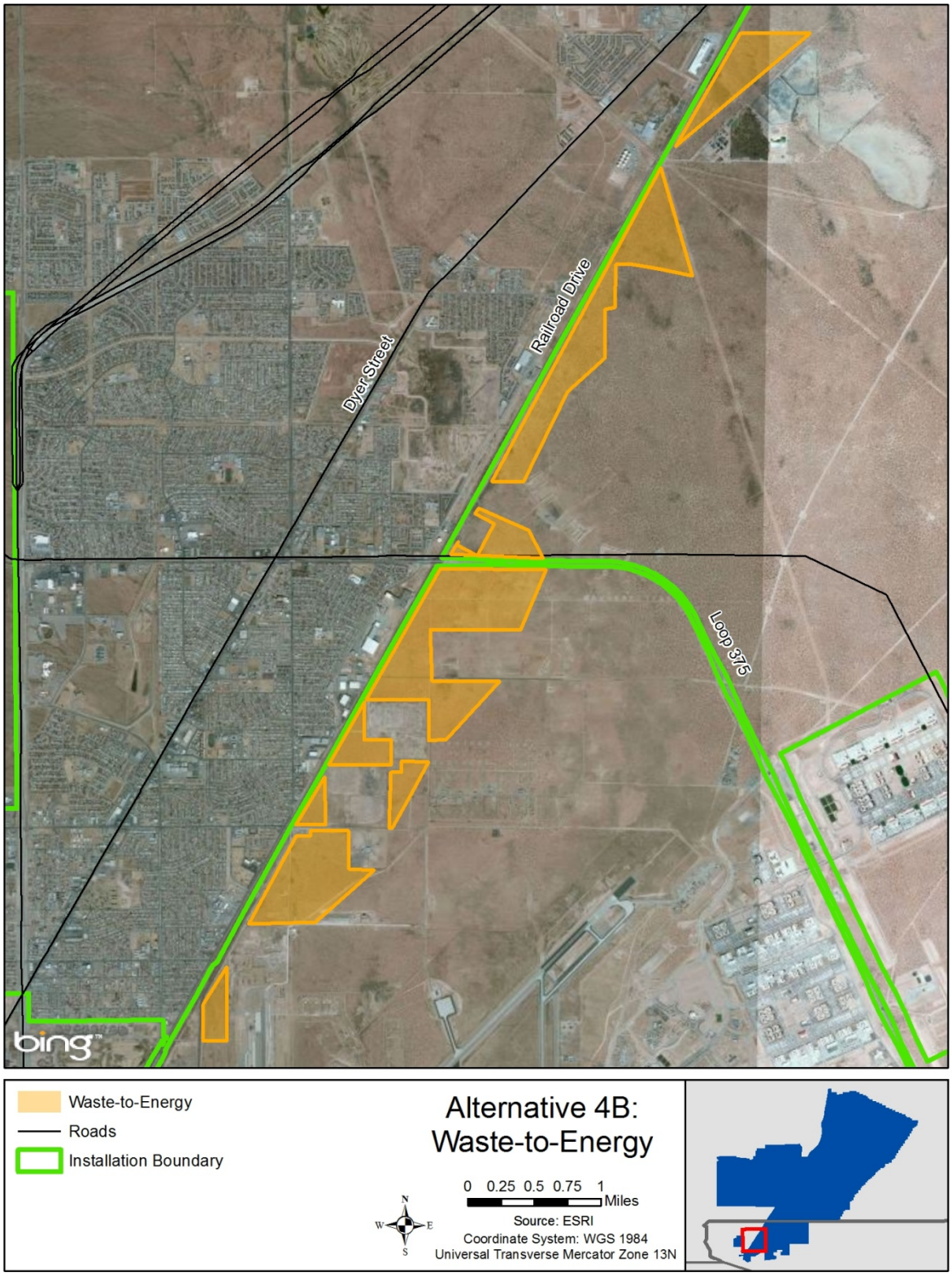

Figure 2-5. Proposed Project Footprint for the Waste-to-Energy Plant under Alternative 4B

remaining waste is fed into a chute that directs the waste into a furnace. In the furnace, the waste is either combusted on a grate or in a fluidized bed to release energy in the form of heat. The gaseous and particulate products of the combustion reaction pass through several stages of emissions controls to meet USEPA air emissions standards. The heat released from the combustion of the fuel is transferred to water in the boiler. This water is converted to steam that drives a steam turbine to produce electricity or is used for various heating applications. Water is used for the boiler and the cooling system. A WTE plant using mass burn incineration and dry-cooling as described for this alternative would consume an estimated 17 to 19 million gallons of water annually for facility operations (Davis 2013). Figure 2-6 illustrates the components of a typical mass-burn WTE plant.

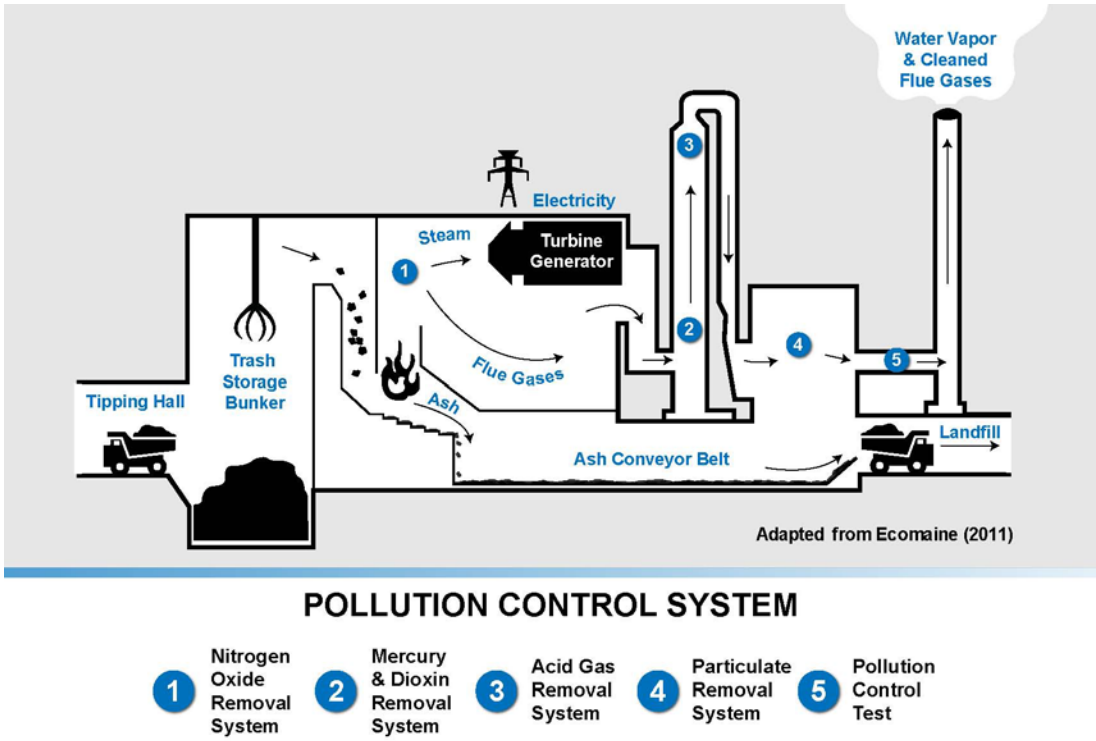

Figure 2-6. Typical Waste-to-Energy Plant

- Gasification – This emerging WTE technology involves heating fuel in an oxygen-limited environment. Waste materials are delivered and stockpiled in a similar manner as mass-burn incineration. These facilities are typically smaller in scale and the rate of feedstock delivery is much smaller. They also are more likely to include sorting of feedstock to remove recyclable materials and help provide a more homogeneous fuel. The non-recyclable material is fed into the gasification chamber using an auger-feed mechanism. Once in the chamber, the fuel is heated and a portion of the fuel is combusted, using the small amount of oxygen present. This exothermic

reaction releases heat necessary to produce endothermic reactions that produce a synthetic gas, or syngas, of primarily hydrogen and carbon monoxide. The syngas can be used in several ways:

- Steam creation: syngas can be combusted to create heat for converting water to steam, which drives a steam turbine to generate electricity.
- Direct motive force: syngas can be cooled and cleaned for use as fuel for an internal combustion engine or gas turbine, either of which can be coupled to a generator for electricity production.
- Liquid fuel conversion: cooled and cleaned syngas can be converted to various liquid fuels using the Fischer-Tropsch process, a series of chemical reactions occurring from introduction of a catalyst to the syngas.
- Energy storage: syngas can be stored for later use or transferred to another location.

- Pyrolysis – This form of incineration chemically decomposes organic materials by heat in the absence of oxygen. Pyrolysis typically occurs under pressure and at operating temperatures above 430 degrees Celsius (ºC) (800 degrees Fahrenheit [ºF]). In practice, it is not possible to achieve a completely oxygen-free atmosphere. Because some oxygen is present in any pyrolysis system, a small amount of oxidation occurs. If volatile or semi-volatile materials are present in the waste, thermal desorption will also occur. Organic materials are transformed into gases, small quantities of liquid, and a solid residue containing carbon and ash. The off-gases may also be treated in a secondary thermal oxidation unit. Particulate removal equipment is also required. The feedstock is the same as for other technologies. The gases produced by pyrolysis can be cleaned and used for electricity generation by various methods similar to those described for gasification.
- Anaerobic digestion – This emerging WTE technology uses biologic methods to process waste materials. The feedstock collection and processes for anaerobic digestion are the same as discussed for mass-burn incineration and gasification. The importance of sorting materials is higher for anaerobic digestion than other WTE technologies. Therefore, manual or automatic sorting of materials is typically the first step to remove inorganic materials and recycle those materials with value. The organic materials are placed into a digester, where microorganisms break down the material and release a biogas high in methane. The resulting biogas is captured and serves several purposes:

  - Steam creation: the biogas can be combusted to provide heat for steam to drive a turbine, coupled to a generator for power production.
  - Motive force: the biogas can be conditioned and serve as fuel for an internal combustion engine or gas turbine, linked to an electrical generator for power production.

- Energy storage: the biogas can be stored for later use or transferred to another location.

- Fermentation – This non-thermal technology uses microorganisms to convert waste into ethanol for use as fuel to power a turbine. Anaerobic fermentation (i.e., hydrolysis followed by fermentation to alcohols) is generally used industrially in beverage, fuel, and chemical applications. Fermentation of starch- and sugar-based feedstocks (i.e., corn and sugar cane) into ethanol is fully commercial but not yet for cellulosic biomass because of the expense and difficulty in breaking down (hydrolyzing) the materials into fermentable sugars. Cellulosic feedstocks, including the majority of the organic fraction of MSW, need hydrolysis pretreatment (acid, enzymatic, or hydrothermal hydrolysis) to break down cellulose and hemicellulose to simple sugars needed by the yeast and bacteria for the fermentation process. With the possible exception of acid recycling and recovery, acid processes are technologically mature, but enzymatic processes are projected to have a significant cost advantage once improved. Lignin in biomass is a byproduct of fermentation processes and is typically considered for use as boiler fuel or as a feedstock for thermochemical conversion to other fuels and products. Hydrolysis of lignocellulosic feedstocks is the subject of intense research. Alcohols, such as ethanol and butanol, are the primary energy product from hydrolysis and fermentation processes. There are no known hydrolysis and fermentation systems operating on MSW feedstocks in the world. Therefore at this time, the use of fermentation is not considered a feasible alternative.

Although various technologies would be considered, mass-burn incineration is the most proven and commonly used technology for WTE at this time. Therefore, Alternative 4 is described based on the use of mass-burn incineration. A private operator would own and operate the WTE plant. The facility would receive waste from both Fort Bliss and the city of El Paso. Approximately 1,100 tons of MSW would be transported to the WTE plant each day by between 67 to 100 truck deliveries. An estimated 30 trucks per day would take ash from the WTE plant to a city of El Paso landfill for disposal. The analysis presented in Chapter 3 assumes this is the greater El Paso landfill in Clint, Texas. The WTE plant maximum generation capacity would be up to 45 MW to Fort Bliss. Further details on construction, electrical tie-in, operation and maintenance, and emissions controls are described below. The design of the facility is not yet complete; however, the conceptual lay-out illustrated in Figure 2-4 was used to develop assumptions about certain details, such as length of new roads and transmission lines that would potentially be required under Alternative 4A. Conceptual transmission line routes and access roads have not been developed for Alternative 4B; however, for purposes of this analysis, they are anticipated to be shorter than Alternative 4A. For all WTE technologies, if the Army chooses to pursue construction and operation of a WTE facility, an assessment of supplemental NEPA requirements will be conducted upon receipt of a

final design proposal. The appropriate level of additional project-specific NEPA analysis would then be completed prior to construction of the project.

Construction – Approximately 30-40 acres would be required to accommodate the WTE plant. Approximately 4 to 6 miles of new access roads are assumed to be required to support the WTE plant. Two boiler systems would be constructed and operated in parallel as part of the WTE plant requiring stacks of 180 to 250 feet tall. The boilers would be waterwall and generate approximately 430,000 pounds per hour steam at a pressure between 700 pounds per square inch (gauge) (psig) and 850 psig with superheaters taking the steam to between 399°C to 443°C (750°F and 830°F). Steam flow from each of the two boilers would be about 215,000 pounds per hour steam. The plant would generate energy through a steam-powered turbine. The WTE plant would include a waste truck tipping area, sorting areas, weigh area, and translocation equipment. Construction of Alternative 4 is estimated to last 2 years and would require approximately 700 construction workers each year for the WTE plant, and an unknown number for the transmission lines. Average onsite duration for construction workers would be 3 to 4 months. The construction cost is estimated at $350 million.

Under this alternative, additional roads and truck holding areas would be developed to accommodate the increased truck traffic at the south end of Fort Bliss leading to the STA from Montana Avenue. A security fence, which would be constructed around the site, would contain any blowing debris.

Electrical Tie-In – The project would require establishment of approximately 13 to 14 miles of electrical transmission lines following existing easements to connect to the East Bliss Substation by the BCTs to ensure delivery of power to the installation's own internal power distribution system (Figure 2-4). Under Alternative 4B, the length of the transmission line to the substation would be shorter, approximately 5 to 6 miles. Transmission lines may be above ground or underground, and it is likely that the routes would follow existing utility rights-of-way. Overhead lines would be constructed in accordance with raptor protection guidelines, and underground lines would be buried in accordance with the National Electric Safety Code according to voltage. Based on the conceptual transmission line route identified in Figure 2-4, approximately 5.8 miles would follow existing rights-of-way under Alternative 4A.

Operation and Maintenance – Up to 100 people would be needed to operate the facility. The WTE plant would average approximately 15 percent down-time for maintenance activities with one of two boilers running at all times. Trucks would pick up MSW curbside throughout Fort Bliss and the city of El Paso and deliver to the facility. Approximately 20 percent of the tonnage of waste would become ash. In compliance with current regulations, MSW ash would be sampled and analyzed regularly to determine whether it is hazardous or not. Hazardous ash would be managed and disposed of as hazardous waste. Hazardous ash would be disposed of in a non-Army hazardous material landfill that meets required design

standards. Non-hazardous ash would be disposed of in a city of El Paso MSW landfill. The major constituents of concern in incinerator ash are heavy metals, such as lead, cadmium, zinc, and mercury. Trash that cannot be burned, such as most metals, also would go to the landfill if not presorted. Assuming dry-cooling, an estimated 17 to 19 million gallons of water would be consumed annually for facility operations (Davis 2013).

Emissions Control – Scrubbers, baghouses, and other air pollutant emissions reduction features would be included as part of the WTE plant. Technologies would be similar to coal plant air pollutant reduction technologies and would ensure that the WTE is in conformity with the Texas Clean Air Act (CAA) state implementation plans and standards. Selective non-catalytic reduction (SNCR) would be used to reduce nitrogen oxide (NO_x) emissions. SNCR is based on the chemical reduction of the NO_x molecule into molecular nitrogen and water vapor. The process involves injecting a nitrogen-based reducing agent, such as ammonia or urea, into the post-combustion flue gas.

2.3.5 Alternative 5 – Geothermal Energy Facility

Fort Bliss would coordinate with the Department of the Interior (DOI) regarding development of a geothermal resource in order to work with private energy development firms to construct and operate a geothermal facility for the production of energy and/or hot water. Geothermal power plants use steam produced from reservoirs of hot water found a few miles or more below the earth's surface to produce electricity. The steam rotates a turbine that activates a generator, which produces electricity. There are three types of geothermal power plants: dry steam, flash steam, and binary cycle. Only flash steam or binary cycle power plants would be possible for use at Fort Bliss:

- Flash steam power plants are the most common and use geothermal reservoirs of water with temperatures greater than 182°C (360°F). This very hot water flows up through wells in the ground under its own pressure. As it flows upward, the pressure decreases and some of the hot water boils into steam. The steam is then separated from the water and used to power a turbine/generator. Any leftover water and condensed steam are injected back into the reservoir, making this a sustainable resource.
- Binary cycle power plants operate on water at lower temperatures of approximately 107°C to 182°C (225°F to 360°F). Binary cycle plants use the heat from the hot water to boil a working fluid, usually an organic compound with a low boiling point. The working fluid is vaporized in a heat exchanger and used to turn a turbine. The water is then injected back into the ground to be reheated. The water and the working fluid are kept separate during the whole process, so there are little or no air emissions.

The exact geothermal technology that would be used for electricity generation under Alternative 5 has not yet been determined. Under this alternative, a geothermal energy facility would be developed within 40 acres located near Davis Dome on McGregor Range (Figure 2-7) and would require at least one injection and production well. The footprint of the facility is estimated to be from 10,000 to 50,000 square feet, which equates to 0.2 to 1.1 acre. The geothermal energy facility would develop a geothermal resource at Davis Dome with a maximum energy generating capacity estimated to be 20 MW. Studies on the geothermal resource are ongoing; however, preliminary information has shown temperatures of approximately 91°C (195°F). Concentrating solar thermal (CST) technology would be developed in association with the geothermal energy facility to maximize generation.[8] The CST technology would be used to increase the temperatures of the geothermal resource and would increase the efficiency of energy production. Construction of transmission lines (less than 2 miles) would supply energy to the McGregor Range Camp Complex. Transmission lines could be aboveground or underground. Aboveground lines would be constructed according to raptor protection guidelines. Other features of the alternative would include pipelines to the power plant from the wells, well drilling and wellhead pads, and parking spaces. It is assumed that existing roads would be adequate to support the facility. Figure 2-7 shows the project footprints for the geothermal facility at the Davis Dome. The geothermal power plant, CST array, and parking facilities would be developed within these identified footprints. Energy generated under this alternative would be strictly for Army use, and no excess power would be generated and sent to off-installation locations. The estimated construction cost is from $15,000,000 to $30,000,000. The number of construction and operations employees required under Alternative 5 would depend on the facility's maximum generation capacity. The following employment estimates assume a 20-MW facility would be developed. Construction of the geothermal energy facility is estimated to require 35 construction workers during a 36-month period (Hillisheim 2013). Operation and maintenance of a 20-MW facility is estimated to require up to six employees (two to four employees to run/monitor the facility and one to two employees for maintenance) (Hillisheim 2013).

[8] CST arrays harness thermal energy from the sun to heat water; whereas, CSP arrays use the sun's thermal energy in the production of electricity, typically through the heating of synfuels that are used to power a turbine.

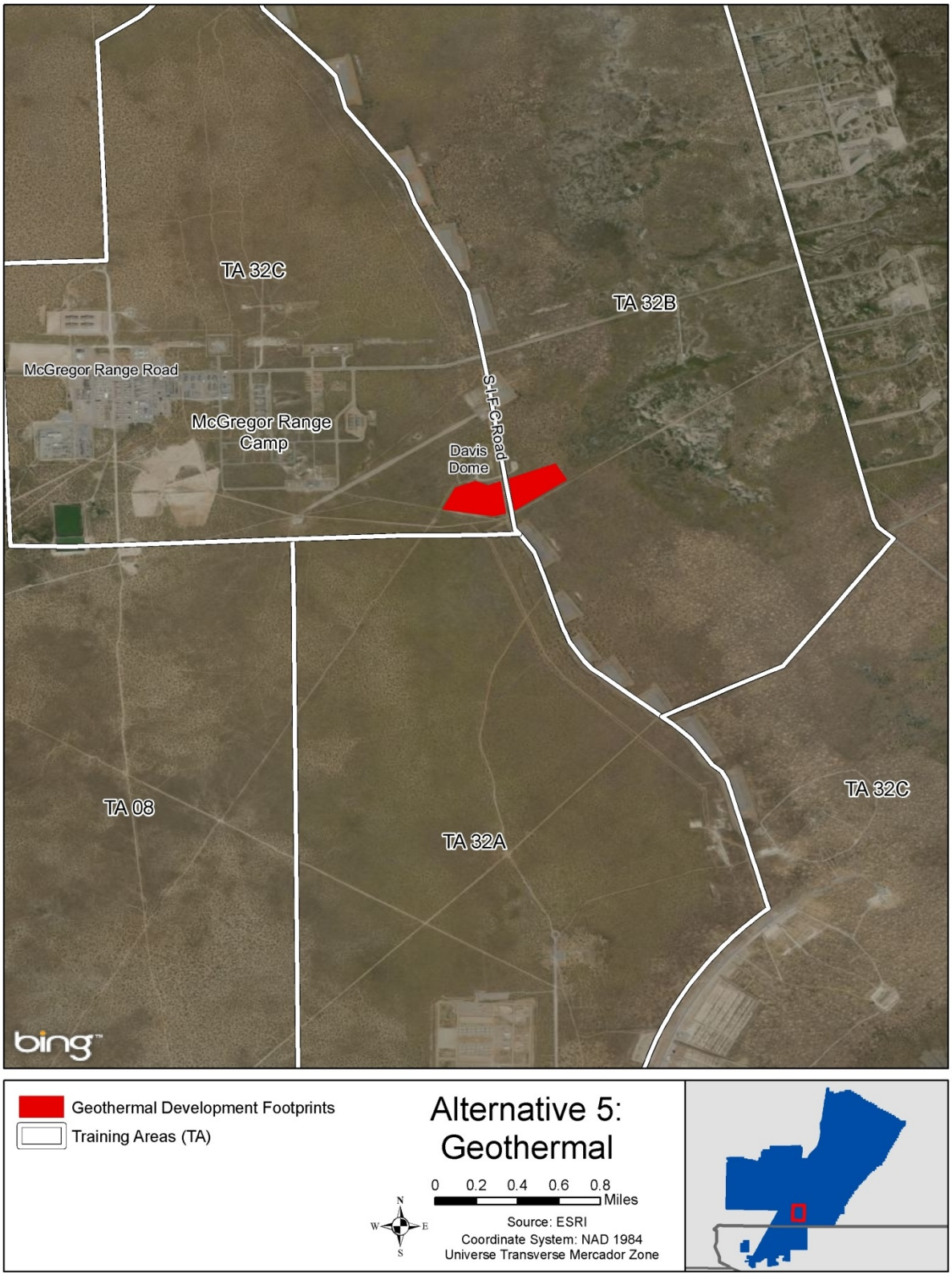

Figure 2-7. Geothermal Development Footprints at Davis Dome on Fort Bliss under Alternative 5

2.3.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Concentrating solar power (CSP) is designed to convert the sun's energy to heat and then apply that heat in various ways to produce electricity. This alternative would use a parabolic trough system, which is a CSP line-focus system that concentrates solar energy along a line-shaped receiver, typically an oil-filled pipe positioned at the focus of parabolic-shaped reflectors (parabolic trough systems). To produce heat, all CSP technologies use direct normal insolation, that is, sunlight that directly strikes the reflecting/concentrating surface, rather than global sunlight, which also includes sunlight that has been refracted or diffused by clouds, airborne dusts, or the ground. Thus, for optimal performance, the reflective surfaces of CSP technologies must track the sun (keeping the sun's incident rays perpendicular to the reflecting surface), and reflectors and/or concentrators must exhibit good optical characteristics.

Fort Bliss would develop CSP parabolic trough technology in the STA on up to 300 acres of land currently used for training (Figure 2-8). The CSP would not be located in areas of steep slopes as identified in Figure 2-8. The CSP array would cool the steam turbine using dry cooling (i.e., air cooling). Parabolic trough CSP systems (Figure 2-9) typically use a heat-transfer fluid (usually synthetic oil in the case of parabolic trough facilities) to transfer the heat generated at the solar collectors to a heat exchanger where steam is produced to drive a conventional steam turbine generator (STG). The power block of a solar thermal facility containing the STG and other related power-generating and power-management equipment is virtually identical in both form and function to the power block of fossil fuel and nuclear power plants that also use steam to produce electricity.

A thermoelectric technology alternative to steam uses Organic Rankine Cycle (ORC) turbines coupled to conventional generators. ORC turbines use heat (versus an external steam source) to boil an organic working fluid contained in the reservoir of a closed system, allowing the resulting hot expanding vapors of the working fluid to drive the turbine-generator set. The working fluid loses sufficient thermal energy to return to its liquid state, and, after further cooling, it is returned to its reservoir, allowing the process to repeat. ORC turbines have many industrial applications, recovering otherwise wasted heat and converting it to electrical power or mechanical energy. The advantages of ORC turbines include: the ability to produce power from relatively minor sources of heat, minimal internal corrosion issues due to the absence of water, thermal efficiencies as high as 85 percent, and extended mechanical life due to relatively slower rotational speeds than conventional STGs. More importantly for CSP applications in water-deprived locations, ORC turbines require substantially less water than conventional STGs.

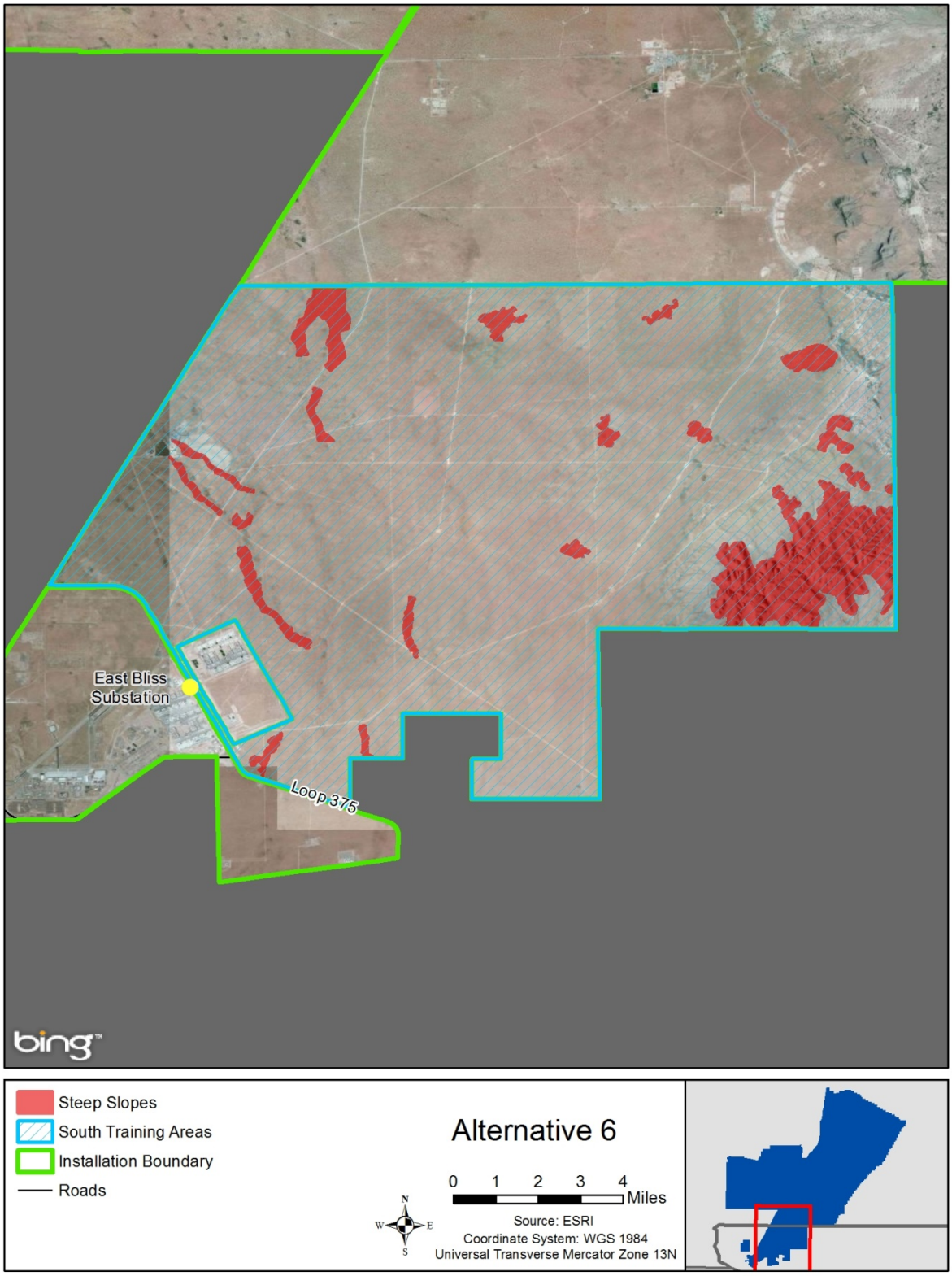

Figure 2-8. Area Evaluated for Location of Potential Concentrating Solar Power Technology under Alternative 6

Figure 2-9. Concentrating Solar Power Parabolic Trough Technology

Three hundred acres would accommodate a 50-MW parabolic trough plant. Without storage, the plant would require an estimated 80 collector loops, totaling a collector area of approximately 74 acres (Turchi 2012). Construction of concrete footers would require approximately 9,590 tons of concrete. Construction of the power block would require an additional approximately 10,582 tons of concrete (Turchi 2012). Access roads would be required and dependent upon actual site location.

Transmission lines would be constructed and tied in with the East Bliss Substation to the west of the STA. Transmission lines would follow existing easements and the installation boundary to the substation. Transmission lines may be above ground or underground for this alternative. Aboveground lines would be constructed according to raptor protection guidelines.

The construction timeframe is estimated at 2 years and would require approximately 400 workers during construction and 28 full-time workers for operation (Turchi 2012). The cost estimate for the facility is approximately $217 million.

2.3.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Solar resources would potentially include the installation of a PV fields on landfills (Figure 2-10). The development of smaller-scale wind energy resources is included as part of Alternative 7 along with other site and mission compatible renewable energy technologies. Implementation of

Figure 2-10. Potential Areas for Photovoltaic Field

Alternative 7 would allow the installation to adaptively select future, compatible footprints and best technologies to increase the installation's energy security, reduce GHG emissions, and increase the percentage of energy consumed that is derived from renewable energy sources.

Wind energy is the process by which wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. This mechanical power can be converted by a generator into electricity. Wind turbines turn in the moving air and power an electric generator that supplies an electric current. The location for development of wind energy would be subject to mission compatibility. Each turbine would require ground disturbance during construction with limited permanent ground disturbance for concrete footers (e.g., approximately 0.4 acre for a 3-MW turbine). Temporary access roads would be required and would likely be unpaved dirt. Electrical tie-in would require the construction of electrical transmission lines, which could be above ground or underground. Grading could potentially be required to allow construction and equipment trucks to access turbine sites. Wind turbines would likely be monitored remotely and trips to potential areas would only be made for maintenance and repair.

Power produced from renewable energy systems can fluctuate over the course of a day and may require the use of combined cycle natural gas turbines for generating a consistent amount of energy flowing into the electrical grid. Likely placement of the combined cycle natural gas turbines would be near electrical substations or co-located with the solar panel arrays. The turbines would operate continuously at idle and boost output when required.

The Army would conduct the appropriate level of follow-on NEPA analysis for future development projects identified under this alternative. CEQ regulations address "tiering" for subsequent narrower analyses that will rely on and incorporate the information as provided in this EIS. Tiered analysis, if necessary, will focus on specific project details and more narrow and specific environmental issues.

2.4 Alternatives Considered but Eliminated from Further Consideration

The following alternatives were considered during alternatives development but were eliminated from further consideration for reasons described in each section.

2.4.1 Water Intensive Solar Technologies

The production of renewable energy through water intensive solar technologies, such as CSP thermal electric trough with evaporative water-cooling, power tower, or compact linear fresnel reflector technologies, were considered but dismissed from further evaluation. The extensive use and evaporative loss of water for power plant cooling and energy production does not meet the long-term sustainability goals of Fort Bliss, promote the attainment of Net Zero objectives, or facilitate Fort Bliss' efforts to

support regional water conservation. Such technologies are deemed too water intensive to support the goals of the installation and the community in a region that does not have abundant water resources. The extensive use of water for cooling and energy production could place a substantial burden on area water resources. Therefore, these water intensive solar technologies are not being carried forward for consideration. If a technology becomes available in the future that decreases water dependency to a level that does not adversely affect resource sustainability, these technologies may be considered in the future, and Fort Bliss would complete necessary NEPA analysis.

2.4.2 Alternative Waste-to-Energy Plant Sites

During the preliminary planning process, several potential sites for a WTE plant were considered. One site was considered on land proposed to be transferred to Fort Bliss from the Texas General Land Office located in the southern part of the installation adjacent to the STA. This site was eliminated from further consideration because, at this time, construction of a WTE plant and associated facilities on the site would not be compatible with the land use requirements of the area.

2.4.3 Wind Energy in the Training Areas

Fort Bliss considered development of wind power technology within the Training Areas 24 and 25 and Training Area 16. The development would have included approximately 1,000 acres in Training Areas 24 and 25, and approximately 1,800 acres in Training Area 16. The wind power would support McGregor Base Camp with development of up to 60 MW of renewable energy. The development would include the installation of up to 20 three-MW wind turbines at each site. This alternative was eliminated from further consideration due to concerns from the U.S. Air Force that the spectrum and physical disturbance of wind turbines in the proposed locations would cause substantial encroachment to their flying training mission. In addition, wind turbines and their associated transmission lines would degrade all and totally prevent some low-level flying training on McGregor Range.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the affected environment of Fort Bliss and the surrounding area to form a baseline for analysis of the environmental effects from the alternatives described in Chapter 2. An ROI is described for each resource area. The ROI varies among resources and defines the geographic extent of potential effects from the alternatives on the important elements of that resource. Each section in this chapter delineates its ROI and identifies the topics and resources addressed by that section. Immediately following the affected environment discussion for each resource is the presentation of environmental consequences for each alternative. This chapter describes the direct and indirect effects associated with each alternative. Cumulative effects and mitigation measures are summarized in Chapters 4 and 5, respectively.

The CEQ defines direct effects as those which are caused by the action and occur at the same time and place; whereas, indirect effects are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR §1508.8). For example, impacts from construction of facilities at Fort Bliss would be a direct effect associated with the alternatives, while an increase in local spending by construction workers would be an indirect effect. Impacts are characterized in this EIS as:

- Beneficial – A positive net impact.
- No impact/negligible – An environmental impact that could occur but would be less than minor and might not be perceptible.
- Minor – While impacts would be perceptible, they would clearly not be significant.
- Less than significant – Impact that is not significant but is readily apparent. Additional care in following standard procedures or applying precautionary measures to minimize adverse impacts, may be called for.
- Significant but mitigable – Significant impact anticipated, but the Army can put management actions or other mitigation measures in place to reduce impacts to less than significant.
- Significant – An adverse environmental impact, which, given the context and intensity, violates or exceeds regulatory or policy standards or otherwise exceeds the identified threshold. The significant impact, however, cannot be mitigated with practical means to a level below significance.

Significance thresholds for each resource are included in Table 3-1. The significance criteria are also described for each resource at the beginning of each environmental consequences discussion. CEQ guidelines indicate significance of an impact is determined by the intensity and the context of the impact. Intensity refers to the severity or extent of an impact, and context relates to the environmental circumstances at the location of the impact. Significance criteria were developed in consideration of CEQ's guidance for determining significance (40 CFR §1508.27).

Impacts also are characterized as short-term or long-term. Short-term effects typically are those that would be temporary and associated with the construction phase but would no longer be perceptible once construction is completed or shortly thereafter. Long-term effects are those that would be permanent or would persist for the operational life of the project.

3.1.1 Resource Areas Carried Forward for Analysis

The U.S. Army Environmental Command (USAEC) NEPA Analysis Guidance Manual (USAEC 2007) provides information on the identification of valued environmental components (VECs), which are those resources that are considered to be important by society and potentially at risk from human activities or natural hazards. After consideration of the anticipated impacts associated with the proposed alternatives and information gathered during the scoping process, the following VECs were selected to be carried forward for detailed analysis in this EIS:

- Air Quality
- Airspace
- Biological Resources (including wildlife, vegetation, and sensitive species)
- Cultural Resources
- Energy Demand and Generation
- Geology and Soils
- Hazardous Materials, Hazardous Waste, and Safety
- Land Use
- Noise
- Socioeconomics and Environmental Justice
- Water Resources
- Transportation and Traffic

Table 3-1. Significance thresholds for each Valued Environmental Component

Valued Environmental Component	Significance Threshold
Air Quality	Impacts would be considered significant if emissions would: • Increase ambient air pollution concentrations above the NAAQS • Impair visibility within federally mandated PSD Class I areas • Result in the potential for any stationary source to be considered a major source of emissions as defined in 40 CFR §52.21 (total emissions of any pollutant subject to regulation under the CAA that is greater than 250 tons per year for attainment areas) or • For mobile source emissions, result in an increase in emissions to exceed 250 tons per year for any pollutant
Air Space	Impacts would be considered significant if they: • Restrict movement of other air traffic in the area • Create conflicts with air traffic control in the region • Change operations within airspace already designated for other purposes • Result in a need to designate controlled airspace where none previously existed • Result in a reclassification of controlled airspace from a less restrictive to a more restrictive classification • Result in a need to designate regulatory special use airspace
Biological Resources	Impacts would be considered significant if they were to result in: • Substantial permanent conversion or net loss of habitat at landscape scale • Long-term loss or impairment of a substantial portion of local habitat (species dependent) or substantial loss to a species population resultant from implementation of the Proposed Action • A “take” of threatened and endangered species or other legally protected species (e.g., migratory birds)
Cultural Resources	Impacts would be considered significant if it meets one or more of the following criteria: • The activity would cause an adverse effect to an archaeological, historical, or other cultural site that is listed on or eligible for inclusion in the NRHP, and measures minimizing or mitigating the adverse effect of the resource are not implemented. • The activity involves construction, repair, or maintenance affecting contributing elements to a historic building or district. • The activity would permanently introduce visual, audible, or atmospheric elements that are out of character with the historic property or alter its setting when setting contributes to the property’s qualifications for the NRHP. • The activity would restrict access to a cultural resource of significance to the federally recognize tribes and there has been no attempt to address issues through government-to-government consultation.

Valued Environmental Component	Significance Threshold
Energy Demand and Generation	Impacts would be considered significant if: • The immediate and/or long-term energy demand of Fort Bliss would have the potential to exceed the actual or projected capacity of Fort Bliss or its energy suppliers to provide service, and would not produce enough energy to meet the energy demands to support the Fort Bliss mission. • Or if the Proposed Action would interfere with Fort Bliss' ability to absorb intermittent impacts and variance in peak energy generation.
Geology and Soils	Impacts would be considered significant if they: • Substantially degrade soils, soil fertility, soil productivity, or geologic resources.
Hazardous Materials, Hazardous Waste, and Safety	Impacts would be considered significant if they would result in: • An unacceptable risk of exposure or impact to human health and safety regarding the amount of materials or waste to be handled, stored, used, or disposed of, or probable regulatory violation. • Site contamination conditions would preclude development of the site for the proposed use.
Land Use	Impacts would be considered significant if: • The action would not be consistent with the surrounding land use. • Or the action would not conform to zoning and community land use plans and policies.
Noise	Impacts would be considered significant if: • The impact off-installation would result in noise levels that exceed the City of El Paso's standards. • The impact on-installation would result in noise levels that exceed the USEPA's standards. • Occupational noise levels exceed 85 dB for an 8-hour day.
Socioeconomics and Environmental Justice	Impacts would be considered significant if the estimated impact on socioeconomic VECs, such as employment, business volume, population, and income, would result in: • An impact, as output by the EIFS model, that exceeds the RTV for a particular VEC. • Or if a large number of individuals, groups, businesses, or government entities would be affected and/or if impacts would be readily detectable and observed and/or occur over a wide geographic area and would have a substantial influence on social and/or economic conditions. An environmental justice impact is considered to be significant if the impact from an action alternative disproportionately and adversely affects a minority or low income community. An impact to a population of children is considered to be significant if the impact from an action alternative disproportionately and adversely affects this population of children.

Valued Environmental Component	Significance Threshold
Water Resources	Impacts would be considered significant if they: • Alter the existing pattern of surface or groundwater flow or drainage in a manner that would adversely affect the uses of the water within or outside the project region • Degrade surface or groundwater quality in a manner that would reduce the existing or potential beneficial uses of the water • Would be out of compliance with existing or proposed water quality standards or other regulatory requirements related to protecting or managing water resources • Would not comply with the CWA • Would not comply with the Safe Drinking Water Act
Transportation and Traffic	Impacts would be considered significant if: • LOS is reduced to unacceptable levels (levels E and F), or • Intersections and gates would reach capacity and extensive delays would develop.

Notes: CAA = Clean Air Act, CFR = Code of Federal Regulations, CWA = Clean Water Act, dB = decibel, EIFS = Economic Impact Forecast System, LOS = level of service, NAAQS = National Ambient Air Quality Standards, NRHP = National Register of Historic Places, PSD = Prevention of Significant Deterioration, ROD = Record of Decision, RTV = rational threshold value, USEPA =U.S. Environmental Protection Agency, VEC = valued environmental component

3.1.2 Valued Environmental Components Dismissed from Further Analysis

After consideration of the anticipated impacts associated with the proposed alternatives and information gathered during the scoping process, the following VECs were dismissed from further analysis for the reasons described:

- Wetlands – Very few of the arroyo-riparian drainages and none of the playa lakes on Fort Bliss are jurisdictional wetlands as defined by the U.S. Army Corps of Engineers (USACE). Jurisdictional wetlands are regulated under the Section 404 of the Clean Water Act (CWA) and Executive Order11990, *Protection of Wetlands*. No wetlands are located within any of the project areas for Alternatives 2 through 6. In addition, wetlands would be avoided for any potential future project implemented under Alternative 7. As a result, wetlands are not analyzed further within this EIS.

3.2 Comparison of Environmental Consequences by Alternative with Mitigation Measures

Table 3-2 summarizes the environmental consequences (direct and indirect impacts) of each alternative on the affected resources evaluated in this EIS. This chapter includes a detailed discussion of these environmental consequences.

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Table 3-2. Summary of Environmental Consequences for Alternatives

Resource	Alternative 1: No Action	Alternative 2: Conservation Policies and Procedures	Alternative 3: Water Reclamation Pipeline	Alternative 4: WTE Plant	Alternative 5: Geothermal Energy Facility	Alternative 6: Dry-cooled CSP Technology	Alternative 7: Implement Additional Renewable Energy Development at Compatible Sites	Alternatives Combined
Air Quality	Beneficial impacts from existing policies and programs to reduce GHGs, including planned renewable energy projects. Some reductions in GHG emissions would be realized; however, Fort Bliss would likely not fully meet its GHG reduction mandates.	Beneficial impacts as a result of reduction in energy consumption and corresponding decrease in pollution-emitting equipment.	Less than significant impacts due to construction-related emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Significant but mitigable impacts from WTE plant operational emissions. Less than significant impacts from mobile operational sources. Less than significant impacts from construction-related emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Less than significant impacts from construction and operation emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Less than significant impacts from construction and operation emissions.	Beneficial indirect impacts from replacement of fossil fuel energy production with renewable energy sources. Less than significant impacts from construction and operation emissions.	Beneficial impacts as a result of reduction in energy consumption and corresponding decrease in pollution-emitting equipment and from replacement of fossil fuel energy production with renewable energy sources. Significant but mitigable impacts from WTE plant operational emissions. Less than significant impacts from construction and operation of geothermal facility and dry-cooled CSP.
Airspace	No impacts	No impacts	No impacts	Negligible impacts as WTE facility in both 4A and 4B footprints would be located in compliance with all FAA height and distance requirements relating to the proximity of the boiler stacks to Biggs AAF and El Paso International Airport.	Less than significant impacts from CST glare-potential. No impacts from construction and operation of the geothermal energy facility.	Less than significant impacts from CSP glare-potential.	Less than significant impacts if implemented following screening and environmental criteria.	Less than significant impacts from CSP glare-potential.
Biological Resources	No impacts	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from construction-related ground disturbance and noise. Less than significant impact to migratory birds and bats from operation of small-scale wind turbines.	Significant but mitigable impacts to vegetation from irrigation with reclaimed water. Less than significant impacts to wildlife and sensitive species resulting from construction-related ground disturbance and noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise.	Significant but mitigable impacts to vegetation from irrigation with reclaimed water. Less than significant impacts to vegetation, wildlife, and sensitive species resulting from loss of vegetation/ habitat from facility and road construction and disturbance to wildlife and sensitive species from construction-related noise. Less than significant impact to migratory birds and bats from operation of small-scale wind turbines.
Cultural Resources	No Impacts	Less than significant impacts to cultural resources resulting from potential modifications to historic architectural resources. Section 106 process would be completed prior to implementation of construction.	Significant but mitigable impacts to parade-ground vegetation from irrigation with reclaimed water. Less than significant impacts to cultural resources from the pipeline construction. Section 106 process would be completed prior to construction.	Less than significant impacts to archeological sites from possible disturbance from construction. Section 106 process would be completed prior to construction.	Less than significant impacts to cultural resources, resulting from construction disturbance and dependent on an archaeological survey. Section 106 process would be completed prior to construction.	Less than significant impacts to cultural resources resulting from construction disturbance. Section 106 process would be completed prior to construction.	Less than significant impacts to cultural resources resulting from construction disturbance. Section 106 process would be completed prior to construction.	Similar to that discussed for Alternatives 2 through 7. Significant but mitigable impacts to parade-ground vegetation from irrigation with reclaimed water. Less than significant impacts to cultural resources from construction. Section 106 process would be completed prior to construction.
Energy Demand and Generation	No Impacts. No beneficial impacts would be realized from reduced Fort Bliss energy demand through Net Zero implementation.	Beneficial impacts to energy demand from reduced energy demand resulting from implementation of conservation policies and procedures.	Negligible impacts	Beneficial impacts toward increased energy security as a result of renewable energy generation adjacent to the Installation boundary and its contribution to meet Net Zero energy goals.	Beneficial impacts to energy generation due to increased onsite renewable energy generation. However, implemented alone would not generate enough renewable energy to meet Net Zero energy goals.	Beneficial impacts to energy generation due to increased on-site renewable energy generation. However, implemented alone would not generate enough onsite renewable energy to meet Net Zero energy goals.	Development would be compatible with environmental screening criteria; however, impacts are not fully characterized at this time. Additional NEPA would be completed to fully characterize impacts.	Beneficial impacts to energy generation due to increased renewable energy generation. Would accommodate the existing base and peak load and the 2015 base load but not the 2015 peak load.

Resource	Alternative 1: No Action	Alternative 2: Conservation Policies and Procedures	Alternative 3: Water Reclamation Pipeline	Alternative 4: WTE Plant	Alternative 5: Geothermal Energy Facility	Alternative 6: Dry-cooled CSP Technology	Alternative 7: Implement Additional Renewable Energy Development at Compatible Sites	Alternatives Combined
Geology and Soils	No Impacts	Negligible impacts to soils from ground disturbance.	Less than significant impacts to soils, resulting from construction-related ground disturbance, soil removal, increased erosion potential, and reclaimed water irrigation. No impacts to geologic features.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and no impacts to geologic features.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and less than significant impacts to geologic features from the construction of the wells.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and no impacts to geologic features.	Less than significant impacts to soils, resulting from construction-related ground disturbance and increased erosion potential and less than significant impacts to geologic features from construction.	Significant impacts to soils, resulting from combined construction-related ground disturbance and increased erosion potential.
Hazardous Waste, Hazardous Materials, and Safety	No Impacts	Beneficial impacts from the reduction in waste generation.	Less than significant impacts from the potential for minor petroleum leaks from construction equipment.	Less than significant impacts from the potential for leaks and spill of chemicals and petroleum products from the operation of all facilities. Less than significant impacts from handling and disposal of ash.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.	Less than significant impacts from the potential for leaks of petroleum products related to the construction and operation of the facilities.
Land Use	No Impacts	Negligible impacts from small changes to land use.	Minor impacts resulting from construction and the small alteration of existing land use.	Less than significant impacts due to alteration of existing land use from construction.	Less than significant impacts due to alteration of existing land use from construction.	Significant impacts from the conversion of training land to developed land. Less than significant impacts due to alteration of existing land use from construction.	Less than significant impacts due to alteration of existing land use from construction.	Significant impacts from the conversion of training land to developed land. Less than significant impacts due to alteration of existing land use from construction.
Noise	No Impacts	Negligible Impacts	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction and operation of the WTE plant.	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction.	Less than significant impacts from noise during construction and operation under each alternative.
Socioeconomics and Environmental Justice	No Impacts	Beneficial impacts to economic growth associated with the procurement of goods and services. Potential less than significant impacts to the local economy from increased utility rates	Beneficial impacts to economic growth associated with the procurement of goods and services. Negligible impacts to housing, government and emergency services, and utilities. No impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth associated with the procurement of goods and services and facility operation and to housing. Less than significant impacts to government and emergency services, and utilities. Adverse, but not disproportionate, impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth associated with the procurement of goods and services and to housing. Less than significant impacts to government and emergency services, and utilities. No impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth associated with the procurement of goods and services and to housing. Less than significant impacts to government and emergency services, and utilities. No impacts to environmental justice and the protection of children.	Beneficial impacts to economic growth or housing could occur depending on the scale and type of future renewable energy sources. Less than significant impacts to government and emergency services and utilities are expected and no impacts to environmental justice or protection of children are expected.	Beneficial impacts to economic growth associated with the procurement of goods and services and to housing. Less than significant impacts to government and emergency services, and utilities. Adverse, but not disproportionate, impacts to environmental justice and the protection of children.
Water Resources	No Impacts. No beneficial impacts to water resources and aquifer recharge would be realized from implementation of Net Zero water goals.	Beneficial impacts to surface water and groundwater supply sources from the implementation of conservation policies and procedures.	Beneficial impacts from the reuse of wastewater for secondary purposes. Less than significant impacts to surface and groundwater from construction.	Less than significant impacts to surface and groundwater from construction and water requirements for the operation of the WTE plant. Potential for significant impacts to water resources under Alternative 4B if water supply was primarily from potable water.	Beneficial impacts could occur to water demand from a lower water use generation source due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and potential for contamination of groundwater from facility operation.	Beneficial impacts could occur to water demand from a lower water use generation source due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and water requirements associated with facility operation.	Beneficial impacts could occur to water demand from a lower water use generation source due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and facility operation.	Beneficial impacts could occur to water demand from a lower water use generation sources due to existing energy source changes. Less than significant impacts to surface and groundwater from construction and potential for contamination of groundwater from facility operation.
Transportation and Traffic	No Impacts	No Impacts	Less than significant impacts from construction traffic.	Significant but mitigable impacts from construction traffic. Less than significant impacts from operational employee and truck traffic associated with the WTE plant operation.	Less than significant impacts from construction traffic and no impacts from traffic associated with facility operation.	Less than significant impacts from construction traffic and traffic associated with facility operation.	Less than significant impacts from construction traffic and traffic associated with facility operation.	Significant but mitigable impacts from construction traffic under Alternative 4. Less than significant impacts from construction traffic and traffic associated with facility operation under Alternatives 3, 5, and 6.

Notes: AAF = Army Airfield, CSP = concentrating solar power, CST = concentrating solar thermal, GHG = greenhouse gas, NEPA = National Environmental Policy Act, WTE = waste-to-energy

3.3 Air Quality

Air quality is defined by ambient air concentrations of specific pollutants that the USEPA has determined to be of concern for the health and welfare of the general public and the environment. The primary pollutants of concern, called criteria pollutants, include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended particulate matter less than or equal to 10 microns in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). Under the CAA, the USEPA has established National Ambient Air Quality Standards (NAAQS) (40 CFR §50) for these pollutants. Areas that are and have historically been in compliance with the NAAQS are designated as attainment areas. Areas that violate a federal air quality standard are designated as non-attainment areas. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment. The NAAQS represent the maximum levels of background pollution that are considered safe, including an adequate margin of safety, to protect public health and welfare. Short-term standards (1-, 3-, 8-, and 24-hour periods) are established for pollutants contributing to chronic health effects.

The Texas Commission on Environmental Quality (TCEQ) has adopted the NAAQS, which are presented in Table 3-3. In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants (HAPs), which are regulated under Section 112(b) of the 1990 CAA amendments. The National Emission Standards for Hazardous Air Pollutants regulate HAP emissions from stationary sources (40 CFR §§61 and 63).

HAPs emitted from mobile sources are called Mobile Source Air Toxics (MSATs). MSATs are compounds emitted from highway vehicles and non-road equipment that are known or suspected to cause cancer or other serious health and environmental effects. In 2001, the USEPA issued its first MSATs Rule, which identified 21 compounds as being HAPs that required regulation. A subset of six of these MSAT compounds were identified as having the greatest influence on health and included benzene; 1,3-butadiene; formaldehyde; acrolein; acetaldehyde; and diesel particulate matter. More recently, the USEPA issued a second MSAT Rule in February 2007, which generally supported the findings in the first rule and provided additional recommendations of compounds having the greatest impact on health. The rule also identified several engine emission certification standards that must be implemented.

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. Many factors, including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions, influence a region's air quality.

Table 3-3. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standards	Secondary Standards
Carbon monoxide	8-hours	9 ppm (10 mg/m^3)	None
	1-hour	35 ppm (40 mg/m^3)	
Lead	Rolling 3-month average	0.15 µg/m^3	Same as primary
Nitrogen dioxide	Annual (arithmetic average)	53 ppb	Same as primary
	1-hour	100 ppb	None
PM_{10}	24-hour	150 µg/m^3	Same as primary
$PM_{2.5}$	Annual (arithmetic average)	12.0 µg/m^3 [a]	15 µg/m^3
	24-hour	35 µg/m^3	Same as primary
Ozone	8-hour	0.075 ppm	Same as primary
	3-hour	None	0.5 ppm
	1-hour	75 ppb	None

Source: USEPA (2012)

Notes: PM_{10} = suspended particulate matter, $PM_{2.5}$ = fine particulate matter, ppb = parts per billion, ppm = parts per million, mg/m^3 = milligrams per cubic meter, µg/m^3 = micrograms per cubic meter

[a] Published 14 December 2012. The USEPA anticipates making initial attainment/nonattainment designations by December 2014 with those designations likely becoming effective in early 2015.

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as CO, SO_2, Pb, and some particulates, are emitted directly into the atmosphere from emission sources. Secondary pollutants, such as O_3, NO_2, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. Airborne emissions of Pb are only evaluated for WTE plant emissions because that would be the only Pb emission source associated with the Proposed Action.

Areas that are and have historically been in compliance with the NAAQS are designated as better than national standards or unclassifiable/attainment. Attainment status is discussed further in Section 3.2.1.

3.3.1 Affected Environment

Defining an ROI for air quality requires knowledge of: 1) the type of emissions; 2) location(s) of the sources of emissions (for stationary sources) and the horizontal and vertical extent of emissions from mobile sources, such as automobiles; 3) emission rates of the pollutant sources; 4) the proximity of

existing emission sources to those sources associated with the Proposed Action; and 5) local and regional climate conditions. The ROI for emissions can vary from less than a mile to more than 30 miles, depending on the pollutant. For example, the affected area for emissions of inert pollutants (pollutants other than O_3, its precursors, or NO_2) is generally limited to a few miles downwind of a source, while O_3 and NO_2 generally extend much farther downwind.

The ROI for the air quality analysis includes portions of the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region (AQCR) (40 CFR §81.82). The entire AQCR includes the Texas counties of Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio; and the New Mexico counties of Doña Ana, Lincoln, Otero, and Sierra. Fort Bliss is located in the portion of the AQCR that includes El Paso County in Texas and Doña Ana and Otero counties in New Mexico. Fort Bliss, while located in parts of each of the three counties in the AQCR, is not located in any nonattainment area; therefore, the CAA General Conformity Rule (40 CFR §§51 and 93) does not apply and is not addressed in the impact analysis presented in this chapter. Fort Bliss, as well as the remainder of the three counties, will be the focus of the emissions impact analysis.

The USEPA has classified portions of the AQCR for criteria pollutants; it has classified El Paso County (40 CFR §81.344) for the criteria pollutants. The only areas designated as nonattainment include a narrow strip of the city of El Paso along the Rio Grande, adjacent to Ciudad Juarez, Mexico, that is a designated "maintenance area" for CO and the city of El Paso, which was designated a nonattainment for PM_{10} in 1990. The USEPA also has classified Doña Ana and Otero counties in New Mexico (40 CFR §81.332) for criteria pollutants. A portion of Doña Ana County (Anthony, New Mexico) is designated as moderate nonattainment for PM_{10}.

The ROI is located in the northern Chihuahuan Desert and has a subtropical desert climate characterized by low rainfall and humidity, hot summers, moderate winters, wide temperature variations, and more than 200 days of sunshine annually. Much of the annual precipitation occurs in July, August, and September in the form of brief, heavy rainstorms that can frequently cause localized flooding. Periods of extreme dryness can last up to several months, and much of the state, including the ROI, has suffered from a severe drought that began in the fall of 2010.

The annual average temperature is 17°C (63.3°F), with a record low of minus 13°C (8°F) and a record high of 46°C (114°F). Daytime humidity is generally low, ranging from 10 to 14 percent. Because of the mountainous terrain and the Rio Grande Valley, there are large diurnal and regional fluctuations in humidity within the ROI.

During the winter, average wind speeds range from 8.2 to 9.0 miles per hour (mph) and are predominantly from the north. The highest average wind speeds (11.3 mph) occur during early spring. The combination of moderately strong sustained winds and the low average precipitation contribute considerably to the occurrence of dust and sand storms in the area. These storms can have a substantial impact on air quality and as a result, both El Paso and Doña Ana County have implemented Natural Events Action Plans to address potential exceedances of the PM_{10} NAAQS due to high wind events. Prevailing wind patterns associated with the area high-wind events make it unlikely that Fort Bliss land holdings are a significant PM_{10} contributor; however, Fort Bliss is party to both Natural Events Action Plan agreements. Monitoring stations in El Paso recorded exceedances for PM_{10} in 2009 to 2011. Stations in Doña Ana County also have recorded exceedances of PM_{10} (2008). During the summer months, average wind speeds drop to their lowest levels of the year (less than 8.0 mph). The predominant wind direction during the summer months is from the south-southwest.

The closest Prevention of Significant Deterioration (PSD) Class I area is the Guadalupe Mountains National Park, which is 55 miles east of Fort Bliss.

3.3.2 Environmental Consequences

This section provides a description of the impacts associated with implementation of any of the seven alternatives. The analysis evaluates projected future emissions, including construction and operations, to determine potential impacts. Significance thresholds for air quality impacts are presented in Table 3-1. Pollutants considered in this analysis include the criteria pollutants. Airborne emissions of Pb are only evaluated for WTE plant emissions because that would be the only Pb emission source associated with the Proposed Action.

For mobile source criteria pollutant emissions, 250 tons per year per pollutant was used as a comparative analysis threshold. The USEPA uses this value in its New Source Review standards as an indicator for impact analysis for listed new major stationary sources in attainment areas. No similar regulatory threshold is available for mobile source emissions, which are the primary sources for the construction phases and also a component of operational emissions for the Proposed Action. Lacking any mobile source emissions thresholds, the 250 ton per year major stationary source threshold was used to equitably assess and compare mobile source emissions.

For stationary sources, the operational emissions of the sources are evaluated against the 250 ton per year criteria pollutant threshold and the 10 tons per year for individual HAPs or 25 tons per year for any HAP aggregate.

3.3.2.1 Alternative 1 – No Action

The Net Zero initiatives for energy, water, and waste would not be implemented at Fort Bliss; therefore, no new construction would occur, and no new operational emissions would result. Electricity would continue to be provided by EPEC. Power that EPEC supplies to Fort Bliss is primarily generated at two power plants fueled by natural gas (EPEC 2012a). If the Proposed Action were not implemented, no impacts to air quality would occur. No beneficial impacts to GHG reduction would be realized from the replacement of fossil fuel energy sources with renewable energy sources and the implementation of conservation measures. Under Alternative 1, Fort Bliss would not likely meet its energy consumption, energy production, and GHG-reduction mandates.

3.3.2.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement policies, procedures, and BMPs to maximize resource re-use, limit waste generation, increase resource re-purposing, and increase water and energy use efficiencies in new and existing facilities. No or very limited construction impacting 5 acres or less would occur, and no new stationary sources would result by implementing Alternative 2. The air quality impact of the conservation policies and procedures would be a net benefit to the region as there would be an associated decrease in energy consumption and likely reductions in the use of pollution-emitting equipment, as well as replacement of old equipment with new, cleaner technologies.

3.3.2.3 Alternative 3 – Water Reclamation Pipeline

Air emissions associated with the water reclamation pipeline would be essentially confined to the construction phase of this alternative. Implementation of the pipeline would result in construction of 23.7 miles of trench.

Air emission impacts from the construction of the pipeline and associated equipment are shown in Table 3-4. As shown, impacts to air quality from implementation of this alternative would be less than significant. No air emissions of any significance are expected to occur as a result of operation of the water reclamation pipeline.

Table 3-4. Estimated Construction Emissions for Reclaimed Water Pipeline

	VOCs	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2e (metric tonnes per year)
	(tons per year)						
2016	0.51	2.71	6.68	0.13	30.55	3.37	743
Significance threshold	250	250	250	250	250	250	25,000

Notes: VOC = volatile organic compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_x = sulfur oxides, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalents

3.3.2.4 Alternative 4 – Waste-to-Energy Plant

Fort Bliss would pursue the construction and operation of a WTE plant to reduce landfill waste. Several types of WTE technologies are under consideration for this alternative. As described in Chapter 2, technologies considered include mass-burn incineration, gasification, pyrolysis, anaerobic digestion, and fermentation. Mass burn incineration is the most conventional technology available, but it is relatively inefficient. However, because it is the most common and may have the highest emission rates, it was selected for detailed analysis.

Construction Impacts

Construction of the WTE plant is expected to last 2 years (National Renewable Energy Laboratory [NREL] 2012) and employ 600 to 800 workers. The building itself has an assumed average height of 5 stories and the complex of buildings in total is assumed to consume 9 acres of the total 40-acre footprint. The remainder of the property is asphalt, concrete, or gravel depending upon use. Construction of 14 miles of transmission lines would take up approximately 6 months and involve 15 workers onsite. Two locations are possible for the WTE (Alternatives 4A and 4B). Because the locations are fairly close to each other, it was assumed that similar amounts of new road and new transmission lines would be constructed. The construction footprint would be the same. Operationally, there would be no difference between the two locations; therefore, the air quality analysis is identical for both Alternatives 4A and 4B. Construction emissions were calculated and evenly split across the 2-year period and are provided in Table 3-5. As shown, the emissions from construction of the WTE Complex would be less than significant.

Table 3-5. Estimated Construction Emissions for WTE Complex 2016–2017

	VOCs	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2e (metric tonnes per year)
	(tons per year)						
2016	2.35	23.29	27.02	0.24	31.68	4.42	2,729
2017	2.11	24.57	27.72	0.34	33.23	4.45	2,810
Significance threshold	250	250	250	250	250	250	25,000

Notes: VOC = volatile organic compound, CO = Carbon monoxide, NO_x = Nitrogen oxides, SO_x = Sulfur oxides, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalents

Direct Impacts from Operations

Direct impacts of Alternative 4 are anticipated to be significant but mitigable. These impacts would result from the daily operation of the 45-MW WTE plant. The WTE plant operations would result in emissions from the actual combustion of waste, emissions from support equipment, and emissions from the staff commuting from the El Paso area to Fort Bliss. The majority of the pollutants associated with the WTE plant would be a result of the combustion of the MSW. The WTE plant would process 1,100 tons of

MSW per day and would combust approximately 70 percent of the MSW. Approximately 30 percent of the waste would likely require sorting from the feed stream due to characteristics that would make it difficult to combust. Waste would be screened prior to combustion to ensure that hazardous waste is not included in the waste stream. It is expected that the WTE would operate one of the two boilers 24 hours a day, 365 days a year to maintain electricity generation requirements. Approximately 100 personnel would be needed to operate the WTE plant, and up to 100 garbage trucks of MSW would be delivered to the plant each day from the Fort Bliss and El Paso communities. An additional 30 trucks per day would deliver ash from the WTE plant to the greater El Paso landfill in Clint, Texas.

The WTE plant is subject to permitting requirements under the federal PSD program, including the New Source Review. The operator of the WTE plant would be required to apply for a permit from the TCEQ prior to construction. The New Source Review permit would be obtained prior to construction, and a Title V operating permit would be obtained prior to operation. It is expected that these permits would be held by the contractor that would design and operate the plant, not Fort Bliss. The WTE plant also would have to comply with New Source Performance Standards for MSW combustors. It is expected that the WTE plant would be controlled by the appropriate air pollution control devices (APCDs) to meet emissions requirements of the PSD program and the New Source Performance Standards. These APCDs are evaluated to obtain the best available control technology and Lowest Achievable Emissions Rate technology. BMPs would be in place to ensure proper combustion to meet air pollutant control requirements. An experienced firm, one that would most likely operate similar plants across the U.S. and Europe, would design and operate the WTE plant. During operation of the plant, the contractor would make every effort to avoid excessive emissions; however, it is possible that occasional malfunctions would occur in an APCD and emissions would be temporarily higher. Permit conditions would most likely be set with requirements for upset conditions (i.e., when emission limits are not met because of a malfunction) and detail the appropriate actions the contractor would be required to take to maintain compliance.

The estimated controlled emissions from operation of the plant are presented in Table 3-6. The control technology assumed for the WTE plant is a spray dryer and fabric filter combination. Nitrogen oxide (NOx) would be controlled using selective non-catalytic reduction (SNCR) technology.

Ancillary equipment anticipated to be included with the WTE plant would be two diesel fire pumps, an emergency generator, and storage silos for dry chemicals. Emissions were estimated for the diesel fire pumps and emergency generator, and the results are included in operation emissions in Table 3-7. Based on review of dry chemical storage silos at similar facilities in the United States (ECT 2012), it is estimated that annual emissions from the silos would be less than 0.05 ton of particulate matter, which is

Table 3-6. Prevention of Significant Deterioration Pollutant Applicability

Pollutant	Spray Dryer/Fabric Filter[a] (ton per year)	Significant Source Threshold[b]	Exceeds Threshold?
Carbon monoxide (CO)	65	100	No
Nitrogen oxides (NOx)	275	40	**Yes**
Particulate matter (PM)	9	25	No
Sulfur dioxide (SO_2)	78	40	**Yes**
Volatile organic compounds(VOC)	17.46	40	No
Lead (Pb)	0.04	0.6	No
Fluoride (as HF)	3.97	3	**Yes**
Sulfuric acid mist	0.01	7	No
CDD/CDF	9.29E-06	3.50E-06	**Yes**
Arsenic (As)	0.00	See MWC metals	
Cadmium (Cd)	0.00		
Chromium (Cr)	0.00		
Mercury (Hg)	0.31		
Nickel (Ni)	0.01		
Municipal waste combustor (MWC) metals	0.33	15	No
Hydrochloric acid (HCl)	30	40	No
Carbon dioxide equivalents (CO_2e)	253,357	100,000	**Yes**

Note: CDD/CDF = total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofurans, 2,3,7,8-tetrachlorodibenzo-p-dioxin, and dibenzofurans

[a] Controlled emissions as estimated by AP-42 method or Mass Balance Method. The spray dryer/fabric filter is a probable control technology.

[b] 40 CFR §52.21(b)(23)(i), PSD significant thresholds.

Table 3-7. Estimated Controlled Potential to Emit from the Proposed Waste-to-Energy Plant and Auxiliary Stationary Equipment

Pollutant	Controlled (SD/FF/SNCR) Emissions (tons per year)[a]	WTE Auxiliary Equipment (fire pumps, emergency generators)[b]	Total Emissions from WTE Stationary Sources	Significant Source Threshold [c]	Exceeds Threshold?
VOC	17.46	6.39E-03	17.47	40	No
CO	65	0.08	65.14	100	No
NOx	275	0.14	275.29	40	**Yes**
SO_2	78	5.46E-03	77.86	40	**Yes**
PM	9	7.09E-03	8.72	25	No
CO_2e (MT/year)	253,357	27.77	253,384	100,000	**Yes**
Lead (Pb)	0.04	--	0.04	0.6	No
Fluoride (as HF)	3.97	--	3.97	3	**Yes**
Sulfuric acid mist	0.01	--	0.01	7	No
CDD/CDF	9.26E-06	--	9.26E-06	3.50E-06	**Yes**
Arsenic	5.94E-04	--	5.94E-04	See MWC metals below	
Cadmium	3.81E-03	--	3.81E-03		
Chromium	4.22E-03	--	4.22E-03		
Mercury	0.31	--	0.31		
Nickel	0.01	--	0.01		
MWC metals	0.33	--	0.33	15	No
Hydrochloric acid	29.65	--	29.65	40	No
Total HAPs	34.31	--	34.31	25	**Yes**

Notes: CDD/CDF = total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofurans, 2,3,7,8-tetrachlorodibenzo-p-dioxin, and dibenzofurans, HAP = hazardous air pollutant.

[a] Controlled emissions as estimated by AP-42 method or Mass Balance Method. The spray dryer/fabric filter is a probable APCD configuration (WPB REF No. 2 2010).

[b] Additional stationary equipment at WTE plant (emergency generator, diesel fire pumps). Combustion of diesel fuel has negligible emissions of heavy metals, acid gases, and lead.

[c] 40 CFR §52.21(b)(23)(i), PSD significant thresholds with the exception of total HAPs.

very low compared to other equipment processes and operations associated with Alternative 4. Low emissions rates are due to the construction and recommended control technologies for dry chemical storage silos. It is assumed all best available control technologies for the silos would be implemented, in accordance with regulatory requirements.

Appendix C, *Air Quality Study*, details the possible combustion technology, APCDs, the applicable regulations, and BMPs for the WTE plant operation.

To evaluate the WTE plant emission impacts on the closest Class I area, Guadalupe Mountains National Park, the Federal Land Manager's Air Working Group (FLAG)-recommended "initial screening test" methodology was used (FLAG 2010). This test is based on screening criteria introduced by the USEPA as part of its Regional Haze Regulation. For stationary sources located greater than 50 kilometers (31 miles) from the subject Class I area, the quantity over distance (Q/D) test is applied to determine whether or not any further visibility analysis is necessary. Q/D is the estimated annual emissions over distance value that constitutes the initial screening test. A value less than or equal to 10 is presumed to have no adverse impact and no further analysis is required. Based on these criteria, the USEPA has concluded that the following sources would not be considered to cause or contribute to visibility impairment:

- Stationary sources located more than 50 kilometers (31 miles) from any Class I area that emit less than 500 tons per year of NOx or SO_2 (or NOx and SO_2 combined)
- Stationary sources located more than 100 kilometers (62 miles) from any Class I area that emit less than 1,000 tons per year of NOx or SO_2 (or NOx and SO_2 combined)

In addition to the above thresholds, the FLAG guidance also evaluates PM_{10}, and sulfuric acid mist because these pollutants also adversely affect visibility and contribute to other resource impacts. The federal land manager (FLM) would consider a source located greater than 50 kilometers (31 miles) from Class I area to have negligible impacts with respect to Class I Air Quality Related Values if its total SO_2, NOx, PM_{10}, and sulfuric acid (H_2SO_4) annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in kilometers) from the Class I area is 10 or less.

Table 3-8 presents the conclusions from applying the Q/D test to the estimated controlled potential to emit (PTE) for the WTE plant. The plant meets the Q/D test with a value of 4.09, well below the significance threshold of less than 10. It should be noted that the annual estimate is based on assumptions for APCD, throughput, and operational characteristics because the 24-hour maximum emissions cannot be estimated at this time.

Table 3-8. Estimated Annual Emissions from Waste-to-Energy Plant Compared to FLAG Q/D

Pollutant	Controlled Emissions from WTE Plant (Q)	Q/D (Q/88.5 km)	Significance Threshold	Result
Total NOx+ SO_2+ PM_{10}+ H_2SO_4(T/Year)	361.88	4.09	< 10	Not Exceeded

Section 165 of the CAA requires the USEPA or the state/local permitting authority to notify the FLM of any new or modified major facility proposing to locate with 100 kilometers (62 miles) of a Class I area. The TCEQ would be required to forward the WTE PSD application to the FLM for review and analysis as soon as possible after receipt.

Controlled emissions from the WTE plant include the stack emissions from the plant after passing through the APCD that for the purposes of this analysis include spray dryer/fabric filter and an SNCR for NOx as the preferred controls and emissions from auxiliary diesel internal combustion engines. These emissions are compared to PSD regulatory significant thresholds. The controlled WTE plant and auxiliary equipment exceed the significance threshold for NOx, SO_2, carbon dioxide equivalents (CO_2e), fluoride, CDD/CDF, and total HAPs. These emissions would have to be addressed during the final design stage and permitting process through:

- Using additional or different equipment and controls to reduce the potential to emit below the major source threshold
- Implementing operating limits to achieve PTE below the major source threshold
- Obtaining emission offsets from other previously decommissioned sources within the region
- Demonstrating that the NAAQS are not exceeded through dispersion modeling and analysis as part of the PSD permitting process

Based on the estimated activity levels, the emissions from the mobile sources associated with the WTE plant would be less than significant because they would not exceed 250 tons per year (Table 3-9).

In addition to WTE plant operations, sources of emissions associated with Alternative 4 include the garbage trucks operating on Fort Bliss and employees who work at the WTE plant and are commuting to work. The estimated annual emissions from these mobile sources are shown in Table 3-9. Based on the estimated activity levels, the emissions from mobile sources associated with Alternative 4 would be less than significant.

Table 3-9. Estimated Annual Emissions from Mobile and Area Sources under Alternative 4

Source	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$	CO_2e (metric tonnes per year)
	(tons per year)						
WTE commuters	0.31	9.89	1.42	0.00	0.06	0.05	285.64
Garbage trucks	0.73	3.87	17.38	0.01	0.72	0.70	1,504
Total	**0.1.04**	**13.76**	**18.80**	**0.01**	**0.78**	**0.75**	**1790.10**
Significance threshold	**250**	**250**	**250**	**250**	**250**	**250**	**25,000**

Notes: VOC = volatile organic compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_2 = sulfur dioxide, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalent

Indirect Impacts from Operations

The implementation of Alternative 4 would add electrical power generating capability to Fort Bliss supporting Net Zero goals and energy mandates for renewable energy production and GHG emissions reductions. In order to evaluate indirect impacts, the emissions from the WTE plant were compared to the emissions that would be generated to provide the same electricity requirements from EPEC, which provides power to Fort Bliss. The power supplied from EPEC is most likely from the output of two local natural gas-fueled power plants, however, electrical power could be from coal, nuclear, or solar power plants. The comparisons are shown in Table 3-10.

Table 3-10. Potential Indirect Emissions Impacts under Alternative 4, Waste-to-Energy Plant (Direct Power Generation Only)

Emissions	VOCs	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (metric tonnes per year)
	(tons per year)						
45-MW generated at EPEC natural gas-fueled power plants	19	67	394	1	8	8	281,798
Controlled WTE emissions	17	65	275	78	9	<9	253,357
Comparative emissions result	-2	-2	-119	76	0	<1	-28,442

Notes: EPEC = El Paso Electric Company, WTE = waste-to-energy, VOC = Volatile Organic Compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_2 = sulfur dioxide, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalent

The emissions from the EPEC plants would be higher for every pollutant but SO_2. The higher SO_2 is a result of the assumed control technology. Overall, the emissions generated under Alternative 4 for Fort Bliss' use would be lower than the emissions generated to produce the same power supply through commercial means today.

3.3.2.5 Alternative 5 – Geothermal Energy Facility

Development of a geothermal energy facility would have an estimated 20-MW production output and would include a CST array, located on 20 acres adjacent to the facility. Construction activities, such as well field development, site preparation, plant construction, and pipeline installation, are estimated to require 35 construction workers for 36 months (Hillisheim 2013).

Table 3-11 presents construction emissions for the geothermal facility. Construction emissions are from the operation of heavy duty diesel equipment, onsite construction workers' privately owned vehicles, and fugitive dust from land-disturbing activities.

Table 3-11. Estimated Construction Emissions for Geothermal Plant 2016–2017

	VOCs	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2e (metric tonnes per year)
	(tons per year)						
2016	0.55	3.08	10.40	0.18	5.09	0.87	979
Significance threshold	250	250	250	250	250	250	25,000

Notes: VOC = volatile organic compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_x = sulfur oxides, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalent

Geothermal energy production has a lower environmental impact than current power production methods used (i.e., EPEC natural gas-powered power plants) because the energy source is underground and the surface energy conversion equipment is relatively compact, making the overall footprint of the system small. Geothermal power plants that operate with a closed-loop circulation, as envisioned for the Fort Bliss facility, have minimal GHG and other emissions. Because geothermal power plants provide dispatchable base-load capacity, there are no storage or backup-power requirements, which further reduce air emission source issues (Massachusetts Institute of Technology 2006). At this time, Fort Bliss does not know how hot the geothermal resource is and therefore whether or not it is viable. A study is currently under way to determine this; however, the study will not be available until September 2013. Because specifics on the geothermal capacity are not available, quantitative assessment of operational air emissions cannot be made, though the anticipated impact would be less than significant based on the relatively minimal emissions typically associated with geothermal energy facilities in general. Control equipment technology is readily available for potential geothermal-specific emissions, such as hydrogen sulfide and ammonia. Any requirements for these control technologies would be included during the plant air permitting process.

An estimated three to six operation and maintenance employees may be required. Operation emissions include an estimated five vehicles commuting to the facility each day. Table 3-12 presents operational emissions for the geothermal plant with CST array.

Table 3-12. Alternative 5 – Geothermal Plant with Concentrating Solar Thermal Array Operational Emissions

	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2e (metric tonnes per year)
	(tons per year)						
Staff commute	0.03	0.88	0.13	0.00	0.01	0.00	25.44

Notes: VOC = volatile organic compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_x = sulfur oxides, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalent

Overall, the emissions generated under Alternative 5 for Fort Bliss would be lower than the emissions generated to produce the same power supply through commercial means today. Potential beneficial indirect impacts could result in a regional reduction in air pollution due to power generation from a renewable source.

3.3.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Alternative 6 includes the installation and operation of a stand-alone CSP array that would be located on up to 300 acres within the STA environs. Transmission lines would be constructed and tied in with the East Bliss Substation.

Construction emissions are presented in Table 3-13 and were calculated based on a 2-year construction period. The transmission lines for this alternative are estimated to be 7 miles long. As indicated in Table 3-13, air emission impacts from the construction of the CSP would be less than significant.

Table 3-13. Estimated Construction Emissions for Concentrating Solar Power Array with Dry-cooled Technology

	VOCs	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2e
	(tons per year)						(metric tonnes per year)
2016	2.19	23.04	30.76	0.57	98.07	10.77	4,076
2017	1.94	21.77	28.23	0.53	64.85	7.39	3,661
Significance threshold	250	250	250	250	250	250	25,000

Notes: VOC = volatile organic compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_x = sulfur oxides, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalent

Air pollutant emissions from the operation of the CSP array include the staff commute of approximately 28 people and negligible fugitive emissions from the cooling system of the CSP. The fugitive emissions from the cooling system of the CSP could occur during maintenance of the system because 100 percent capture is unlikely. Additionally, seals and pipes for the CSP may not be absolutely leak proof. However, the CSP would be maintained to keep fugitive emissions to a minimum, so they are not calculated as part of the impact analysis because air emissions would be negligible.

Estimated air emissions from the staff commutes are included in Table 3-14. Based on the estimated activity levels, the emissions from the mobile sources associated with the CSP operation would be less than significant.

Table 3-14. Alternative 6 – Concentrating Solar Power Worker Commute Emissions

	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	CO_2e
	(tons per year)						(metric tonnes per year)
Staff commute	0.09	2.74	0.39	0.00	0.02	0.01	79.13

Notes: VOC = volatile organic compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_x = sulfur oxides, PM_{10} = suspended particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = carbon dioxide equivalent

In order to evaluate indirect impacts of implementing Alternative 6, the emissions from the CSP array were compared to the emissions that would be generated to provide the same electricity requirements from EPEC, which provides power to Fort Bliss. The comparisons are shown in Table 3-15.

Table 3-15. Potential Indirect Emissions Impacts Concentrating Solar Power Array under Alternative 6

Emissions	VOCs	CO	NOx	SO_2r	PM_{10}	$PM_{2.5}$	CO_2e (metric tonnes per year)
	(tons per year)						
50 MW generated at EPEC natural gas-fueled power plants	21	74	438	2	9	9	313,109
Emissions from CSP plant power generation[a]	0	0	0	0	0	0	0
Comparative emissions result	–21	–74	-438	-2	–9	–9	–313,109

Notes: CSP = concentrating solar power, EPEC = El Paso Electric Company, VOC = Volatile Organic Compound, CO = Carbon monoxide, NO_x = Nitrogen oxides, PM_{10} = coarse particulate matter, $PM_{2.5}$ = fine particulate matter, CO_2e = Carbon dioxide equivalent

[a] CSP power generation is assumed to produce negligible emissions rounded to 0.

The emissions from the EPEC plants would be higher for every pollutant. Other than the less than significant emissions during construction and negligible commuter emissions, solar energy generation would have no emissions and would be lower than the emissions generated to produce the same power supply through commercial means today. Potential beneficial indirect impacts could result in a regional reduction in air pollution due to power generation from a renewable source.

3.3.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Air quality impacts for additional geothermal or solar resources that would be

implemented at Fort Bliss would be similar as those described for Alternatives 5 and 6. The largest land disturbance that could be undertaken for siting additional resources would be up to a 0.4-acre disturbance to establish a 3-MW wind turbine. Other minor disturbance activities might involve the construction of unpaved access roads, installation of transmission lines, and grading, although the small-scale nature of these projects would be expected to generate negligible emissions. Therefore, it can be concluded that the emissions from the construction or operation of any additional geothermal or solar resources would be less than significant. Air emissions would be evaluated for each project as they are identified and evaluated under this programmatic alternative.

Implementation of wind energy projects at Fort Bliss would result in construction emissions from the operation of heavy duty diesel equipment, onsite construction worker's privately owned vehicles, and fugitive dust from land-disturbing activities associated with the construction of turbines and transmission lines. The emissions from mobile sources associated with the wind turbine and transmission line construction would likely be of a similar magnitude to that described for Alternatives 5 and 6 and would be less than significant. Operational air emissions from wind energy would be limited to emissions from employees going to and from the wind farms. The emissions from employees traveling to/from wind farms would be negligible, so the air emissions from the operation would be negligible. Other than the emissions during construction and commuter emissions, wind energy generation would have no emissions and, therefore, would be lower than the emissions generated to produce the same power supply through commercial means today. Potential beneficial indirect impacts from wind energy projects could result in a regional reduction in air pollution due to power generation from a renewable source. Power produced from some renewable energy systems can fluctuate over the course of a day and would require the use of combined cycle gas turbines for generating a consistent amount of energy flowing into the electrical grid. The turbines range in output from approximately 15 kW to 20 MW and would primarily be fueled by natural gas, although other fuels could be used in an emergency. Likely placement of the turbines would be near electrical substations or co-located with the solar panel arrays. The turbines would operate continuously at idle and boost output when required. Although not a renewable energy technology, gas turbines would be needed, in some instances, to effectively implement solar or other renewable technologies. Table 3-16 presents the calculated annual, uncontrolled emissions for a single 2.5-MW natural gas turbine because the actual rated output and number of gas turbines that would be used is not known. The emission factors for natural gas turbines do not change by power rating because emissions are more dependent on the actual load. A standard load of 80 percent is used for stationary gas turbines (USEPA 2000). The values for the representative single gas turbine can be aggregated additively for combinations of gas turbines or to assess a turbine with a greater energy output.

Table 3-16. Annual Emissions for One 2.5-MW Gas Turbine (Uncontrolled Emissions)

VOC	CO	NOx	SO_2	PM	CO2e (metric tonnes per year)
(tons per year)					
3	118	459	5	9	146,841

Notes: VOC = volatile organic compound, CO = carbon monoxide, NO_x = nitrogen oxides, SO_2 = sulfur dioxide, PM = particulate matter, CO_2e = carbon dioxide equivalents

3.3.2.8 Alternatives Combined

If all of the alternatives were implemented at Fort Bliss, significant but mitigable impacts would result from operation of the WTE plant under Alternative 4. Less than significant impacts would result from construction and operation of Alternatives 3, 5, and 6. Alternatives 3 through 6 would provide some indirect beneficial impacts due to production of energy from a renewable source. Alternative 2 would result in beneficial impacts due to reduced energy consumption as a result of conservation measures.

3.4 Airspace

Airspace use and management addresses how and where aircraft operate in airspace in or near Fort Bliss and its ranges. This section examines the rules, regulations, and procedures for military aircraft to operate safely among all aircraft in the National Airspace System as managed by the Federal Aviation Administration (FAA). Airspace under the National Airspace System contains all facets of navigable airspace, including terrestrial- and satellite-based navigation facilities, equipment, and services; airports or landing areas; aeronautical charts, information, and services, rules, regulations, and procedures; technical information, manpower, and materials. Navigable airspace is airspace above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft, as defined in 14 CFR §77.

3.4.1 Affected Environment

The DoD and the Army manage airspace delegated by the FAA to them in accordance with the processes and procedures outlined in DoD Directive 5030.19, *DoD Responsibilities on Federal Aviation and National Airspace System Matters* (DoD 1997), and are implemented by Army Regulation 95-2, *Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigation Aids* (U.S. Army 2008a). The DoD and the Army collaborate with the FAA to ascertain the minimum requirement for airspace, evaluating any environmental consequences of proposed airspace designations in compliance with both the FAA and the DoD's NEPA implementing regulations.

There are two categories of airspace or airspace areas: regulatory and non-regulatory. Within these two categories, there are four types of airspace: controlled, special use airspace (SUA), other, and uncontrolled airspace. Controlled airspace is airspace of defined dimensions within which air traffic control service is provided to instrument flight rule flights and to visual flight rule flights in accordance with the airspace classification (FAA 2008). Controlled airspace is categorized into five separate classes: Classes A through E. These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place to place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace. Uncontrolled airspace is designated Class G airspace.

The airspace around El Paso and Fort Bliss is designated by the FAA as controlled airspace for activities associated with the El Paso International Airport and the Biggs AAF (Figure 3-1). These airports are adjacently located, both in the northeast portion of El Paso. Biggs AAF consists of a 13,572-foot-long, Class B, concrete runway oriented on a northeast/southwest axis with associated taxiways and ramp space to support full military, Department of Justice, and other government aircraft operations. El Paso International Airport has three runways and has significant levels of passengers from a number of U.S. cities. While, not examined in this report, it is noted that the Abraham Gonzalez International Airport is located in Ciudad Juarez, Mexico, approximately 12 miles to the south.

Airspace around both El Paso International Airport and Biggs AAF is controlled and therefore is designed to provide aircraft separation for approach, landing, and takeoff from the airports. The five classifications of controlled airspace relate to the level of service provided and the amount of regulation imposed. Most airspace above 1,200 feet above ground level (AGL) is controlled and in the presence of busier airports, controlled airspace extends all the way to the surface. In the area of El Paso International Airport and Biggs AAF Classes C, D, and E airspace exist. Class C airspace extends from the surface upward to 8,000 feet above mean sea level (amsl) outward to a 5-nautical-mile radius, from 5 to 10 nautical miles, a Class C shelf extends with a floor of approximately 1,200 AGL and a ceiling of approximately 4,000 feet amsl (U.S. Army 2012b). Based on the presence of the international boundary with Mexico, the radius is not a complete circle and ends at the boundary. For support of Biggs AAF, a Class D surface area extension begins at the 5-nautical-mile loop of the Class C airspace to the northeast in a keyhole shape in order to provide greater communication and weather requirements for operations under the visual flight rule than would otherwise exist. A Class E airspace shelf extends beyond the edges of Class D and E airspace and covers airspace at 700 feet AGL and extends upward to 1,200 feet AGL, where it joins the overlying Class E airspace (U.S. Army, 2010b).

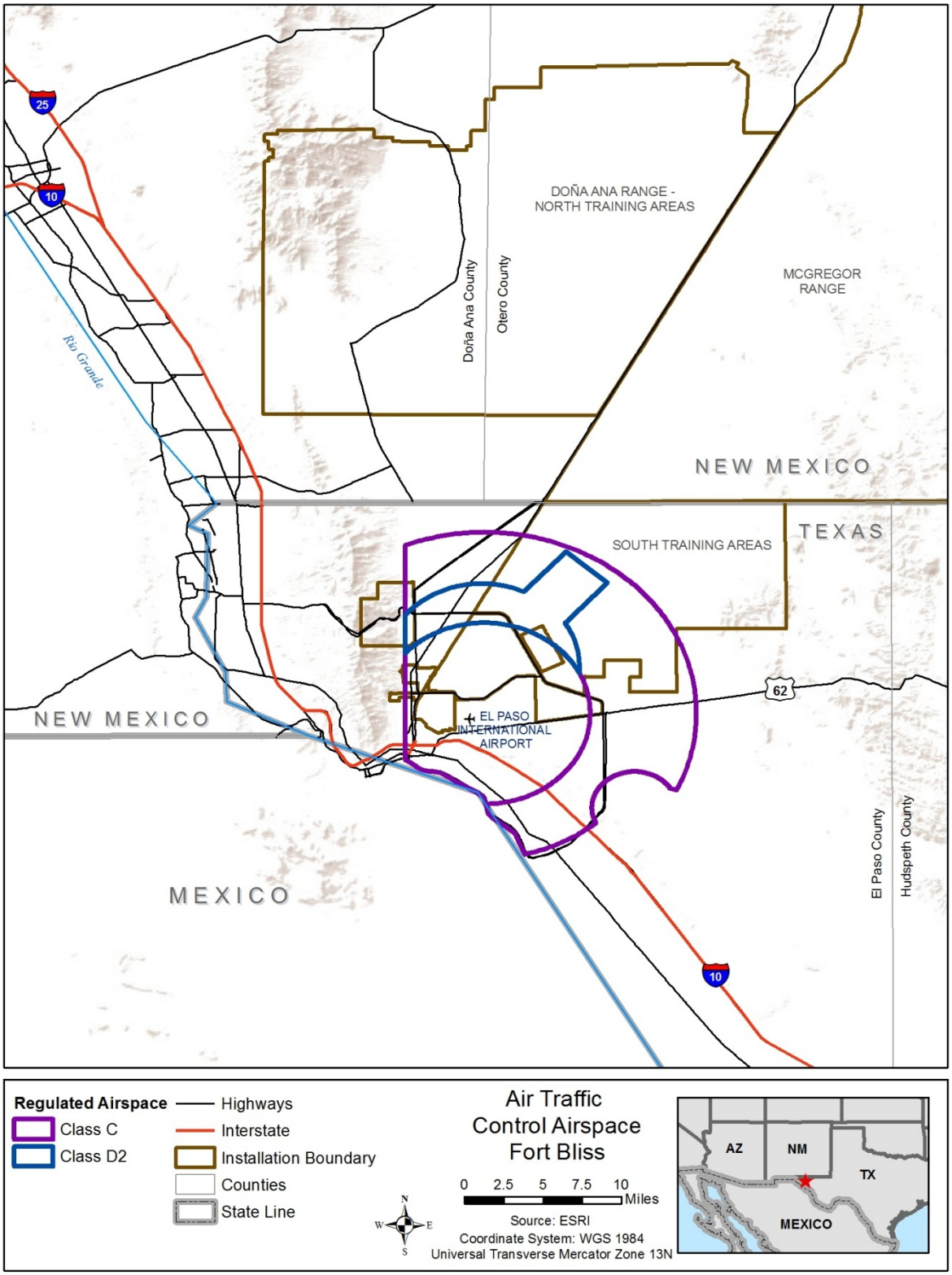


Figure 3-1. Air Traffic Control Airspace at Fort Bliss

Outside of the controlled airspace over El Paso, SUA dominates the Fort Bliss McGregor Range and the Doña Ana Range/NTA (Figure 3-2). The SUA associated with Fort Bliss in the McGregor Range and the Doña Ana Range/NTA is part of a larger series of SUA that covers much of the southeast quadrant of New Mexico. Different SUA occurring in this area is Restricted (R-) Areas, Military Operations Area, and Military Training Routes. Within the McGregor Range SUA is R-5103 A/B/C and within the Doña Ana Range/NTA R-5107 A/K are used.

The R-5103 A restricts airspace from the surface to 17,999 feet amsl and R-5103 B/C restricts airspace from the surface to an unlimited ceiling elevation. R-5107 A restricts use from the surface to unlimited elevation as does R-5107 K. However, this restricted use is only in effect from 7:00 a.m. to 8:00 p.m. Monday through Friday and at other times when requested. The principal use and purposes of these SUAs are to:

- Protect non-participating aircraft from range activities occurring on the ground
- Promote realistic training, allowing scenarios to unfold without training distracters, such as suspensions that are required when civilian aircraft penetrate the Restricted Areas
- Segregate non-participating aircraft from high-speed military fighter aircraft engaged in simulated aerial combat
- Segregate non-participating aircraft from unmanned aircraft system flight operations

Military fighter aircraft station or temporary duty aircraft at Holloman AFB and elsewhere use the upper extents of Fort Bliss' airspace to train in aerial combat (U.S. Army 2010b).

Between the El Paso International Airport Class and Biggs AAF Classes C, D, and E airspace and the Fort Bliss Restricted Areas, there is a segment of airspace that is designated as Class G, or uncontrolled, airspace below 1,200 feet amsl, with non-designated Class E airspace above that. Class E airspace extends from the surface to the overlying or adjacent controlled airspace. Within the Class G airspace and the non-designated Class E airspace, any aircraft can fly at any altitude from the surface up to 18,000 feet amsl without contact with the air traffic controller (ATC) at El Paso International Airport or Biggs AAF. This Class E and G airspace also connects with a Class E and G corridor extending from El Paso to Alamogordo, New Mexico, generally following the U.S. 54 corridor (U.S. Army 2012b).

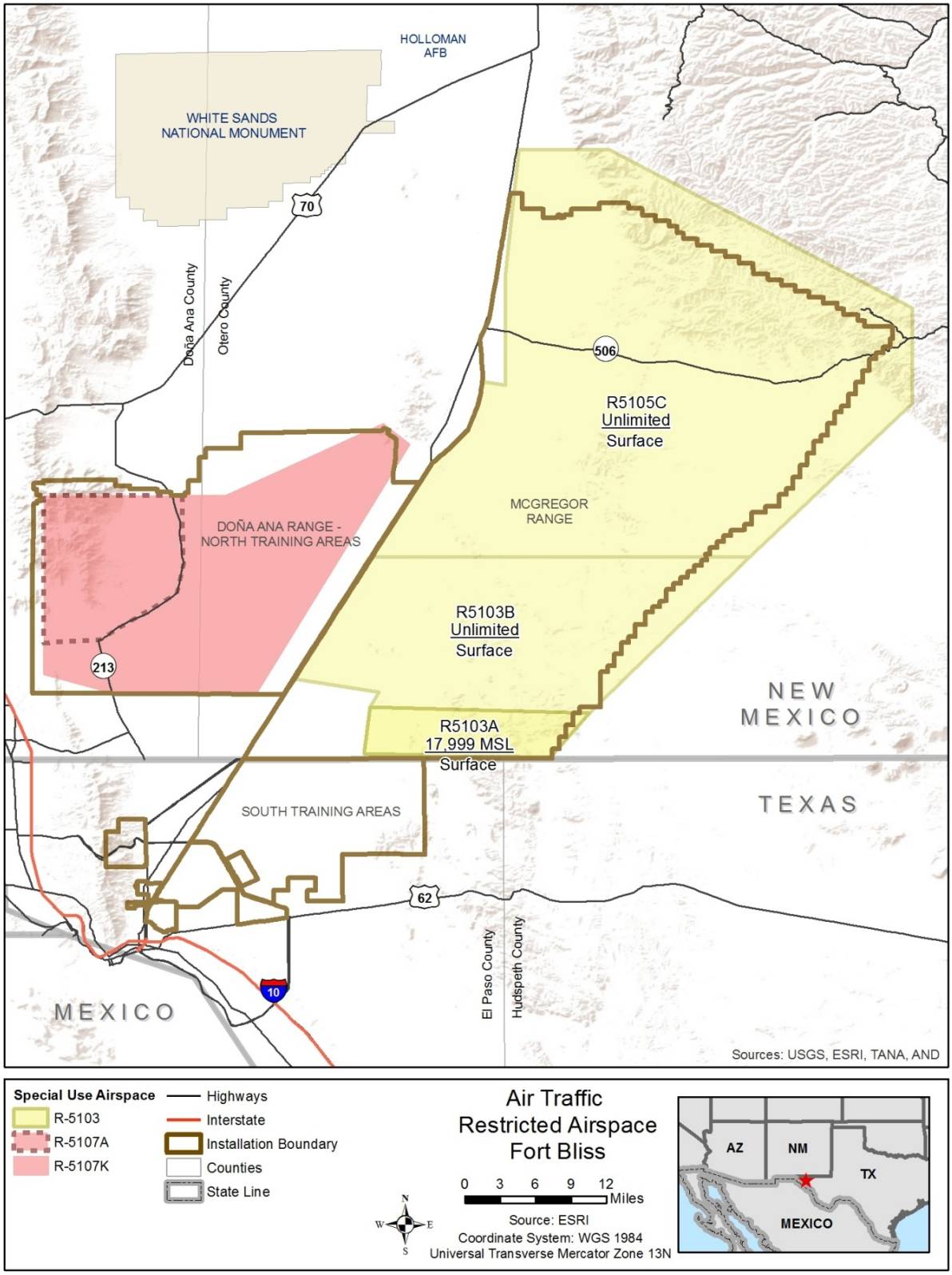


Figure 3-2. Restricted Airspace at Fort Bliss

Within this Class E and G airspace area, most of which is over Fort Bliss property, the number of aircraft operating is estimated at approximately 50 aircraft per week, mostly at altitudes of between 6,500 and 8,500 feet amsl (U.S. Army 2012b). The undesignated Class E and Class G airspace is beyond the normal takeoff and landing approach slopes controlled by ATC at El Paso International Airport, and commercial aircraft in that area are operating at altitudes above 5,500 feet amsl. Military aircraft (primarily helicopters) flying out of Biggs AAF would generally operate in the Class E and G area at altitudes between the surface and 1,200 feet AGL as they land or take off for training on the FBTC (U.S. Army 2012b).

3.4.2 Environmental Consequences

The type, size, shape, and configuration of individual airspace elements in a region are based upon, and are intended to, satisfy competing aviation requirements. Potential impacts could occur if air traffic in the region and/or the ATC systems were encumbered by changed flight activities contributed by the Proposed Action or alternatives. Airspace impacts significance thresholds are presented in Table 3-1.

3.4.2.1 Alternative 1 – No Action

Under the No Action Alternative, Fort Bliss would not pursue additional Net Zero initiatives, beyond those policies and procedures that are currently in place; therefore, no impacts to airspace would occur. No impacts to Biggs AAF or El Paso International Airport would occur and activities at these airports would remain unchanged. Airspace classifications throughout Fort Bliss and the surrounding region would remain unchanged as the No Action Alternative would not implement any activities that would require alterations to existing classifications. The implementation of the No Action Alternative would not affect military training/SUA.

3.4.2.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement policies, procedures, and BMPs to maximize resource re-use, limit waste generation, increase resource re-purposing, and increase water and energy use efficiencies in new and existing facilities. Where small wind turbines are installed, Fort Bliss would adhere to all FAA distance and height requirements and would notify the FAA of all construction activities as applicable per 14 CFR §77.9. Under Alternative 2, Fort Bliss would adhere to all FAA airspace regulations, so actions would have no potential to impact airspace use or designation; therefore, there would be no impacts to airspace.

3.4.2.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, Fort Bliss would pursue the construction and use of a water reclamation pipeline to provide Fort Bliss with reclaimed water for installation secondary uses. Although construction activities

and policies associated with Alternative 3 would occur on East and West Bliss, the majority would be either underground or at a minimal height resulting in no impacts to airspace. As a result, airspace classifications throughout Fort Bliss and the surrounding region would remain unchanged under Alternative 3. Activities associated with Alternative 3 would not be located in the military training/SUA and would have no impacts to these areas.

3.4.2.4 Alternative 4 – Waste-to-Energy Plant

Alternative 4A – STA Site

Under Alternative 4A, Fort Bliss would pursue the construction and operation of a WTE plant. This plant would be potentially located in the southeast portion of Fort Bliss and would receive Fort Bliss' and city of El Paso waste streams. Two boiler systems that would be operated in parallel as part of the plant would require stacks of 180 to 250 feet tall.

Construction activities and the operation of a WTE plant have the potential to negligibly impact both Biggs AAF and/or El Paso International Airport. While the proposed construction and operation of a WTE plant would place stacks in the general vicinity of El Paso International Airport and Biggs AAF, these stacks would not be at a sufficient height or at a close enough distance to interrupt flight activities such as take-offs and landings to affect the airport and airfield. In addition, it is not anticipated that the stacks would produce smoke or steam in quantities that would adversely impact visibility for pilots or existing flight operations. When the proposed site and specifications of the smokestacks have been determined, Fort Bliss will seek approval from the FAA.

Alternative 4A would have no impact to current airspace classifications because flight activity at both El Paso International Airport and Biggs AAF would remain at current levels and current airspace classifications would remain the same, resulting in less than significant impacts to airspace.

Activities associated with Alternative 4A would not be located in the military training/SUA and would have no impacts to these areas.

Alternative 4B – Railroad Drive Site

Similar, to Alternative 4A, Fort Bliss would pursue the construction and operation of a WTE plant with two boilers and stacks of 180–250 feet tall. Dependent upon a finalized location of the WTE site within the Alternative 4B footprint, the WTE plant may have the potential to negligibly impact both Biggs AAF and/or El Paso International Airport. However, siting of the plant within the project footprint would be based on consultation with the FAA and compliance with all FAA height and distance restrictions regarding the WTE boiler stacks and proximity to Biggs AAF and El Paso International Airport. As a result, Alternative 4B would be anticipated to have no impacts to current airspace classifications because

flight activity at both El Paso International Airport and Biggs AAF would remain at current levels and current airspace classifications would remain the same. Alternative 4B would not be located in the military training/SUA and would have no impacts to these areas.

3.4.2.5 Alternative 5 – Geothermal Energy Facility

Construction activities and the operation of the geothermal facility and associated use of CST would have no impact on either El Paso International Airport or Biggs AAF because the facility is not proposed to be located in the vicinity of either the airport or airfield. While the project is not located near the El Paso International Airport or Biggs AAF, it is located in the vicinity of a landing strip associated with helicopter and unmanned aerial vehicle operations. However, with the distance between the site and the landing strip and the use of anti-glare protection of pilots and the strip's primary nighttime use, it is expected that no impacts would occur to this landing strip as a result of Alternative 5.

Alternative 5 is not located within controlled airspace and would not affect current airspace classifications.

While the proposed geothermal facility and potential CST array would occur in military training/SUA, the structure associated with the geothermal facility would have no impacts on flight activity in this area and would result in no impacts. During the construction and operation of CST, BMPs and technologies to reduce possible glare for flight activities occurring in this area would be used and would have a less than significant impact to the military training/SUA.

3.4.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Under Alternative 6, Fort Bliss would develop up to 300 acres in the STA for CSP technology as well as required transmission lines. While the CSP would be located in the vicinity of El Paso International Airport and Biggs AAF, it is expected that BMPs and technologies would be used that would minimize potential glare from the solar mirrors and is a safe enough distance from the airport and airfield to have less-than significant impacts.

Alternative 6 would have no impact to current airspace classifications because current flight activity would remain the same. Alternative 6 would not be located in the military training/SUA and would have no impacts to these areas.

3.4.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria

presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Dependent on the location of future geothermal, wind, or solar resources, impacts to both the El Paso International Airport and Biggs AAF have the potential to occur. Screening criteria for identifying future project locations should include avoidance of locations that would impact El Paso International Airport, Biggs AAF, or Holloman AFB. Any potential solar use in the area is expected to employ BMPs and applicable technologies would be used by pilots to reduce the potential for glare. In addition, it is assumed that any development of wind resources would not occur in the general vicinity of either the airport or airfield based on the potential for conflicts to existing flight patterns and flight activity at both the airport and airfield and would likely not meet screening criteria resulting in no impacts. The development of a geothermal structure would likely have no impact on either El Paso International Airport or Biggs AAF because the structure would likely not be placed in existing flight paths. If a structure were placed in existing flight paths, it would be subject to height and other restrictions to mitigate impacts.

The potential for future geothermal, wind, or solar projects associated with Alternative 7 would likely have less than significant impacts to air traffic control classifications or military training/SUA.

3.4.2.8 Alternatives Combined

The alternatives would either have no or less than significant impacts to airspace, and none of the alternatives would require adjustments to existing airspace classifications. Therefore, the selection of a combination of alternatives would likely result in less than significant impacts to airspace. Fort Bliss would coordinate with the FAA or Holloman AFB on the locations of future projects.

3.5 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are generally referred to as vegetation, and animal species are referred to as wildlife. Habitat can be defined as the resources and conditions present in an area that produces occupancy of a plant or animal (Hall et al. 1997). Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. For purposes of this analysis, these resources are divided into three major categories: vegetation, wildlife, and sensitive species.

The ROI for biological resources includes Fort Bliss and its immediate vicinity. The analysis focuses primarily within the specific project areas identified for Alternatives 3 through 6 (see Chapter 2). Specific project footprints have been identified for Alternatives 3, 4A, 4B, and 5, while Alternative 6 is planned for somewhere in the STA (Figure 2-1). However, due to the programmatic nature of Alternative 7, the

affected environment could be anywhere on the installation that meets identified screening criteria and is compatible with future development. Biological information for all of Fort Bliss can be found in the Fort Bliss Army Growth and Force Structure Realignment EIS (U.S. Army 2010b) or the Fort Bliss Mission and Master Plan, Final Supplemental Programmatic Environmental Impact Statement (U.S. Army 2007b).[9] As a result, general information for the entire installation is discussed.

3.5.1 Affected Environment

3.5.1.1 Vegetation

Vegetation types include all existing terrestrial plant communities as well as their individual component species. Fort Bliss is located in the Northern Chihuahuan Desert with noticeable vegetation variants locally. Fort Bliss is dominated by desert basin and mountains, with a small proportion of the mountains occupied by conifer woodlands or forests. The land cover types on Fort Bliss were re-mapped in 2008 and include 16 land cover mapping units and 14 vegetation categories. Major vegetation categories include shrublands (basin desert shrubland [coppice dunes], basin sandshrub, basin desert lowland shrubland, creosote piedmont shrublands, foothill desert shrublands, and foothills desert scrub), grasslands (sandy plains desert grassland, basin lowland grassland, mesa grassland, and foothill desert grassland), woodlands (montane riparian, montane shrublands, montane woodland, and montane forest), and other (military facilities, no data). Under Alternative 3, Fort Bliss would pursue the construction and use of a water reclamation pipeline located on East and West Bliss within areas that are primarily paved, landscaped, or disturbed. Vegetation types and the number of acres for the remaining project alternative locations are shown in Table 3-17. More detailed descriptions of each of these vegetation types can be found within the Fort Bliss Army Growth and Force Structure Realignment EIS (U.S. Army 2010b) or within the Fort Bliss Integrated Natural Resources Management Plan (INRMP) (U.S. Army 2001). Figures 3-3 through 3-5 depict the vegetation types found within the project areas for Alternatives 4 through 6.

Three vegetation communities on Fort Bliss are considered locally important natural resources due to their rareness, sensitivity, uniqueness, and/or high-quality and undisturbed nature. Black grama grasslands are rare and endangered ecosystems within the Chihuahuan Desert that were once widespread. Sand

[9] See Fort Bliss' website at: https://www.bliss.army.mil/DPW/Environmental/EISDocuments2.html

sagebrush vegetation can be found in three unique and relatively undisturbed high-quality areas on Fort Bliss: northern Otero mesa, Culp canyon, and central Tularosa Basin on the east side of the Jarilla Mountains. The unique and isolated shinnery oak (*Quercus havardii*) islands are located within the sand dunes at the entrance of Culp Canyon and in the Aeloian Basin. None of these locally important vegetation communities are found within the project footprints for Alternatives 3 through 6.

Table 3-17. Number of Acres of Each Vegetation Type within the Project Alternative Locations

Vegetation Type	Alternative 4A[a]	Alternative 4B[a]	Alternative 5	Alternative 6[b]	Alternative 7[c]
Shrublands					
Basin Desert Shrubland (coppice dunes)	3,456.9	778.4	0	71,004.8	Unknown/TBD
Basin Sandshrub	0	0	40.0	2,653.9	Unknown/TBD
Basin desert lowland shrubland	0	73.5	0	1,728.8	Unknown/TBD
Creosote piedmont shrublands	0	0	0	2,298.0	Unknown/TBD
Foothill desert shrublands	0	10.7	0	4,329.4	Unknown/TBD
Foothills desert scrub	6.5	0	0	137.7	Unknown/TBD
Grasslands					
Sandy plains desert grassland	0	250.3	0	1,563.3	Unknown/TBD
Foothills desert grassland	0	0	0	165.1	Unknown/TBD
Basin lowland grassland	0	0	0	121.9	Unknown/TBD
Other					
Non-native vegetation	0	114.2	0	1,442.8	Unknown/TBD
Total Acres	**3,463.4**	**1,227.1**	**40.0**	**85,445.7**	Unknown/TBD

Source: U.S. Army (2009b)

[a] A maximum of 94.2 acres would be disturbed under Alternative 4A or Alternative 4B.

[b] A maximum of 300 acres would be disturbed under Alternative 6.

[c] The number of acres disturbed under Alternative 7 is unknown. Under Alternative 7, the affected environment could be anywhere on the installation that meets identified screening criteria and is compatible with the Fort Bliss mission.

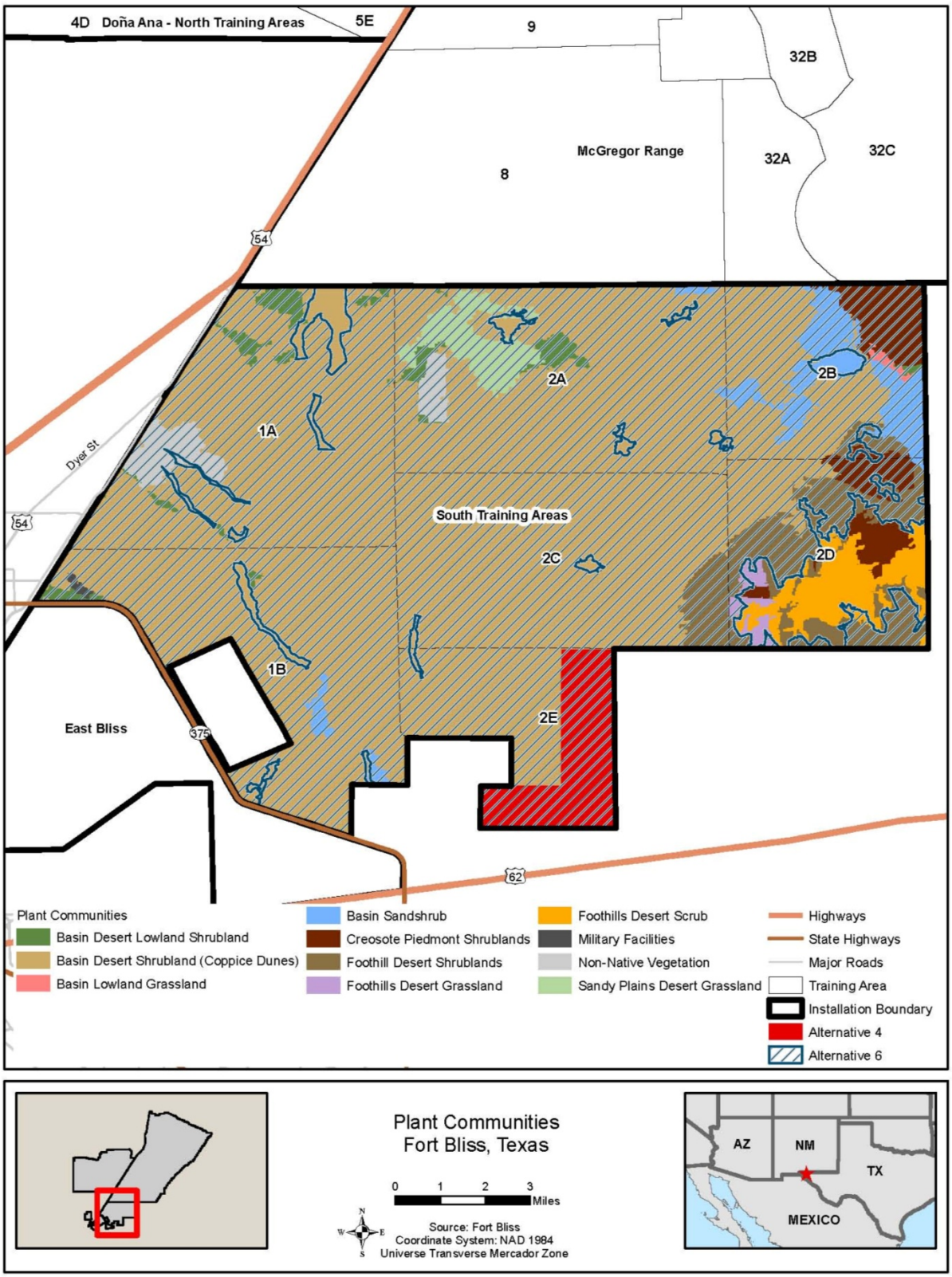


Figure 3-3. Plant Communities in the Vicinity of Alternatives 4A and 6

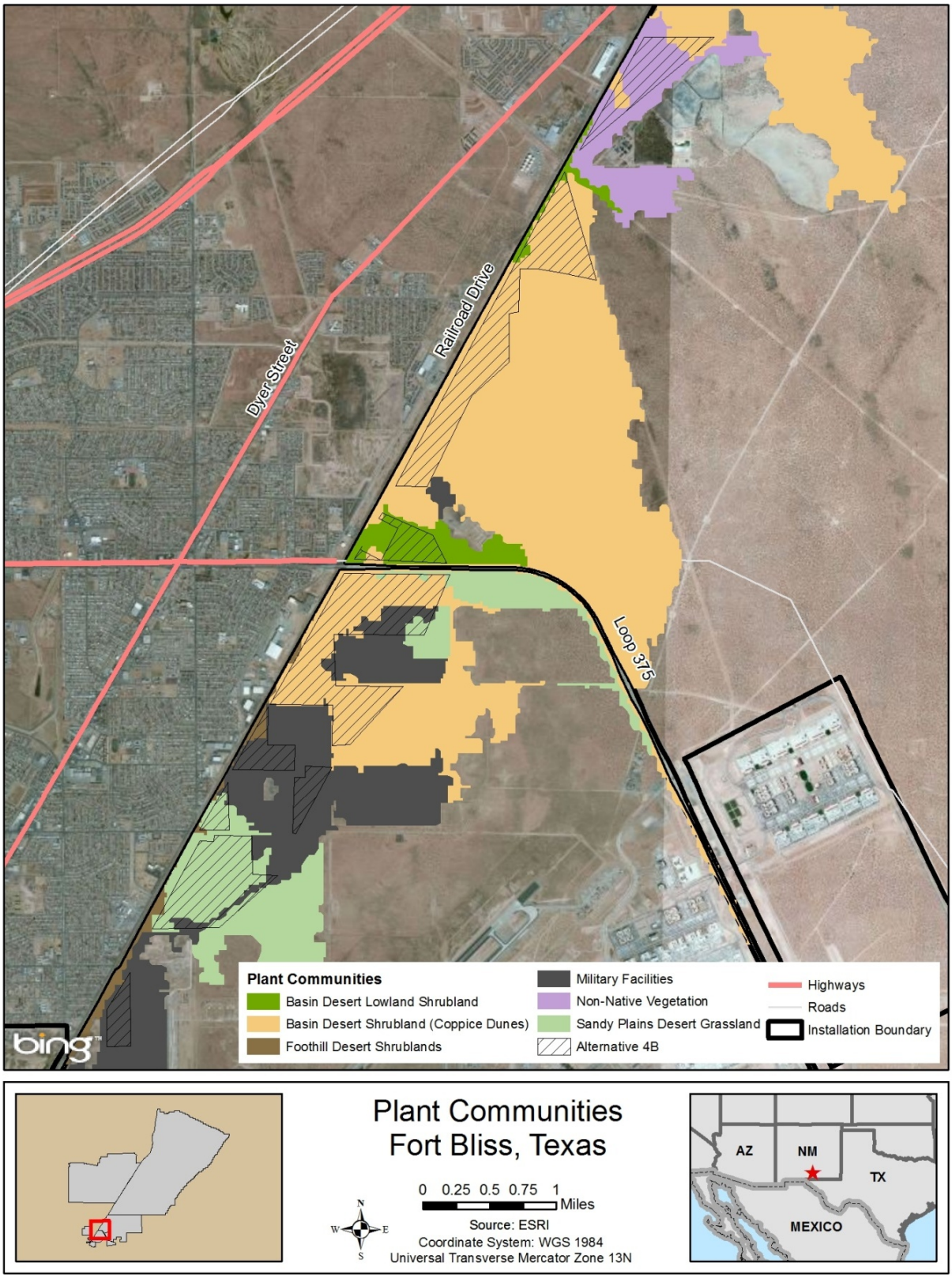


Figure 3-4. Plant Communities in the Vicinity of Alternatives 4B

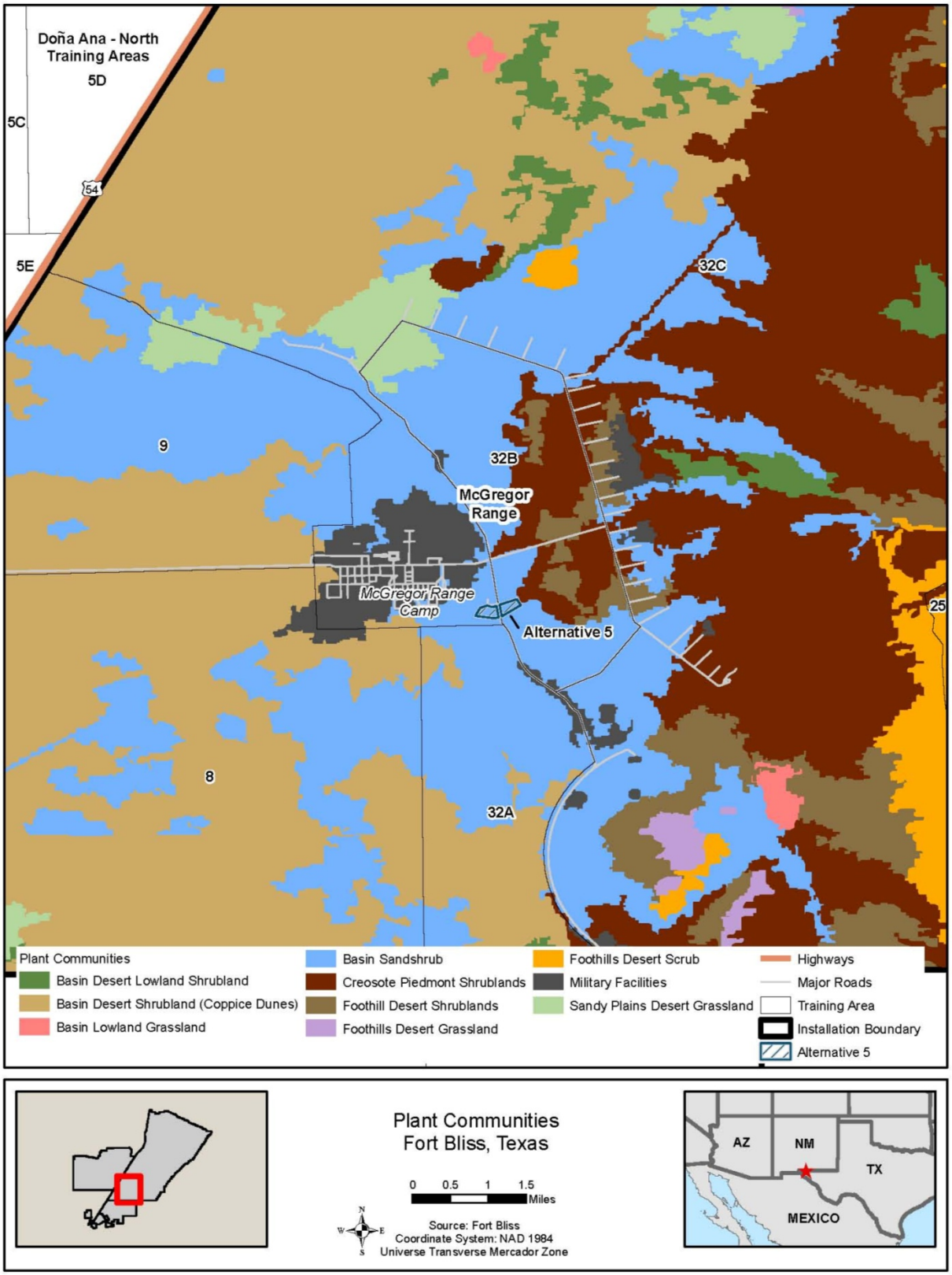


Figure 3-5. Plant Communities in the Vicinity of Alternative 5

3.5.1.2 Wildlife

Approximately 335 species of birds, 58 species of mammals, 39 species of reptiles and 8 species of amphibians are known to occur on Fort Bliss. A detailed list of species found on Fort Bliss is included in the INRMP (U.S. Army 2001). Species listed below do not represent an all-inclusive list of species found on the installation. Common game species found on Fort Bliss include mule deer (*Odocoileus hemionus*), oryx (*Oryx gazella*), mourning doves (*Zenaida macroura*), white-winged doves (*Zenaida asiatica*), scaled quail (*Callipepla squamata*), and Gambel's quail (*Callipepla gambelii*). Other nongame mammal species include the Arizona black-tailed prairie dog (*Cyomys ludovicianus arizonensis*) found on McGregor Range, and various rodent species found in arroyo-riparian habitats and adjacent upland habitats, including the silky pocket mouse (*Perognathus flavus*) and Merriam's kangaroo rat (*Dipodomys merriami*). Other mammals commonly found in desert shrubland habitats include the desert cottontail (*Sylvilagus audubonii*) and black-tailed jackrabbit (*Lepus californicus*). Larger mammals found in desert shrubland habitats include the coyote (*Canis latrans*), badger (*Taxidea taxus*), bobcat (*Lynx rufus*), and kit fox (*Vulpes macrotis*). Several bat species have been observed on Fort Bliss, including western pipistrelles (*Pipistrellus hesperus*), Myotis (*Myotis* spp.), and free-tailed bats (*Tadarida* sp.) (U.S. Army 2001).

Common reptile species found on Fort Bliss include the western diamondback rattlesnake (*Crotalus atrox*) and bull snake (*Pituophis catenifer*) (U.S. Army 2001). The most common amphibians include the Great Plains toad (*Bufo cognatus*) and the Mexican spadefoot (*Spea multiplicata*) (U.S. Army 2007c).

Most of the bird species that have been recorded on Fort Bliss are protected under the MBTA. Riparian habitat is one of the most important habitats for migratory birds (Kozman and Mathews 1997). A 5-year study conducted within Fort Bliss demonstrated that arroyos are utilized by migratory birds more often than the surrounding uplands. During this study 290 migrant individuals (comprising 24 species) were captured in arroyos, while 52 migrant individuals (comprising 14 species) were captured in adjacent upland habitat. The most common species captured in arroyos included the ash-throated flycatcher (*Myiarchus cinerascens*), brown-headed cowbird (*Molothrus ater*), rufous-crowned sparrow (*Aimophila ruficeps*), and verdin (*Auriparus flaviceps*) (U.S. Army 2001, Kozma 1995). Common bird species found in desert shrub habitats on Fort Bliss include the black-throated sparrow (*Amphispiza bilineata),* western kingbird (*Tyrannus verticalis),* Scott's oriole (*Icterus parisorum),* and ash-throated flycatcher (*Myiarchus cinerascens).* Common raptors on the installation include Swainson's hawk (*Buteo swainsonii*) and turkey vulture (*Cathartes aura*), which are frequently observed in the desert shrublands. Common bird species found on East and West Bliss include the house sparrow (*Passer domesticus*), great-tailed grackle

(*Quiscalus mexicanus*), house finch (*Carpodacus mexicanus*), and rock dove (*Columba livia*) (U.S. Army 2001).

Although a complete inventory of all invertebrates on Fort Bliss has been not conducted, a number of species have been identified as being of special interest due to a variety of reasons (i.e., endemism [a species that is only found in a given region or location and nowhere else in the world], prized by collectors, or important food source), including various species of grasshoppers, beetles, flies, and butterflies. Recent studies suggest up to eight endemic snail species can be found in the Organ Mountains (U.S. Army 2001).

3.5.1.3 Sensitive Species

Sensitive species are defined as plant and animal species listed as endangered, threatened, and proposed for listing by the USFWS under the Endangered Species Act. The federal Endangered Species Act protects federally listed endangered and threatened plant and animal species. Federally identified candidate species (species proposed for listing) are not protected under law; however, these species could become federally listed over the near term and therefore are considered herein to avoid future conflicts if they were to be listed during the preparation of this EIS. Additionally, the NMDGF and the Texas Parks and Wildlife Department protect state-listed plant and animal species through state environmental conservation administrative codes.

Table 3-18 lists the species that have been observed or have the potential to occur (due to presence of potential habitat) within the project area footprints. Currently, 57 sensitive species have been observed or have the potential to occur on Fort Bliss; 6 of these species have the potential to occur within the project area footprints. A more detailed list and description of other sensitive species found on Fort Bliss can be found within the Fort Bliss Army Growth and Force Structure Realignment EIS (U.S. Army 2010b) or the Fort Bliss INRMP EIS (U.S. Army 2001). The northern aplomado falcon and Kuenlzer hedgehog cactus are not known to occur in the identified project areas under Alternatives 3 through 6. No critical habitat is located on Fort Bliss.

Table 3-18. Protected Species Known or Having the Potential to occur on Fort Bliss Within or Near the Project Areas

Species	Status			Location on Fort Bliss
	Federal	New Mexico	Texas	
Plants				
Sandhill goosefoot (*Chenopodium cycloides*)	SC	--	--	Occasional in sandy, disturbed places, Doña Ana Range-North Training Areas. Potential to occur within Alternatives 4 and 6 project footprints.
Invertebrates				
Anthony blister beetle *(Lytta mirifica*)	SC	SGCN	--	Not known to occur on Fort Bliss, but habitat occurs in sand dunes Potential to occur within Alternatives 4, 5, and 6 project footprints.
Los Olmos tiger beetle *(Cicindela nevadica)*	SC		--	Not known to occur on Fort Bliss, could occur in areas of limestone soil. Do not occur in sandy habitats dominated by coppice dunes. Potential to occur within Alternative 4 project footprint.
Reptiles				
Texas horned lizard *(Phrynosoma cornutum)*	SC	--	T	Widespread throughout Fort Bliss. Found within open areas with sparse plant cover, commonly in loose sand or loamy soils. Potential to occur within footprints of all alternatives.
Birds				
Western burrowing owl* *(Athene cunicularia)*	SC	--	--	Occurs throughout Fort Bliss except the mountain areas; Occurs primarily on sandy soils in all desert shrubland and grassland vegetative communities on Fort Bliss. Potential to occur within all alternative footprints.
Loggerhead shrike *(Lanius ludovicianus)*	SC	S	--	Wintering and breeding bird on Otero Mesa and throughout Tularosa Basin. Potential to occur within all alternative footprints.
Scaled quail[a] (*Callipepla squamata*)				Occurs within desert shrubland communities. Potential to occur within all alternative footprints.
Crissal thrasher[a] (*Toxostoma crissale*)				Occurs within desert shrubland communities. Potential to occur within all alternative footprints.
Black-tailed gnatcatcher[a] (*Polioptila melanura*)				Occurs within desert shrubland communities. Potential to occur within all alternative footprints

Source: U.S. Army (2001), Partners in Flight (2012)

Notes: -- = without status, SC/S = species of concern is not a formal category defined under the Endangered Species Act, SGCN = species of greatest conservation need, T = threatened species

[a] Priority bird species defined by Partners in Flight.

3.5.2 Environmental Consequences

Analysis of impacts focuses on whether and how components of the Proposed Action could affect vegetation, wildlife, or sensitive species. Impact analysis uses Geographic Information System (GIS) and other relevant biological resource references, including more specific information on type and amount of vegetation/habitat types, wildlife species, and sensitive species that could be impacted at proposed project sites. Significance thresholds for biological resources are included in Table 3-1.

3.5.2.1 Alternative 1 – No Action

Under Alternative 1, Fort Bliss would not pursue additional Net Zero initiatives. Vegetation as described under the Affected Environment would remain unchanged. No activities would be conducted with the potential to impact wildlife and sensitive species or their habitats. Therefore, no impacts to vegetation, wildlife, or sensitive species would occur.

3.5.2.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement policies, procedures, and BMPs to maximize resource re-use, limit waste generation, increase resource re-purposing, and increase water and energy use efficiencies in new and existing facilities. Alternative 2 may also include development of small-scale, renewable energy projects. A maximum of 5 acres of ground disturbance would occur on East and West Bliss. Construction could increase the likelihood of introduction and/or expansion of exotic or invasive species. Preventive and control measures presented in INRMP would be implemented to reduce the possibility of exotic species invasions and further spreading of existing populations. In addition, these areas would be monitored following construction to determine whether project activities are causing an increase of exotic or undesirable plant species. If monitoring shows invasive species are increasing, a strategy for control would be implemented.

While no exact locations for potential projects described under Alternative 2 have been established, construction activities would likely occur on previously developed lands or disturbed, actively managed areas (i.e., mowed or landscaped) and would result in short-term increases in noise associated with construction equipment. Construction-related noise may temporarily displace wildlife and migratory bird populations from suitable habitat in the immediate vicinity of the project area. However, there are not substantial amounts of native habitat within the proposed construction area because of the developed nature of East and West Bliss. Additionally, wildlife species on East and West Bliss are adapted to the existing urban/industrial environment. It is possible, however, that construction-related activities, such as excavation, could result in mortality of some less mobile wildlife species. Open trenches and ditches associated with construction have the potential to trap wildlife. Mitigation measures outlined in Section

5.1.3 would minimize impacts to wildlife. Impacts to wildlife and migratory bird species from operation and maintenance activities associated with activities described under Alternative 2 would be minor because they would be similar to existing operation and maintenance activities. Impacts to wildlife, including migratory birds, from the construction activities would be less than significant.

The operation of small-scale wind turbines could potentially affect migratory birds and bats. Wind turbines can cause direct mortality of birds and bats through collision, mainly presumed to be with turbine blades. In addition, some research suggests that bat fatalities can result from rapid decompression resulting from sudden changes in pressure near the rapidly moving blade tip and outer portions of the blade (Strickland et al. 2011). It has also been suggested that turbines may disrupt a bat's echolocation capability. Echoes from moving blades can have features that make them attractive to bats or may make it difficult for the bat to accurately detect and locate the blades (Long et al. 2010). Most studies of avian fatalities report less than or equal to three fatalities per MW per year (Strickland et al. 2011). Impacts to birds and bats would be reduced by following the 2012 USFWS Land-Based Wind Energy Guidelines during installation and operation of wind energy facilities (USFWS 2012).

No sensitive plant species or potential habitats are known to occur on East and West Bliss because of the soil types present. Impacts to sensitive species would be similar to that for wildlife. Impacts to sensitive species are expected to be minor from the construction or operation and maintenance under Alternative 2. The Texas horned lizard (listed as threatened in Texas), the burrowing owl (a federal species of concern), the loggerhead shrike (listed as sensitive in New Mexico), and the scaled quail, Crissal thrasher, and black-tailed gnatcatcher (Partner in Flight priority bird species) are common and occur in most of the vegetative communities on Fort Bliss and have the potential to occur within areas that would be disturbed on East and West Bliss. However, habitat loss due to construction would be less than significant because the area disturbed would account for only a small proportion of habitat on Fort Bliss, and the majority of the areas that would be disturbed by construction are currently areas that are paved, landscaped, or previously disturbed. Construction-related noise may temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area.

3.5.2.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, construction of the pipeline would disturb approximately 20 acres on East and West Bliss. The majority of the areas that construction would disturb are currently paved, landscaped, or previously disturbed. Alternative 3 would not affect locally important vegetation communities or sensitive species habitats. Following construction of the pipeline, areas would be revegetated or repaved. However, temporary removal of vegetation would cause a short-term loss of nesting habitat for birds located within the area. BMPs would be employed during construction activities to minimize soil movement, stabilize

runoff, and control sedimentation. Water from this pipeline would be Type 1/Class A reclaimed water (as described in 30 TAC §210.33[1]) and would be used for irrigation purposes on East and West Bliss. See Section 3.12 for more details regarding the water quality of reclaimed water. The elevated salinity of the reclaimed water from the city of El Paso could potentially have an impact on the vegetation that is being irrigated. The salinity tolerance of plants varies, and the extent of salt accumulation in the soil depends on the concentration of salts in the irrigation water and the rate at which the salts are removed by leaching. Potential impacts to vegetation could include reduced plant growth or mortality (USEPA 2004). Fort Bliss would incorporate potential management techniques for reducing impacts to vegetation from increased salinity such as increasing drainage potential through soil aeration, choosing salt tolerant species into existing and new landscapes, applying water in excess of plants' water needs to maintain salt balance in root zone, blending saline water with less-saline water, adding soil amendments to correct sodium and alkalinity problems, and avoid spraying reclaimed water directly on the foliage of plants that are salt-sensitive. Consequently, impacts to vegetation under Alternative 3 could be significant but mitigable.

Construction of the pipeline could increase the likelihood of introduction and/or expansion of exotic or invasive species. Preventive and control measures presented in INRMP would be implemented to reduce the possibility of exotic species invasions and further spreading of existing populations. In addition, these areas would be monitored following construction to determine whether project activities are causing an increase of exotics or undesirable plant species. If monitoring shows invasive species are increasing, then a strategy for control would be implemented.

Construction activities would occur on previously developed lands or disturbed, actively managed areas (i.e., mowed or landscaped) and would result in short-term increases in noise associated with construction equipment. Construction-related noise may temporarily displace wildlife and migratory bird populations from suitable habitat in the immediate vicinity of the project area. However, there are no significant amounts of native habitat within the proposed construction area because of the developed nature of East and West Bliss. Additionally, wildlife species on East and West Bliss are adapted to the existing urban/industrial environment. It is possible, however, that construction-related activities, such as excavation, could result in mortality of some less mobile wildlife species. Open trenches and ditches associated with construction have the potential to trap wildlife. Mitigation measures outlined in Section 5.1.3, such as trenching during cooler months when possible and providing escape ramps for trenches left unfilled overnight, would minimize impacts to wildlife. Impacts to wildlife and migratory bird species from operation and maintenance activities associated with the new pipeline would be minor because they would be similar to existing operation and maintenance activities. Long-term impacts to wildlife

populations, including migratory birds, would not occur. In addition, less than significant impacts to wildlife, including migratory birds, would occur from the construction activities.

No sensitive plant species or potential habitats are known to occur within the project area due to the soil types present. No federally listed or proposed threatened or endangered species are known to reside within the proposed project area. No critical habitat is located on East and West Bliss. Impacts to sensitive species would be similar to that for wildlife. Impacts to sensitive species are expected to be minimal from the construction or operation and maintenance of the new pipeline under Alternative 3. The Texas horned lizard (listed as threatened in Texas), the burrowing owl (a federal species of concern), the loggerhead shrike (listed as sensitive in New Mexico), and the scaled quail, Crissal thrasher, and black-tailed gnatcatcher (Partner in Flight priority bird species), are common and occur in most of the vegetative communities on Fort Bliss and have the potential to occur within the project areas on East and West Bliss. However, habitat loss due to construction would be less than significant because the area disturbed would account for only a small proportion of habitat on Fort Bliss, and the majority of the areas that would be disturbed by construction are currently areas that are paved, landscaped, or previously disturbed. Construction-related noise may temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area.

3.5.2.4 Alternative 4 – Waste-to-Energy Plant

Under Alternative 4, construction of the WTE plant would result in a permanent loss of a maximum of 40 acres of vegetation. In addition, approximately 4 to 6 miles of new access roads for the facilities would be constructed, resulting in a maximum of 34.2 acres of vegetation that would be removed. Within the project area for both Alternatives 4A and 4B, the majority of the vegetation is basin desert shrublands (coppice dunes). However, this loss of habitat would be less than significant because this vegetation type is the most widespread on Fort Bliss (348,847 total acres) and is widespread regionally. In addition, a loss of approximately 94.2 acres would represent 0.03 percent of the total acreage on Fort Bliss. Furthermore, 13 to 14 miles of new transmission lines (either underground or above ground) would be constructed following existing easements and utility corridors to the extent possible. Vegetation along these existing easements and utility corridors would be disturbed during construction of these lines. The exact location of these lines is currently unknown; however, it is likely that the vegetation has been previously disturbed from construction and routine maintenance of existing lines. Implementation of Alternative 4A or Alternative 4B would not affect locally important vegetation communities.

BMPs would be employed during construction activities to minimize soil movement, stabilize runoff, and control sedimentation. Construction of the WTE plant and associated transmission lines could increase the likelihood of introduction and/or expansion of exotic or invasive species. For activities occurring on the

installation, preventive and control measures presented in the INRMP would be implemented to reduce the possibility of exotic species invasions and further spreading of existing populations. In addition, these areas would be monitored following construction to determine whether project activities are causing an increase of exotic or undesirable plant species. If monitoring shows invasive species are increasing, then a strategy for control would be implemented.

Under Alternatives 4A and 4B, impacts to wildlife would include removal of habitat for construction of the WTE plant and associated infrastructure. Wildlife associated with basin desert shrublands (coppice dunes) have the potential to occur at this site. Common migratory species that could be found within this habitat include the black-throated sparrow, western kingbird, and ash-throated flycatcher. However, coppice dunes are not considered important habitat for migratory birds. Habitat loss due to construction would be less than significant due to the widespread distribution of mesquite coppice sand dunes on Fort Bliss as well as regionally, and the small percentage that would be impacted (0.03 percent). Construction activities under this alternative would occur adjacent to or within proximity of existing developed industrial/urban areas and would result in temporary increases in noise associated with construction equipment. Construction-related noise may temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area. Open trenches and ditches associated with construction have the potential to trap wildlife. Mitigation measures outlined in Section 5.1.3, such as trenching during cooler months when possible and providing escape ramps for trenches left unfilled overnight, would minimize impacts to wildlife. Impacts from operation and maintenance of the WTE plant, including noise and increased traffic and human presence, could displace wildlife from suitable habitat in the immediate vicinity of the project area. However, because the proposed location is within existing training areas and is close (approximately 1 mile) to existing developed areas, wildlife within the area are likely habituated to military training and military vehicle use. It is possible that construction-related activities, such as clearing and grading, could result in mortality of some less mobile wildlife species. Construction of aboveground transmission lines associated with this facility would potentially affect a few individual birds by increasing collision and electrocution potential with the power lines. However, impacts to birds would be reduced by following existing utility corridors and following the 2006 Suggested Practices for Avian Protection on Power Lines (Avian Power Line Interaction Committee [APLIC] 2006). Overall, bird populations on this part of Fort Bliss would not be significantly affected.

Impacts to sensitive species from the construction or operation and maintenance of the WTE plant and associated infrastructure under Alternatives 4A and 4B would be similar to that described for wildlife. The Texas horned lizard and the burrowing owl are common and occur in most of the vegetative communities on Fort Bliss and have the potential to occur at this site. In addition, the sandhill goosefoot,

the Anthony blister beetle, and the Los Olmos tiger beetle, all federal species of concern, have the potential to occur within the project area. However, habitat loss due to construction would be less than significant due to the widespread distribution of mesquite coppice sand dunes and sandshrub on Fort Bliss and regionally. As stated previously, construction-related noise may temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area. No federally listed or proposed threatened or endangered species are known to reside within the proposed project area. No critical habitat is located on Fort Bliss, including the project footprint under Alternatives 4A and 4B.

3.5.2.5 Alternative 5 – Geothermal Energy Facility

Under Alternative 5, primary impacts to vegetation, wildlife habitat, and sensitive species would include removal of approximately 20 acres of basin sandshrub habitat for construction of the facility. However, this loss of habitat would be less than significant because this is less than 0.01 percent of the total number of acres of basin sandshrub habitat on Fort Bliss (which totals 76,160 acres). The Texas horned lizard, burrowing owl, loggerhead shrike, scaled quail, Crissal thrasher, and black-tailed gnatcatcher are common and occur in most of the vegetative communities on Fort Bliss and have the potential to occur at this site. In addition, the Anthony blister beetle has the potential to occur within the project area. Approximately 2 miles of new transmission lines (either underground or above ground) would be constructed following existing easements and utility corridors to the extent possible. Vegetation along these existing easements and utility corridors would be disturbed during construction of these lines. Vegetation is expected to re-establish following reconstruction; however it could re-establish at a lesser density. The exact location of these lines is currently unknown; however, it is likely that the vegetation has been previously disturbed from construction and routine maintenance of existing lines. Alternative 5 would not affect locally important vegetation communities.

BMPs would be employed during construction activities to minimize soil movement, stabilize runoff, and control sedimentation. Construction of the geothermal facility could increase the likelihood of introduction and/or expansion of exotic or invasive species. Preventive and control measures presented in the INRMP would be implemented to reduce the possibility of exotic species invasions and further spreading of existing populations. In addition, these areas would be monitored following construction to determine whether project activities are causing an increase of exotic or undesirable plant species. If monitoring shows invasive species are increasing, then a strategy for control would be implemented.

Construction-related noise may temporarily displace wildlife or sensitive species from suitable habitat in the immediate vicinity of the project area. It is possible that construction-related activities, such as clearing and grading, could result in mortality of some less mobile wildlife species. Open trenches and ditches associated with construction have the potential to trap wildlife. Mitigation measures outlined in

Section 5.1.3, such as trenching during cooler months when possible and providing escape ramps for trenches left unfilled overnight, would minimize impacts to wildlife. Impacts from operation and maintenance activities associated with the geothermal facility, including noise and increased traffic and human presence, could displace wildlife from suitable habitat in the immediate vicinity of the project area. Construction of aboveground transmission lines associated with this facility would potentially affect a few individual birds by increasing collision and electrocution potential with the power lines. However, impacts to birds would be reduced by following existing utility corridors and following the 2006 Suggested Practices for Avian Projection on Power Lines (APLIC 2006). Overall, bird populations on this part of Fort Bliss would not be significantly affected.

No sensitive plant species, or potential habitat, are known to occur within the project area due to the soil types present. No federally listed or proposed threatened or endangered species are known to reside within the proposed project area. No critical habitat is located on Fort Bliss, including the project footprint under Alternative 5.

3.5.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Under Alternative 6, construction of a CSP facility would result in the removal of approximately 300 acres of vegetation and wildlife habitat. Because the exact footprint for the CSP facility is unknown at this time, any of the vegetation types within the STA could be removed under this alternative. The most common vegetation/habitat type within the STA is basin desert shrubland (coppice dunes). Other common vegetation communities include foothill desert shrublands, creosote piedmont shrublands, basin sand scrub, and foothills desert scrub (Figure 3-5). Table 3-19 shows the total number of acres of each vegetation type within the STA, the total number of acres of that vegetation type within Fort Bliss, as well as the percent of the total number of acres of each vegetation type on Fort Bliss that would be removed assuming all 300 acres were removed within one vegetation type. In areas where less than 300 acres of that vegetation type is present within the project area, it is assumed that all the vegetation type within the project area would be removed.

Migratory birds and wildlife associated with these vegetation types have the potential to lose up to 300 acres of habitat. However, vegetation/habitat loss from construction is anticipated to be less than significant because the percent of each vegetation type that would be removed within the project area would represent 3.37 percent or less of the percent of those vegetation types on Fort Bliss (excluding the removal of non-native vegetation). In addition, approximately 7 miles of new transmission lines (either underground or aboveground) would be constructed following existing easements and utility corridors to the extent possible. Vegetation along these existing easements and utility corridors would be disturbed during construction of these lines. The exact location of these lines is currently unknown; however, it is

likely that the vegetation has been previously disturbed from construction and routine maintenance of existing lines. Implementation of Alternative 6 would not affect locally important vegetation communities.

Table 3-19. Vegetation Types Potentially Impacted Under Alternative 6

Vegetation Type	Acres on Fort Bliss	Acres within South Training Areas	Maximum % of Fort Bliss Acres that would be Removed[a]
Basin Desert Shrubland (coppice dunes)	348,847	71,004.8	0.09
Basin Sandshrub	76,160	2,653.9	0.39
Basin desert lowland shrubland	45,178	1,728.8	0.66
Creosote piedmont shrublands	141,638	2,298.0	0.21
Foothill desert shrublands	64,416	4,329.4	0.47
Foothills desert scrub	95,361	137.7	0.31
Sandy plains desert grassland	8,908	1,563.3	3.37
Foothills desert grassland	133,740	165.1	0.12
Basin lowland grassland	27,344	121.9	0.45
Non-native vegetation	1,605	1,442.8	18.7

Source: U.S. Army (2009b)

[a] Assumes that all 300 acres would be taken from one vegetation type. Acres removed do not include potential acres removed due to installation of transmission lines. Acreage for power lines are not included within these calculations because locations are still unknown.

BMPs would be employed during construction activities to minimize soil movement, stabilize runoff, and control sedimentation. Construction of the CSP facility could increase the likelihood of introduction and/or expansion of exotic or invasive species. Preventive and control measures presented in the INRMP would be implemented to reduce the possibility of exotic species invasions and further spreading of existing populations. In addition, these areas would be monitored following construction to determine whether project activities are causing an increase of exotics or undesirable plant species. If monitoring shows invasive species are increasing, then a strategy for control would be implemented.

Construction activities under this alternative would occur adjacent to or close to existing developed industrial/urban areas and would result in temporary increases in noise associated with construction equipment. Construction-related noise may temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area. Open trenches and ditches associated with construction have the potential to trap wildlife. Mitigation measures outlined in Section 5.1.3, such as trenching during cooler months when possible and providing escape ramps for trenches left unfilled overnight, would minimize impacts to wildlife. Impacts from operation and maintenance of the CSP facility, including noise and

increased traffic and human presence, could displace wildlife from suitable habitat in the immediate vicinity of the project area. However, because the proposed location is close to existing developed areas, wildlife within the area is most likely accustomed to the existing urban/industrial environment.

Construction of aboveground transmission lines associated with this facility would potentially affect a few individual birds by increasing collision and electrocution potential with the power lines. However impacts to birds would be reduced by following existing utility corridors and following the 2006 Suggested Practices for Avian Protection on Power Lines (APLIC 2006). Overall, bird populations on this part of Fort Bliss would not be significantly affected.

Less than significant impacts to sensitive species are expected from the construction or operation and maintenance of the CSP facility and associated facilities under Alternative 6. The Texas horned lizard, burrowing owl, loggerhead shrike, scaled quail, Crissal thrasher, and black-tailed gnatcatcher are common and occur in most of the vegetative communities on Fort Bliss and have the potential to occur at this site. In addition, the sandhill goosefoot and Anthony blister beetle have the potential to occur on this site. However, coppice dunes are not considered important habitat for sensitive species as well as migratory birds. Habitat loss due to construction would be less than significant due to the widespread distribution of mesquite coppice sand dunes on Fort Bliss as well as regionally, as well as the small percentage (0.09 percent) that would be impacted. Construction-related noise may temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area. It is possible that construction-related activities, such as clearing and grading, could result in mortality of some less mobile wildlife species. No federally listed or proposed threatened or endangered species are known to reside within the proposed project area. No critical habitat is located on Fort Bliss including within the Alternative 6 project area.

3.5.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Development of wind energy projects would include similar ground disturbance activities and impacts as described for Alternatives 4 through 6. In addition, the operation of wind energy facilities could potentially affect migratory birds and bats. Wind turbines can cause direct mortality of birds and bats through collision, mainly presumed to be with turbine blades. In addition, some research suggests that bat fatalities can result from rapid decompression resulting from sudden changes in pressure near the rapidly moving blade tip and outer portions of the blade (Strickland et al. 2011). It has also been suggested that turbines may disrupt a bat's echolocation capability. Echoes from moving blades can have

features that make them attractive to bats or may make it difficult for the bat to accurately detect and locate the blades (Long et al. 2010). Most studies of avian fatalities report less than or equal to three fatalities per MW per year (Strickland et al. 2011). Impacts to birds and bats would be reduced by following the 2012 USFWS Land-Based Wind Energy Guidelines during installation and operation of wind energy facilities (USFWS 2012).

Impacts to vegetation, wildlife, and sensitive species would be evaluated on a project-specific basis as future project locations are identified. However, the following environmental screening criteria have been chosen to aid in minimizing impacts to vegetation, wildlife, and sensitive species when choosing future locations of facilities:

- Do not locate new facilities and transmission lines where locally important natural resources, such as black grama grasslands, sand sagebrush communities, shinnery oak islands, and riparian and wetland areas, occur. In addition, do not locate new facilities and transmission lines within areas that would cause a significant decrease in the relative percentage of any one vegetation type within Fort Bliss, particularly if the vegetation type is not widespread within Fort Bliss or regionally.
- Whenever possible, do not locate future facilities within or adjacent to riparian habitat. Future transmission lines would be sited to minimize impacts to riparian habitat and to take advantage of existing corridors and rights-of-way to the maximum extent possible and designed according to 2006 Suggested Practices for Avian Projection on Power Lines (APLIC 2006).
- Do not locate new facilities where sensitive plant and animal species are known to occur or where high quality potential habitat for these species occurs.

3.5.2.8 Alternatives Combined

Construction of the facilities described for Alternatives 4, 5, and 6 would remove approximately 414.2 acres of vegetation/habitat if all alternatives are chosen. Additional vegetation would be removed for installation of power lines. Table 3-20 shows the total number of acres of each vegetation type within the project areas combined, the total number of acres of that vegetation type within Fort Bliss, as well as the maximum percent of the total number of acres of each vegetation type on Fort Bliss that would be removed. This calculation assumes that within each alternative footprint, the maximum number of acres of vegetation removed would be removed from one vegetation type. In areas where the acres for the project footprint are greater than the amount of the vegetation type present within the project area, it is assumed that all the vegetation type within the project area would be removed.

Table 3-20. Vegetation Types Potentially Impacted by Alternatives 4, 5, and 6.

Vegetation Type	Acres Present for Alternatives 4,[a] 5, and 6 Combined	Acres on Fort Bliss	Maximum Number of Acres Removed from All Alternatives Combined[b]	Maximum % of Fort Bliss Acres that would be Removed[c]
Basin desert shrubland (coppice dunes)	74,461.7	348,847	394.2	0.11
Basin Sandshrub	2,693.9	76,160	320	0.42
Basin desert lowland shrubland	1,728.8	45,178	10.6	0.02
Creosote piedmont shrublands	2,298.0	141,638	300.00	0.21
Foothill desert shrublands	4,329.4	64,416	300.00	0.47
Foothills desert scrub	144.2	95,361	306.50	0.32
Sandy plains desert grassland	1,563.3	8,908	27.9	0.31
Foothills desert grassland	165.1	133,740	165.1	0.12
Basin lowland grassland	121.9	27,344	121.9	0.45
Non-native vegetation	1,442.8	1,605	300	18.69
TOTAL ACRES	**88,949.1**	**943,197**	**NA**	**NA**

Source: U.S. Army (2009b)

[a] Totals presented include only acres under Alternative 4A because either Alternative 4A or Alternative 4B would be implemented and Alternative 4A acres are representative of potential impacts under Alternative 4.

[b] Acreage for power lines are not included within these calculations because locations are still unknown.

[c] This number assumes that the maximum number of acres for each alternative would be taken all within one vegetation type.

Loss of vegetation and habitat due to construction is anticipated to be minimal because the maximum percent of each vegetation type that would be removed within the project area would represent approximately 0.47 percent or less of the percent of those vegetation types on Fort Bliss (excluding removal of non-native vegetation).

Construction-related noise may temporarily displace wildlife or sensitive species from suitable habitat in the immediate vicinity of the project areas. Impacts from facility operation and maintenance, including noise and increased traffic and human presence, could displace wildlife from suitable habitat in the immediate vicinity of the project areas.

3.6 Cultural Resources

Cultural resources include archaeological sites, buildings, structures, objects, historic landscapes and districts, sacred sites, properties of traditional religious, and cultural importance, and traditional cultural properties (TCPs). A historic property, as defined in the National Historic Preservation Act of 1966 (NHPA), as amended, is a cultural resource that is included or eligible for inclusion NRHP. Under

Section 106 of the NHPA and its implementing regulations in 36 CFR §800, *Protection of Historic and Cultural Properties*, federal agencies must take into account the effects of their undertakings on historic properties. These regulations also require that federal agencies consult with the State Historic Preservation Office (SHPO) on their undertakings, and that they afford the Advisory Council on Historic Preservation (ACHP) the opportunity to comment on their undertakings. Section 110 of the NHPA further requires federal agencies to assume responsibility for the identification and preservation of historic properties on land owned or controlled by the agency.

Army Regulation 200-1 outlines policies, procedures, and responsibilities for Army compliance with historic preservation laws and regulations through the development and implementation of an Integrated Cultural Resources Management Plan (ICRMP) (U.S. Army 2007d). Pursuant to Army Regulation 200-1, the Garrison Commander is ultimately responsible for compliance with historic preservation laws. The ICRMP incorporates the Programmatic Agreement (PA) among the Fort Bliss Garrison Command, the ACHP, and the Texas and New Mexico SHPOs. The PA was signed in 2006. The PA directs Fort Bliss in fulfilling its cultural resource management responsibilities under Sections 106 and 110 of the NHPA. The ICRMP and PA[10] includes procedures to streamline and standardize regulatory compliance.

Compliance with historic preservation laws and Army regulations, and consultations with SHPOs, the ACHP, and federally recognized Native American tribes are coordinated on behalf of the Garrison Commander by an appointed Cultural Resource Manager (CRM). Consultations with federally recognized Native American tribes are conducted on a government-to-government basis. DoD's American Indian and Alaska Native Policy (1999) provides guidance for interaction and consultation with federally recognized American Indian governments.

The ROI for cultural resources varies for each alternative and includes the areas that would be potentially impacted by the construction of the proposed facilities.

3.6.1 Affected Environment

3.6.1.1 Prehistoric and Historic Background

This section presents the historical setting of the area now encompassed by Fort Bliss. The 2000 Mission and Master Plan Programmatic EIS (U.S. Army 2000) and ICRMP for Fort Bliss (U.S. Army 2008b) both contain detailed information about the prehistory and history of Fort Bliss. Because the baseline

[10] A copy of the Fort Bliss PA can be found at: https://www.bliss.army.mil/dpw/Environmental/documents/ICRMP_Volume%20I%20_PUBLIC.pdf.

information presented in these documents is current, only brief summaries of the documents are provided here and incorporated by reference.

The area now encompassed by Fort Bliss lies within the Jornada Mogollon cultural region (U.S. Army 2008b, 2000). The earliest conclusively documented evidence of human occupation of the region dates to the Paleoindian period from approximately 10,000 to 6000 B.C. Paleoindian groups in the area are generally viewed as small bands of highly mobile hunter-gatherers who followed herds of big game including Pleistocene megafauna (U.S. Army 2008b, 2000). The beginning of the Archaic period (circa 6,000 B.C.) roughly corresponds with warmer and drier climatic trends resulting in a transition from grasslands to the current desert shrub of the Chihuahuan Desert and the extinction of large game animals. Archaeological evidence suggests that Archaic groups were seasonally mobile, broad spectrum hunters and gatherers. Cultural developments during the Archaic period include a greater use of plant resources, increased sedentism (i.e., living in one place permanently), the construction of domestic structures, and population growth. Increased population likely led to restricted territorial home ranges and the eventual adoption of agriculture during the Late Archaic (U.S. Army 2008b, 2000). Following the long Archaic period, the Formative period, or Jornada Mogollon, is generally divided into three phases: the Mesilla phase (A.D. 200–1000), the Doña Ana phase (A.D. 1000–1300), and the El Paso phase (A.D. 1300–1450). The Formative period is characterized by a rapid succession of changes in architecture, settlement patterns, technology, and subsistence. Among the most notable developments are the use of ceramics and increasing agricultural dependence and specialization (U.S. Army 2008b, 2000). The Mesilla phase inhabitants lived in small hut-like pit houses, practiced agriculture, and made undecorated ceramics called El Paso brownware. The Doña Ana phase was a relatively brief transitional period marked by bichrome and polychrome ceramics, increasingly formal pit structures, an increase in population, and more concentrated use of arable lands. The El Paso phase represents the last and most intensive habitation of the Fort Bliss area. The phase is characterized by pueblo architecture, peak population levels, increased dependence on agriculture, increased trade with neighboring areas, and the introduction of small triangular projectile points (U.S. Army 2008b, 2000).

The first documented contact between Europeans and Native Americans in the El Paso area occurred in A.D. 1581 during the Spanish expedition led by Fray Agustin Rodriguez and Captain Francisco Sanchez Chamuscado (U.S. Army 2008b). At least two Native American groups, the Manso and the Suma, occupied the area at the time of first contact with the Spanish (U.S. Army 2000). Both groups practiced a mix of farming, hunting, and gathering. Between 1680 and 1682, Spanish fleeing the Pueblo Revolt brought the Tigua Indians to the El Paso area from northern New Mexico. The Manso joined the Tigua at Spanish missions at El Paso, but smallpox epidemics and intermarriage with the Tigua effectively

destroyed the Manso culture. The Suma culture gradually disappeared after being weakened by drought and Spanish and Apache raids. The Tigua continued to practice agriculture along the Rio Grande and hunt and gather resources in the Hueco Mountains to the north. In 1751, a Spanish royal land grant set aside lands for the Tigua Indians in the El Paso area (U.S. Army 2000). The Mescalero Apache were the other Native American tribe present in the area in the 1600s. Unlike the sedentary Manso, Suma, and Tigua, the Mescalero Apache were semi-nomadic hunters and gatherers ranging primarily over western Texas and southeastern New Mexico. (U.S. Army 2008b, 2000). The relationship between the Mescalero Apache and Spanish settlers was hostile until 1810, when the Spanish signed a treaty with them. The Mescalero's traditional lands came under U.S. jurisdiction after the Mexican-American War and the Gadsden Purchase in 1853. An influx of settlers and miners brought the Mescalero Apache in frequent contact with American settlers, and hostilities between the groups were common. It was not until 1922 that lands comprising the Mescalero reservation in the Sacramento Mountains of New Mexico were formally transferred to the tribe (U.S. Army 2000).

Beginning in the early 1700s, the Comanche also occupied the area now encompassed by Fort Bliss, and by the mid-1800s, they had displaced Mescalero Apache. The Kiowa made occasional forays into the El Paso area during the time the Comanche were dominant (U.S. Army 2000).

Formally established in 1893, Fort Bliss began as a minor military installation in 1849. During the Mexican Revolution of 1910, the fort became a major cavalry installation, and by 1916, more than 40,000 Soldiers were stationed in the area. Fort Bliss served a significant role during World War I as an enlistment, training, and mobilization center. During World War I, several thousand acres were acquired around the original 1,000-acre installation, and the fort continued to provide training and border security after the war. During World War II, Fort Bliss served as a troop reception center and continued its expansion into New Mexico. During the Cold War (1946–1991), Fort Bliss provided research facilities for the strategic missile program and served as the Army Air Defense Center. The installation has since become a major training facility (U.S. Army 2000). Currently, Fort Bliss is the home of the 1st Armored Division and a major training center for soldiers prior to deployment.

3.6.1.2 Cultural Resources Inventories and Investigations

Cultural Resource studies have been conducted on Fort Bliss since the 1920s (Abbott et al. 1996). As of 2009, more than 18,000 archaeological and architectural properties have been identified on Fort Bliss (Miller et al. 2009). These resources are associated with all prehistoric and historic periods recognized in the area now encompassed by the installation and represent the material manifestations of approximately 12,000 years of human occupation. The vast majority of these properties were recorded during several hundred cultural resource surveys conducted as part of Section 106 and 110 compliance processes. The

cultural resource staff at Fort Bliss maintains a database of all archaeological and architectural properties thus far identified on the installation. In consideration of Native American concerns as required by the NHPA and Executive Order 13007, *Indian Sacred Sites*, Fort Bliss has initiated inventories of TCPs and sacred sites on the installation. The Mescalero Apache, the Ysleta del Sur Pueblo (Tigua), the Comanche Tribe, the Fort Sill Apache, the Kiowa Tribe of Oklahoma, and the Navajo Nation maintain interests in lands managed by the installation, and Fort Bliss would continue to consult with these Native American groups (U.S. Army 2010b).

3.6.2 Environmental Consequences

NRHP-eligibility criteria provide the threshold for cultural resource significance under Section 106 of the NHPA. To be eligible for inclusion in the NRHP, a cultural resource must have integrity, the physical characteristics that existed during the resource's historic or prehistoric occupation or use, and must meet one or more of the following criteria in 36 CFR §60.4 (*Parks, Forests, and Public Property – National Register of Historic Places Criteria for Evaluation*):

- A – A property associated with events that have made a significant contribution to the broad patterns of our history
- B – A property associated with the life of a person significant in our past
- C – A property that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possess high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction
- D – A property that has yielded, or may be likely to yield, information important in prehistory or history

Cultural resources that do not meet at least one NRHP-eligibility criterion are not historic properties per the NHPA and need not be considered further under Section 106.

It is important to note that some properties of traditional religious and cultural importance may not meet the criteria for significance under 36 CFR §60.4, but they may still be significant to Native American groups. Under federal law, impacts to sacred sites and cultural resources may be considered adverse if the resources have been identified as important to Native American groups as outlined in NHPA, Executive Order 13007, issued in 1996, and other laws and regulations. The American Indian Religious Freedom Act (AIRFA) affirms the right of Native Americans to express and exercise their traditional religions, and to access religious sites on federal lands. Under Executive Order 13007, executive agencies responsible

for the management of federal lands shall 1) accommodate access to and the ceremonial use of sacred sites, 2) avoid adversely affecting the integrity of sacred sites, and 3) maintain the confidentiality of sacred sites.

Fort Bliss has developed a two-tiered program for determining the NRHP eligibility of prehistoric sites in the *Significance and Research Standards for Prehistoric Archaeological Sites at Fort Bliss* (Miller at al. 2009). The first tier of the NRHP eligibility evaluation procedure assesses site integrity and chronological data potential. Prehistoric sites that lack spatial (horizontal and/or stratigraphic) integrity and chronometric information do not have potential to empirically address research questions, and as such, are not eligible for inclusion in the NRHP. If a prehistoric site has demonstrable integrity and chronological potential, its potential NRHP eligibility is further assessed under the second evaluation tier. The second tier requires archaeologists to consider the research potential of a prehistoric site relative to its historic context - an organizational format incorporating major research issues within geographical areas and chronological periods. According to the Fort Bliss *Significance and Research Standards*, prehistoric sites are considered eligible for NRHP inclusion only if they contain sufficient information to address the analysis needs and data requirements for a historic context.

Table 3-1 includes the significance thresholds for cultural resources impacts in the context of this EIS. Direct effects generally involve physical damage or destruction to all or part of a resource through ground-disturbing activities, or deterioration or destruction of a resource brought about through neglect. Indirect effects generally result from alterations to the characteristics of the surrounding environment or setting that contribute to a resource's significance, and increased use of or access to an area containing historic properties. Areas within the project footprints discussed in this impact analysis have been surveyed to varying degrees, and therefore, each action alternative could require further studies/surveys if selected to fully determine the potential for significant impacts. This impacts analysis assumes that any alternative, if selected for implementation, would adhere to the PA, where applicable, and Section 106 consultation would be completed prior to construction. As a result, any adverse effects on cultural resources would be avoided, minimized, or mitigated. For properties and resources of interest to the federally recognized tribes, Fort Bliss will conduct government-to-government consultation to resolve any potential issues and impacts.

3.6.2.1 Alternative 1 – No Action

Under Alternative 1, Fort Bliss would not implement Net Zero initiatives; therefore, there would be no impacts to cultural resources. Cultural resources would continue to be managed by Fort Bliss in accordance with federal laws and Army regulations.

3.6.2.2 Alternative 2 – Conservation Policies and Procedures

The installation of energy, water, and waste efficient systems in existing facilities under Alternative 2 may impact cultural resources. Impacts may be significant if modifications are made to architectural resources included in or eligible for inclusion in the NRHP, and the modifications adversely affect the features that contribute to the NRHP eligibility of the property. As such, the ROI for this alternative potentially includes all historic architectural resources. In accordance with the PA, a determination of effect would be made prior to construction activities. If proposed modifications are determined to have an adverse effect on historic properties, potential mitigation measures may be offered for consideration by the installation's historical architect. The Fort Bliss CRM would initiate and continue consultations with the Texas SHPO through the Section 106 process. It is assumed that proposed modifications would be implemented in accordance with the PA and ICRMP; therefore, anticipated impacts to cultural resources would be less than significant.

3.6.2.3 Alternative 3 – Water Reclamation Pipeline

Construction and operation of the water reclamation pipeline have the potential to impact cultural resources. The majority of the proposed pipeline route has been investigated during 18 cultural resource studies, and all but one of the archaeological surveys are valid under the current PA. Cultural resource investigations of the portions of the proposed pipeline route not previously surveyed may not be required. Under the terms of the PA, undertakings that occur in disturbed areas in the Main Cantonment Area (referred to herein as East and West Bliss) that are determined by the CRM to retain no integrity are exempt from SHPO or ACHP review. As currently configured, the proposed pipeline route passes through 13 previously identified archaeological sites. Twelve of the sites have been determined to be not eligible for inclusion in the NRHP. The remaining site, determined eligible for inclusion in the NRHP, was mitigated through data recovery. Any previously unidentified archaeological sites encountered during construction would be subject to the inadvertent discovery clause of the PA. The PA provides procedures in the event of accidental discovery of cultural resources. In the unlikely event that Native American human remains are discovered during construction, construction activities would cease, and the Fort Bliss NAGPRA policy would be followed.

Approximately 2.1 miles of the total 23.7 miles of proposed pipeline are contained within the Fort Bliss Main Post Historic District (Figure 3-6). This historic district, comprising 346 contributing elements, was listed in the NRHP in 1998 under multiple historic contexts. The parade ground, as a focal point of the post, is an important landscape element of the historic district. Although it is unknown how much of the parade ground's vegetation remains from the period of significance, "it can be inferred that the current state of the overall pattern of vegetation along the periphery of the parade ground conveys a sense of its

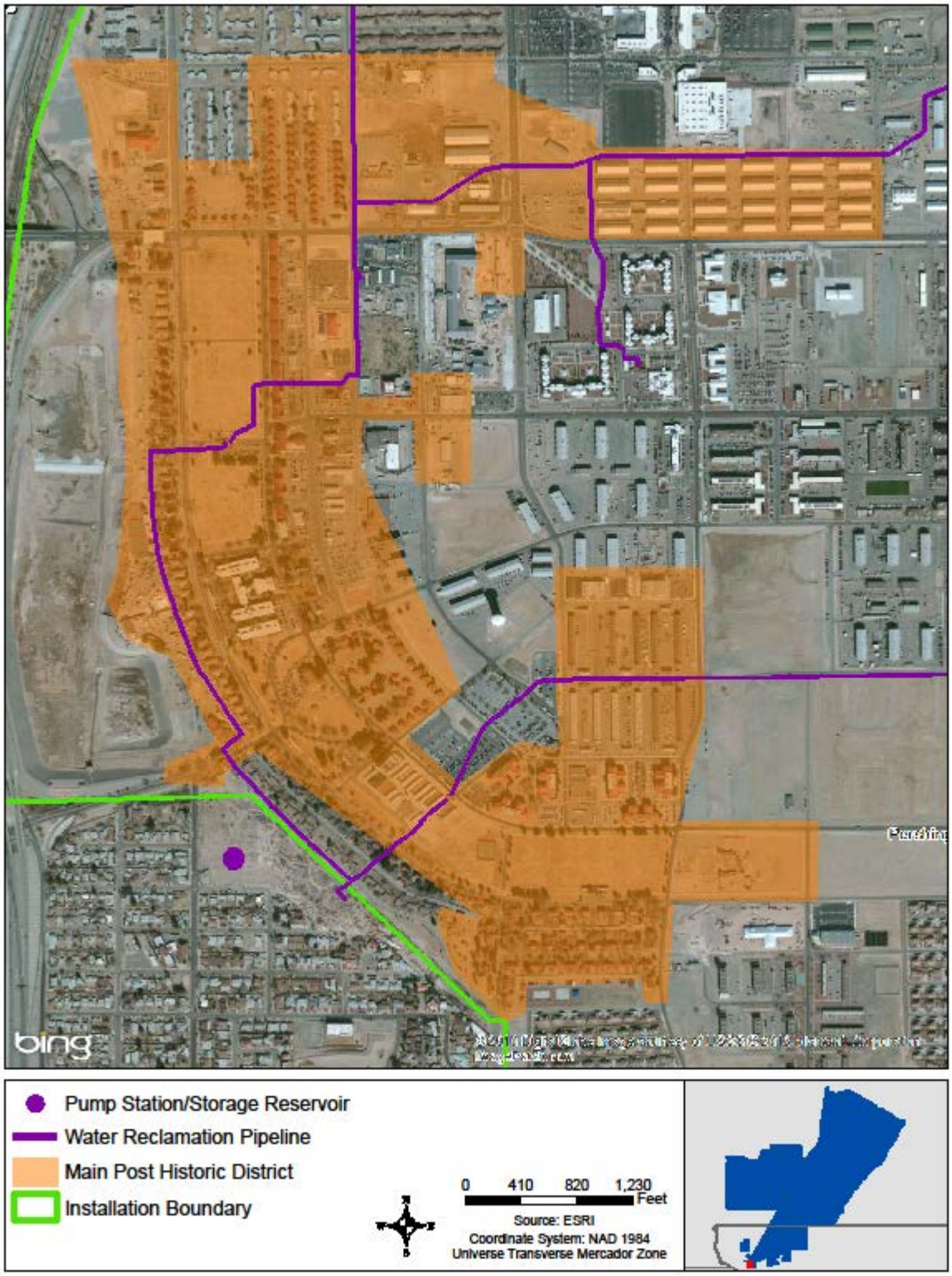


Figure 3-6. Proposed Reclaimed Water Pipeline Route and Fort Bliss Main Post Historic District

historic character" (National Park Service 2000). As described in Section 3.5.2.4, the elevated salinity of the reclaimed water from the city of El Paso could potentially have an adverse impact on the vegetation that is being irrigated. Impacts to vegetation that are contributing elements to the historic district would be a significant but mitigable adverse effect. Potential management techniques for reducing impacts to vegetation from increased salinity could mitigate the potential impacts to the historic district. Once a buried pipeline route is finalized and the potential impacts to vegetation in the historic district are assessed, Fort Bliss would consult with the signatories of the PA to determine if the project is an adverse effect to the historic district.

3.6.2.4 Alternative 4 – Waste-to-Energy Plant

Alternative 4A – STA Site

Construction and operation of the WTE plant and associated transmission lines and access roads under Alternative 4A is expected to impact identified cultural resources. The proposed project area in the STA has been investigated by nine cultural resource studies, and covered by archaeological investigations valid under the current PA. These studies have resulted in the identification of 181 archaeological sites. However, archaeological investigations by Ernst (2010) and Lukowski et al. (2011) determined that of the 181 sites initially identified in the ROI, 39 were not located or found to be no longer extant, 33 were combined with other sites, and three do not meet the current minimum criteria for site designations. Nine prehistoric sites within the project area have been determined to be eligible for inclusion in the NRHP. These sites could be adversely impacted by construction activities depending on the final location of the WTE plant within the proposed footprint. However, because measures to minimize or mitigate any adverse effects would be implemented, the impact would be less than significant. An additional site within the project area was determined to be eligible for inclusion in the NRHP, but the site was mitigated through data recovery. The remaining sites within the proposed footprint are not eligible for NRHP inclusion.

Depending on the routes of the transmission lines and access roads associated with this alternative, additional cultural resource studies may be required if those portions of the ROI have not been inventoried for cultural resources by valid surveys. If NRHP-eligible historic properties are identified within the ROI, strategies to avoid, minimize, or mitigate adverse impacts would be developed prior to construction. In accordance with the PA, the Fort Bliss CRM would continue consultations with the Texas SHPO and interested tribal governments through the Section 106 process. Potential adverse indirect effects could result from changes in access to historic properties or cultural resources of interest to the tribes. Although cultural resources of interest to the tribes have not been identified in the STA, they could possibly occur based on past use of the area (U.S. Army 2000). Any previously unidentified

archaeological sites encountered during construction would be subject to the inadvertent discovery clause of the PA. In the unlikely event that Native American human remains are discovered during construction, construction activities would cease, and Fort Bliss NAGPRA policy would be followed. It is anticipated that because a plan would be in place to avoid, minimize, or mitigate adverse impacts to historic properties, adherence to the PA and ICRMP, and consultation with the SHPO, impacts would be less than significant.

Alternative 4B – Railroad Drive Site

Construction and operation of the WTE plant and associated transmission lines and access roads under Alternative 4B is expected to impact identified cultural resources. The proposed project area has been investigated by 12 cultural resource studies, and covered by archaeological investigations valid under the current PA. Additional cultural resource studies and NEPA analysis may be required once truck and transmission line routes are identified. Cultural resource surveys of the truck and transmission line routes may not be required if the project areas have been inventoried by surveys valid under the current PA or if they occur within the Main Cantonment Area (referred to herein as East and West Bliss). Under the terms of the PA, undertakings that occur in disturbed areas in the Main Cantonment Area that are determined by the CRM to retain no integrity are exempt from SHPO or ACHP review. Previous studies have resulted in the identification of 35 archaeological sites within the proposed footprint of Alternative 4B. However, of the 35 sites initially identified in the ROI, 5 were combined with other sites, and 3 were not located during re-visitations. Six sites within the proposed project area have been determined to be eligible for inclusion in the NRHP. Taking into account the combination of sites, the NRHP-eligible historic properties consist of three prehistoric sites and one historic site. The NRHP-eligibility of four sites within the proposed footprint is undetermined, and archaeological evaluations may be required prior to implementation of this alternative. The remaining sites within the current footprint are not eligible for NRHP inclusion.

Strategies to avoid, minimize, or mitigate adverse impacts to NRHP-eligible historic properties within the ROI would be developed prior to construction. In accordance with the PA, the Fort Bliss CRM would continue consultations with the Texas SHPO and interested tribal governments through the Section 106 process. Any previously unidentified archaeological sites encountered during construction would be subject to the inadvertent discovery clause of the PA. In the unlikely event that Native American human remains are discovered during construction, construction activities would cease, and Fort Bliss NAGPRA policy would be followed. It is anticipated that because a plan would be in place to avoid, minimize, or mitigate adverse impacts to historic properties and because of adherence to the PA and ICRMP and consultation with the SHPO, impacts would be less than significant.

3.6.2.5 Alternative 5 – Geothermal Energy Facility

Construction and operation of the geothermal energy facility under Alternative 5 is expected to impact identified cultural resources. Six prehistoric archaeological sites were identified within the proposed facility footprints during an archaeological inventory of Maneuver Areas 3–8 (Carmichael 1986). The potential NRHP eligibility of the sites has not been evaluated. Anticipated transmission lines associated with this undertaking may require survey or resurvey work depending upon their route, which has yet to be determined. If NRHP-eligible historic properties are identified within the ROI, strategies to avoid, minimize, or mitigate adverse impacts would be developed prior to construction. In accordance with the procedures outlined in the PA, the Fort Bliss CRM would continue consultations with the New Mexico SHPO and interested tribal governments through the Section 106 process.

3.6.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Potential impacts to cultural resources from CSP technology development in the STA would be similar to that discussed for Alternative 4. If the NRHP-eligible sites in the STA cannot be avoided, mitigation would be developed prior to construction. In accordance with the PA, the Fort Bliss CRM would continue consultations with the Texas SHPO through the Section 106 process. Associated transmission lines and access roads outside the currently delineated footprint may require cultural resource inventories and evaluations. There is potential for adverse indirect effects resulting from increased access to historic properties, or restricted access to cultural resources of interest to the tribes. It is anticipated that because a plan would be in place to avoid, minimize, or mitigate adverse impacts to historic properties, adherence to the PA and ICRMP, and consultation with the SHPO, impacts would be less than significant.

3.6.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. These actions could impact cultural resources. Once potential ROIs are delineated, determination of whether valid cultural resource studies of the project area or areas can be made, and potential direct and indirect impacts can be assessed. Wind energy development would take into consideration potential visual impacts depending on the placement and height of turbines. Adherence to the environmental screening criteria mentioned previously would minimize impacts from future projects. If NRHP-eligible historic properties are identified within the ROIs, strategies for avoidance or mitigation would be developed prior to construction. In accordance with the procedures outlined in the PA, the Fort Bliss CRM would continue consultations with the appropriate state SHPO, interested tribal governments,

or other interested parties through the Section 106 process. Any previously unidentified archaeological sites encountered during construction would be subject to the inadvertent discovery clause of the PA. In the unlikely event that Native American human remains are discovered during construction, construction activities would cease, and the Fort Bliss NAGPRA policy would be followed. It is anticipated that because a plan would be in place to avoid, minimize, or mitigate adverse impacts to historic properties, adherence to the PA and ICRMP, and consultation with the SHPO, impacts would be less than significant.

3.6.2.8 Alternatives Combined

If all alternatives are selected for further consideration, impacts would be similar for those discussed under Alternative 2-7. Extensive archaeological inventories and evaluations of identified sites would be necessary, numerous possible adverse effects would need to be considered, and consultations with Texas and New Mexico SHPOs, tribal governments, and other possible interested parties would need to be conducted. If NRHP-eligible historic properties are identified within the ROI, strategies for avoidance or mitigation would be developed prior to construction. In accordance with the procedures outlined in the PA, the Fort Bliss CRM would continue consultations with the appropriate state SHPO and interested tribal governments through the Section 106 process. Any previously unidentified archaeological sites encountered during construction would be subject to the inadvertent discovery clause of the PA. In the unlikely event that Native American human remains are discovered during construction, construction activities would cease, and the Fort Bliss NAGPRA policy would be followed.

3.7 Energy Demand and Generation

Energy security is increasingly viewed as essential to ensuring and protecting the long-term viability of installation operations. Safe and reliable access to energy is critical to virtually all activities on Army installations. The Army recognizes the threats to its installations and operations posed by increasing costs of centrally distributed, over-burdened, utility-provided energy grids, as well as the vulnerabilities posed by potential disruption of military installation energy supplies. Therefore, the Army has included energy as part of its Net Zero strategy.

The Army Net Zero approach comprises five interrelated steps: reduction, re-purpose, recycling and composting, energy recovery, and disposal. Each step is a link toward achieving Net Zero, as discussed in Section 1.3.1. Reduction includes maximizing energy efficiency in existing facilities. Re-purpose involves diverting energy to a secondary purpose with limited processes. For energy, recycling involves cogeneration where two forms of energy (heat and electricity) are created from one source. Energy recovery can occur from converting unusable waste to energy, renewable energy, or geothermal water sources.

3.7.1 Affected Environment

3.7.1.1 Electricity

EPEC supplies electrical power to Fort Bliss through a 115-kilovolt (kV) transmission line that serves Fort Bliss, the city of El Paso, and military reservations to the north. The line is part of a loop that can supply Fort Bliss from two directions. The line has a loading capacity of about 150 megavolt amperes (MVA) (U.S. Army 2007b). The EPEC substation on Fort Bliss consists of two 15/20/25 MVA power transformers operated in parallel for a total capacity of 50 MVA.

In 2010, Fort Bliss' electricity consumption had a base load of 30 to 40 MW with a 65.8-MW maximum peak load, or about 1 volt ampere per person on installation (Fort Bliss 2011). Electrical consumption is projected to increase to an 80-MW baseload and a 130-MW maximum peak load in 2015 (Fort Bliss 2011). One MW is equivalent to one MVA. Average power consumption for the area, based on standard rates in Army Technical Manual TM-5-811, is on the order of 0.3 kW/person, or 10 MW (U.S. Army 2007b).

EPEC has a total generating capacity of 840 MW and can purchase an additional 110 MW from the Four Corners Plant. Current peak electricity usage within the EPEC service area is estimated to be approximately 75 percent of available power (U.S. Army 2007b). East and West Bliss consume approximately 1 percent of power available from EPEC (1.4 percent of peak electricity use). Off-site military dependents consume considerably less than this amount. It is estimated that Fort Bliss, as a whole, consumes approximately 3 percent of EPEC's energy production (Favela 2012). Under current Texas law, EPEC charges Fort Bliss a discounted rate for utility usage. El Paso residents are charged a minimal monthly fee, which is specifically listed on each bill, to reflect this discount. The EIS considers the impact to electricity rates for residents of El Paso, and this impact is addressed further in Section 3.11.2.

3.7.1.2 Natural Gas

El Paso Natural Gas Company supplies natural gas, the primary heating fuel on East and West Bliss, through lines owned and maintained by Texas Gas Services. A number of distribution points, with an estimated total capacity of 2.5 million cubic feet per hour (CFH), is dispersed on a looped network throughout the installation.

Design per capita gas consumption on the installation is estimated at 28.2 CFH (U.S. Army 2007b), a level that would only be used on the coldest days. With a population on the installation of approximately 30,000, this translates to a consumption rate on the coldest days of 0.85 million CFH. Assuming an energy requirement of 80 British thermal units (btu) per square foot of floor space per hour,

approximately 11 million square feet of floor space, and 1,000 btu per cubic foot of natural gas, the installation would require approximately 0.88 million CFH on the coldest days. The annual consumption of natural gas on East and West Bliss is not known; however, in 2010, Fort Bliss purchased 900,824 million Btu of natural gas (Fort Bliss 2011). The Texas Gas Company provides 25.9 billion cubic feet of natural gas per year to 28 cities in Texas, including El Paso, with an annual average consumption of 47 thousand cubic feet per customer (U.S. Army 2007b).

3.7.2 Environmental Consequences

To analyze impacts to energy demand and generation, the EIS examined if the proposed efficiency improvements, energy reductions, and renewable energy generation methods would meet the current and projected energy demands of Fort Bliss. Significance thresholds for impacts to energy demand are included in Table 3-1.

3.7.2.1 Alternative 1 – No Action

Under Alternative 1, Fort Bliss would not implement energy-related conservation policies or procedures beyond that currently being implemented or construct and operate new sources of renewable energy on the installation. Fort Bliss would continue to purchase electricity and natural gas from the current vendors to meet its current and future energy demands. Because implementation of this alternative would not result in increased energy demand over existing or projected levels, there would be no impact to energy demand. Alternative 1 would not contribute to Fort Bliss meeting its renewable energy generation and consumption requirements under existing laws and executive orders or achieve Net Zero goals. No beneficial impacts would be realized under this alternative.

3.7.2.2 Alternative 2 – Conservation Policies and Procedures

Alternative 2 would continue to implement several strategies to improve conservation policies and procedures at the installation. Alternative 2 would result in the installation of new energy meters to obtain baseline data and allow Fort Bliss to determine what buildings may be operating inefficiently and target specific strategies for improving energy usage. This baseline would examine energy efficiency of installation infrastructure as well as vehicle fleets. Using these baseline data, overall efficiency could be improved, lowering the overall energy demand at the installation. Buildings could be targeted for renovations and technology upgrades to increase the efficiency of power usage. Specific strategies could include the installation of smart grids, energy-saving electronic equipment, and motion-sensor lighting and the implementation of policies meant to change behavior in Soldiers, civilians, and contractors in support of Net Zero goals at the installation. Such changes in installation policies could include increasing

telecommuting and shared space arrangements and allowing for growth in the workforce without the need for expanded space or increased energy demand.

In addition to infrastructure efficiency improvements, under Alternative 2, Fort Bliss also would examine transportation and fleet upgrades and innovations, including the use of electric vehicles and battery storage upgrades. Electric vehicles would increase the energy demand on Fort Bliss; however, the exact demand would vary by the number of electric vehicles purchased and the number of vehicle charging stations installed.

Under Alternative 2, Fort Bliss would renovate existing structures to be more energy efficient and include energy efficient design into all future construction. Alternative 2 would also include development of Net Zero Communities and small-scale, renewable energy projects. Alternative 2 would reduce the per person energy demand, especially on East and West Bliss, resulting in beneficial impacts regarding energy demand. While Alternative 2 would have a beneficial impact on energy demand, the alternative alone would not enable Fort Bliss to meet its renewable energy generation requirements under existing laws and executive orders, or achieve Net Zero goals because it includes minimal on-site renewable energy generation. The installation would still rely on outside utilities to provide electricity and natural gas.

3.7.2.3 Alternative 3 – Water Reclamation Pipeline

Construction of a water reclamation pipeline under Alternative 3 would not result in any permanent increases in energy demand on Fort Bliss, and therefore would have negligible impacts. Alternative 3 alone would not enable Fort Bliss to meet its renewable energy generation requirements under existing laws and executive orders, or achieve Net Zero goals because it does not include any renewable energy generation. The installation would still rely on outside utilities to provide electricity and natural gas.

3.7.2.4 Alternative 4 – Waste-to-Energy Plant

The environmental consequences to energy demand and generation are the same for Alternatives 4A and 4B. Implementation of Alternative 4 would provide Fort Bliss with a source of renewable energy generation through the construction and operation of a WTE plant. Currently, it is anticipated that the capacity of the WTE plant would provide a maximum of 45 MW of energy capacity. Under the current Fort Bliss electricity demand of 30 to 40 MW with a peak load of 65 MW, the WTE plant would be capable of meeting a portion of the existing electrical demands; however, it would not solely be capable of meeting existing peak load or the 2015 projected base load (80 MW) and peak load (130 MW).

This analysis also considered the energy demand at Fort Bliss inclusive of that currently derived from natural gas. To determine the energy demand needed under an electrical heating system, the analysis used the 2003 Commercial Buildings Energy Consumption Survey to determine the estimated electrical

demand per square foot. Using the Commercial Buildings Energy Consumption Survey results for a federally owned building that uses electricity for heating and is located in Climate Zone 5, which includes Fort Bliss, this analysis assumes a demand of 15.7 kilowatt-hours (kWh) per square foot annually (DOE 2003). To translate that estimate into the MW demand, 15.7 kWh was multiplied by 11 million square feet of building space, resulting in an annual demand of 172,700,000 kWh annually, or 19,714.61 kW. This figure is then converted to MW by dividing by 1,000 for the final result of 20 MW. An assumption of 20 MW to replace the existing natural gas heating demand is used to evaluate all action alternatives.

Assuming an average of the additional 20-MW load, the energy demand of Fort Bliss would increase to 50 to 60 MW with a peak load of nearly 90 MW. With the added energy demand from electrical heating, the WTE plant would not solely have the capacity to meet the 2010 energy demand needs of Fort Bliss or the 2015 projected base load (100 MW) and peak load (150 MW), modified for natural gas energy demands. Alternative 4 would have a beneficial impact regarding energy generation due to the increased renewable energy generation, which would be capable of meeting a portion of the existing and projected energy demand needs for Fort Bliss. It is anticipated that Alternative 4 would contribute to Fort Bliss meeting its renewable energy generation requirements under existing laws and executive orders, as well as its Net Zero energy goals.

3.7.2.5 Alternative 5 – Geothermal Energy Facility

Implementation of Alternative 5 would provide Fort Bliss with the capacity to produce an estimated 20 MW of energy on the installation. The geothermal energy facility by itself would not produce sufficient energy for Fort Bliss to meet the existing or future energy demands of the installation. The installation would still rely on outside utilities to provide electricity and natural gas. The alternative would also not meet the 20-MW estimated energy demand required to replace the natural gas heating system. It is likely that the 20-MW replacement, derived from an average annual load, would be higher or lower based on the season and heating needs. Therefore, under Alternative 5, the geothermal energy facility would have to operate at 100 percent capacity and still would not reliably meet the current heating demands of Fort Bliss. Therefore, although Alternative 5 would have a beneficial impact on energy generation it would not be of sufficient quantity to solely meet Fort Bliss' Net Zero energy goals. However, implementation of Alternative 5 would contribute to Fort Bliss meeting its renewable energy generation requirements under existing laws and executive orders.

3.7.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Implementation of Alternative 6 would provide Fort Bliss with the capacity to produce 50 MW of energy on the installation. The dry-cooled CSP technology by itself would not be able to meet the full existing or

future energy demands of the installation. Similar to Alternative 6, the CSP arrays would be capable of meeting the energy demand needs required to heat Fort Bliss, replacing the existing natural gas system. The arrays could meet the average electrical load, which averages between 30 to 40 MW but would be unable to meet the peak electrical demand of Fort Bliss, which is currently 65.8 MW. The installation would still rely on outside utilities to provide electricity and/or natural gas. Therefore, although Alternative 6 would have a beneficial impact on energy generation it would not be of sufficient quantity to solely meet Fort Bliss' Net Zero energy goals. However, it would contribute to Fort Bliss meeting its renewable energy generation requirements under existing laws and executive orders.

3.7.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. The energy generation capacity of these additional projects is not known at this time. Additional renewable energy development may help supplement other energy production on installation, but it may not be able to meet the full existing or future energy demands of the installation by itself. If projects identified were similar to those described for Alternatives 5 and 6, beneficial impacts would result from reducing the demand on the EPEC system and adding on-site renewable energy sources. These same beneficial impacts would be anticipated from wind energy development. However, it cannot be determined at this time if projects under this alternative alone would have the potential to meet Net Zero energy goals. Implementation of Alternative 7 would contribute to Fort Bliss meeting its renewable energy generation requirements under existing laws and executive orders. As noted in Chapter 2, renewable energy technologies can fluctuate over the course of a day and could require the use of a combined cycle natural gas turbine to ensure the energy source could reliably meet demand, resulting in beneficial impacts to energy demand. Depending on the specifics of future projects, the installation may still rely on outside utilities to provide electricity and/or natural gas.

3.7.2.8 Alternatives Combined

If Fort Bliss were to implement all action alternatives, the installation would have the capacity to produce 115 MW of energy on the installation. This capacity would exceed the existing energy demand of Fort Bliss, which is currently estimated to experience a peak load of 90 MW. The capacity would also meet the projected 2015 energy demand but not the 2015 peak demand. Combined with the energy conservation policies implemented under Alternative 2, implementation of all action alternatives would result in a

beneficial impact to energy demand and generation and would allow Fort Bliss to meet its Net Zero energy goal, as well as renewable energy generation requirements of existing laws and executive orders.

3.8 Geology and Soils

Bedrock exposures in the Fort Bliss ROI consist primarily of the mountains that bound the installation: Franklin, Organ, Sacramento, and Hueco. Soils that have formed on the flanks of the mountains and in the vast expanses of the basin areas are predominately Entisols and Aridisols. Soil erosion is a major concern and can be accelerated by many military and civilian activities. Mitigation and control of soil erosion is important in support of the Army mission.

3.8.1 Affected Environment

The ROI for geology and soil impacts is defined as essentially any area on Fort Bliss on which project-related activities could occur, including the footprint of facilities and associated renewable energy technologies, corridor roads, transmission lines, and construction staging areas.

Fort Bliss lies within the Basin and Range physiographic province (Collins and Rainy 1994), a region covering much of the western U.S., consisting of prominent north-south-trending mountain ranges separated by expansive, sediment-filled basins. The installation is also in the northern part of the Chihuahuan Desert (Schmidt, 1979), an interior continental desert which receives most of its rainfall during the hot summer months. Elevation on the basin floor is approximately 3,800 feet above sea level, rising to more than 8,000 feet on the western margins (Organ Mountains).

Most of the installation is situated in a large intermontane basin consisting of the Tularosa and Hueco basins of southern New Mexico and west Texas. The basins lie between the Franklin and Organ mountains to the west, and the Sacramento and Hueco mountains to the east. Rocks in the Franklin Mountains include Precambrian granite and meta-sedimentary units over one billion years old, overlain by younger Paleozoic marine sedimentary strata. The Organ Mountains are comprised mainly of Tertiary igneous rocks approximately 33 million years old (Seager 1981). The Sacramento and Hueco mountains are made up largely of Paleozoic marine sedimentary rocks. Surface deposits in the Tularosa and Hueco basins are predominantly Holocene (younger than 10,000 years BP) aeolian (wind-deposited) sand dunes and sand sheets. Underlying the Holocene sediments are older basin-fill gravels, sands, and finer sediments.

The majority of soils at Fort Bliss and vicinity are broadly classified as Entisols, Aridisols, or Mollisols. The sand dunes and sheets are mainly Entisols, exhibiting little soil horizon development, and having formed only within the last few hundred years. Typically underlying the sand are older, more developed soils (mainly Aridisols), which often include a prominent calcrete (“caliche”) horizon up to several meters

thick. The calcrete is a massive white calcium carbonate unit which generally has a soil texture of sandy clay loam. Loamy and clayey soils are typical of low-lying playas and other depressions within the basins and are subject to occasional flooding after major rainfall events. Otero Mesa and a few other upland areas on Fort Bliss contain Mollisols which are soils darkened by relatively high organic matter content, typical of grasslands, and are areas with high biodiversity. Certain areas also have soil surfaces that are covered by a biological crust, consisting of communities of highly specialized organisms such as algae, bacteria, lichens, mosses, liverworts, and fungi. These crusts serve to retain soil moisture, and reduce wind and water erosion.

Fan-piedmont soils on the margins of the basins are mainly Entisols and Aridisols, but are predominantly alluvial (water-deposited) in origin. The texture for these alluvial soils is most commonly sandy loam, but the soils also contain variable amounts of rock fragments eroded from the adjacent mountains. Soils comprising these fan-piedmont areas of Fort Bliss are generally susceptible to gully and sheet erosion from running water.

In general, the dry climate and sparse vegetation on the installation make soils vulnerable to wind and water erosion. The majority of soils are susceptible to dust generation and dune formation. Wind speeds in El Paso are relatively moderate averaging 9.0 mph, with March and April having the highest average wind speeds of 11.3 mph, leading to the majority of sandstorms. Most soils on both the NTA and STA are highly susceptible to wind erosion, while McGregor Range contains soils that are highly susceptible to both water and wind erosion (U.S. Army 2001).

More detailed information on Fort Bliss soils can be found in the Fort Bliss Soil Survey (USDA 2004) which includes physical, chemical, and engineering properties, as well as limitations for military uses and ecological site descriptions and classifications. The soil survey contains data characterizing current conditions of soils, vegetation, and overall ecology, which may be useful in planning military actions and selecting sites for construction or training purposes. Soils and rock materials on Fort Bliss, including sand, gravel, and limestone, are currently produced in numerous quarries (U.S. Army 2010b).

Based on the soil survey, soil units are broken down into eight general soil associations. Each soil association is a map unit that comprises two or more geographically associated soils or miscellaneous areas that are grouped as one (USDA 2004). Basic characteristics of each of these soil associations are presented in Table 3-21. Each of the eight soil associations is then broken down into more detailed soil map units. A total of 63 individual soil series are described for Fort Bliss (U.S. Army 2010b). Soil series occurring in the project area of the Proposed Action are presented in Table 3-22, with a discussion of the

alternative and the potential impacts to the soil units being presented in the environmental consequences section of this resource.

Table 3-21. General Soil Association Characteristics

Soil Unit	Percent of Fort Bliss	Physical Characteristics
Copia-Mcnew-Elizario Association	22	2–5% slopes, very deep, well drained to excessively drained, high proportion of sand on surface
Copia-Nations-Hueco Association	15	0–5% slopes, very deep to moderately deep, loamy fine sand surface texture
Pendero-Copia-Piquin Association	6	2–15% slopes, very deep, excessively drained, loamy fine sand to very gravelly sandy loam surface texture
Jerag-Reyab-Armesa Association	14	0–5% slopes, well drained, very deep to shallow, very fine sandy loam and silt loam surface texture
Reyab-Infantry-Crossen Association	20	0–10% slopes, well drained, very deep to very shallow, surface texture mixed (silt loam, very gravelly loam, gravelly fine sandy loam)
Bissett-Altuda-Rock Outcrop Association	16	5–65% slopes, well drained, shallow and very shallow, very gravelly or very cobbly loam surface texture
Brewster-Rock Outcrop-Stallone Association	4	5–90% slopes, well drained, very deep to very shallow, very gravelly loam to extremely bouldery, sandy loam surface texture and rock outcrop
Deama-Rock Outcrop-Penalto Association	3	5–65% slopes, well drained, shallow and very shallow, very cobbly or gravelly loam surface texture

Source: USDA (2004)

Table 3-22. Soil Series Located in Proposed Project Areas

Soil Type	Slope (%)	Drainage	Permeability	Geographic Position	Major Use
Cavalry loamy fine sand (11)	1–3	Well drained	Moderate	Basin floor	Livestock grazing, wildlife habitat, military installation
Hueco loamy fine sand (21)	1–3	Well drained	Moderately slow	Basin floor	Wildlife habitat
Mcnew-Copia-Foxtrot complex (40)	1–5	Well drained	Moderately rapid	Basin floor	Livestock grazing, wildlife habitat
Elizario-Copia complex (41)	2–5	Well drained	Moderately rapid	Basin floor, hills	Livestock grazing, wildlife habitat
Copia-Nations complex (22)	1–3	Excessively well drained	Moderately slow-rapid	Basin floor	Wildlife habitat
Copia loamy fine sand (7)	5–15	Excessively well drained	Moderately rapid	Dune	Livestock grazing, wildlife habitat
Deama-Rock outcrop complex (77)	35–65	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat

Soil Type	Slope (%)	Drainage	Permeability	Geographic Position	Major Use
Deama-Rock outcrop complex (75)	5–15	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Deama-Penalto-Rock outcrop complex (80)	35–65	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Deama-Penalto-Rock outcrop complex (79)	15–35	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Altuda-Rock outcrop complex (54)	5–15	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Altuda-Rock outcrop complex (55)	15–35	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Altuda-Rock outcrop complex (56)	35–65	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Bissett-Rock outcrop complex (52)	15–35	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Bissett-Rock outcrop complex (53)	35–65	Well drained	Moderately slow	Hill	Livestock grazing, wildlife habitat
Cale silt loam (81)	2–5	Well drained	Moderately slow	Valley	Livestock grazing, wildlife habitat
Oryx loam	1–5	Well drained	Moderately slow	Fan piedmont	Livestock grazing, wildlife habitat
Crossen gravelly fine sandy loam (30)	2–5	Well drained	Moderately slow	Fan remnant	Wildlife habitat
Sonic very gravelly fine sandy loam (27)	1–8	Well drained	Moderately slow	Fan piedmont	Wildlife Habitat
Infantry-Sonic complex (12)	3–10	Well drained	Moderately rapid	Fan piedmont	Livestock grazing, wildlife habitat

Source: USDA (2004)

Prime Farmland soils are protected under the Farmland Protection Policy Act of 1981 (FPPA). The intent of the act is to minimize the extent to which federal programs contribute to the unnecessary or irreversible conversion of farmland soils to nonagricultural uses. The FPPA also ensures that federal programs are administered in a manner that, to the extent practicable, would be compatible with private, state, and local government programs and policies to protect farmland. The Natural Resources Conservation Service is responsible for overseeing compliance with the FPPA and has developed rules and regulations for

implementation of the act (see 6 CFR §658, revised 1 January 1998). No prime farmlands are listed at Fort Bliss (USDA 2004).

3.8.2 Environmental Consequences

Table 3-1 includes significance thresholds for impacts to geology and soils.

3.8.2.1 Alternative 1 – No Action

Under Alternative 1, the current conditions in the ROI would persist and Fort Bliss would not pursue additional Net Zero initiatives, beyond those policies and procedures that are currently in place. No grading or excavation of soils or removal of vegetation would occur under this alternative. Implementation of the No Action Alternative would result in negligible impacts on soils.

3.8.2.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, the current soil and geologic conditions in the ROI would persist. Although Fort Bliss would continue to implement conservation policies and procedures, negligible impacts to soils are expected because there would be only small-scale, limited construction activities and ground disturbance of less than 5 acres.

3.8.2.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, Fort Bliss would pursue the construction and use of a water reclamation pipeline to provide Fort Bliss with reclaimed water for installation secondary uses. The Copia-Mcnew-Elizario Association is the only soil unit and Calvary loamy fine sand and Hueco loamy fine sand are the only soil series located in the area of Alternative 3. This soil unit and series are highly erodible to wind erosion, but not highly erodible to water erosion. The primary recommended use of this soil unit is wildlife habitat and is classified as somewhat limited in its building construction potential (USDA 2004).

Under Alternative 3, most impacts to soils would be the result of construction activities. Construction activities throughout the project area would temporarily compact, expose, disturb, and modify the structure of soils during earth-moving activities. The installation of the pipeline would require soil displacement to an approximate 7 foot depth and 7 foot width at the widest part, potentially changing the structure of the soil and resulting in the loss of some soil in the direct location of the pipeline. Construction and related activities, in particular the compaction and exposure of soils, could create increased potential for erosion and dust; however, it is expected that BMPs would be used and the project would adhere to the Fort Bliss Stormwater Pollution Prevention Plan (SWPPP). Overall, some soil would be permanently lost in the footprint of the proposed pipeline and an increased potential for erosion, dust, and alteration of the soil structure would occur during construction. Soils may be adversely impacted over

time from irrigation of areas with reclaimed water due to greater accumulation of salts. Higher salinity could have an adverse impact on salt-intolerant plants. The amount of soil affected is relatively small when compared to East and West Bliss and Fort Bliss as a whole. Therefore, when combined with the use of BMPs and the adherence to all applicable regulations, the impacts to soils under this alternative is less than significant. In addition, it is not expected that the implementation of Alternative 3 would affect geologic features.

3.8.2.4 Alternative 4 – Waste-to-Energy Plant

Alternative 4A – STA Site

Under Alternative 4, Fort Bliss would pursue construction and operation of a WTE plant. The Copia-Nations-Hueco Association is the only soil unit and Copia-Nations complex is the only soil series located in the area of Alternative 4A. This soil unit and series is highly erodible to wind erosion, but not highly erodible to water erosion. The primary recommended use of this soil unit is wildlife habitat; however, it is classified as not limited in building construction potential (USDA 2004). Construction activities would compact, expose, disturb, and modify the structure of the soils during earth-moving activities, resulting in short-term adverse impacts.

The construction of the WTE plant would result in the long-term loss of the soils within the building footprint as well as in the footprint of proposed access roads. Utility trenching would result in soil compaction, disturbance, and exposure, increasing the potential for erosion and the permanent loss of soils in the actual footprint of the transmission lines. Based on the increased potential for erosion from construction activities as well as the susceptibility of the area to wind erosion, BMPs would be used to prevent erosion and dust and the alternative would adhere to an SWPPP. Overall, the construction and operation of a WTE plant would result in increased potential for erosion, the displacement of soils during construction, stockpiling of soil adjacent to the facility, and the loss of soils in the building footprints. Impacts resulting from Alternative 4A would be proportionally small when compared to the remainder of Fort Bliss and the implementation of Alternative 4A would result in less than significant impacts to soils. It is not expected that the implementation of Alternative 4A would affect geologic features because the magnitude of the proposed projects would be too minimal to affect geology.

Alternative 4B – Railroad Drive Site

In the area of Alternative 4B, the Copia-Nations-Hueco and the Copia-Mcnew-Elizario Associations are the two soil units found and the Hueco loamy fine sand, Mcnew-Copia-Foxtrot and Elizario-Copia are the soil complexes found. Both of the soil units and complexes are highly erodible to wind erosion but not highly erodible to water erosion. The primary recommended uses for both soil units is wildlife habitat,

with the Copia-Nations-Hueco soil unit being not limited in building construction potential and the Copia-Mcnew-Elizario soil unit being somewhat limited in building construction potential (USDA 2004). The somewhat limited building construction potential of the Copia-Mcnew-Elizario soil unit is not expected to limit the placement or construction of the WTE plant.

Construction activities and impacts under Alternative 4B would be the same as those presented for Alternative 4A, with overall impacts being proportionally small when compared to Fort Bliss as a whole and would result in overall less than significant impacts to soils. It is not expected that the implementation of Alternative 4B would affect geologic features because the magnitude of the proposed projects would be too minimal to affect geology.

3.8.2.5 Alternative 5 – Geothermal Energy Facility

Under Alternative 5, Fort Bliss would establish and operate a geothermal facility for the production of energy and/or hot water. The facility would occur within one of the two 20-acre footprints at the Davis Dome site and require at least one injection and production well, as well as less than 2 miles of transmission line and a CST array to increase geothermal temperatures.

The Copia-Nations-Hueco, Pendero-Copia-Piquin and Reyab-Infantry-Crossen soils units and Hueco loamy fine sand and Copia loamy fine sand soil series exist in the area of Alternative 5. Each of these soils units and series is highly erodible to wind erosion, but not highly erodible to water erosion. The primary recommended use of the Copia-Nations-Hueco and Pendero-Copia-Piquin soil units is wildlife habitat, and the recommended use of the Reyab-Infantry-Crossen soil unit is grazing and wildlife habitat. The Copia-Nations Hueco soil unit is not limited in building construction potential, the Pendero-Copia-Piquin soil unit is very limited in building construction potential, and the Reyab-Infantry-Crossen soil unit is somewhat limited to very limited in building construction potential (USDA 2004).

Construction activities associated with the geothermal facility and potential CST array would temporarily compact, expose, disturb, and modify the structure of the soils during earth-moving activities. The construction of the geothermal facility and CST array would result in the permanent loss of the soils within their footprints. The drilling of the wells would result in the permanent loss of soils within the footprint of the wells. Utility trenching would cause soil compaction, disturbance, and exposure, increasing the potential for erosion. Based on the increased potential for erosion from construction, construction activities and operation of the CST array as well as the susceptibility of the area to wind erosion, BMPs would be used. Overall, the construction and operation of a geothermal facility would result in increased potential for erosion, the short-term displacement of soils, and the loss of soils in the building and well footprints; however, impacts would be proportionally small when compared to the

remainder of Fort Bliss. Consequently, the implementation of Alternative 5 would result in less than significant impacts to soils.

Impacts to geology may occur from the construction and operation of the injection and production well. However, based on the minimal size of the wells, impacts are expected to be less than significant.

3.8.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Under Alternative 6, Fort Bliss would develop up to 300 acres in the STA for CSP technology as well as required underground transmission lines. The Copia-Nations-Hueco Association is the only soil unit and the Copia-Nations complex is the only soil series location in the area of Alternative 6. This soil unit is highly erodible to wind erosion, but not highly erodible to water erosion. The soil unit is classified as not limited in building construction potential (USDA 2004).

Construction activities associated with the CSP array would temporarily compact, expose, disturb, and modify the structure of the soils during earth-moving activities. The construction of the CSP array would result in the permanent loss of the soils in the footprint and removal of all soil productivity of the soils directly below the solar mirrors. Utility trenching would result in soil compaction, disturbance, and exposure increasing the potential for erosion. Based on the increased potential for erosion from construction, construction activities and operation of the CSP array as well as the susceptibility of the area to wind erosion, BMPs would be used. The construction of the CSP array would also require the existing soil to be leveled to a 1 percent to 2 percent grade, and would require concrete footers of 4 feet to 5 feet, displacing existing soils and leading to a permanent loss of soils in the footprint of the footers and if soils need to be removed to achieve this grade. Overall, the construction and operation of the CSP array would result in increased potential for erosion, the short-term displacement of soils, the loss of soils in the CSP footprints, and removal of all soil productivity of the soils directly below the CSP mirrors. Impacts to soils under Alternative 6 would be significant. It is not expected that the implementation of this alternative would impact geologic features because the magnitude of this alternative would be minimal and would not impact these features.

3.8.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Dependent on the location of future geothermal, wind, or solar resources impacts to soils and geologic features have the potential to occur. Impacts from the implementation of projects

meeting the environmental screening criteria would have impacts less than significant or significant but mitigable.

3.8.2.8 Alternatives Combined

The selection of all alternatives would have significant impacts to soils. Fort Bliss proposes to construct renewable energy projects that require some alteration to the existing soil structure, have the possibility of increasing potential for erosion and dust, and would result in the permanent loss of soils. The selection of a combination of alternatives would affect more soil than individual alternatives. Also, where applicable all soil would be returned to its pre-construction level and BMPs and regulations, including SWPPPs, would be adhered to during construction.

3.9 Hazardous Materials, Hazardous Waste, and Safety

This section describes the use, handling, and storage of hazardous materials at Fort Bliss facilities; the generation and disposal of hazardous wastes; and potential site contamination issues, including the potential presence of hazardous materials in any structures to be demolished. The ROI for hazardous materials and the environmental waste management program includes East Bliss, West Bliss, and the FBTC.

3.9.1 Affected Environment

3.9.1.1 Hazardous Materials Use, Handling, and Storage

Hazardous materials are used in many facilities at Fort Bliss, ranging from small quantities of cleaners and printing supplies to larger quantities of fuels, oils, and chemicals. The following describes hazardous materials expected to be used, handled, and/or stored at the various sites assessed in this document, based on existing environmental data and studies and the description of the facilities provided. Current policy stipulates that DoD facilities use materials that are the most environmentally suitable and least damaging as long as the materials meet the criteria and specifications for a given task. All hazardous materials would be handled and stored in appropriate hazardous materials cabinets or containers in accordance with applicable regulations and label precautions.

Fort Bliss uses and stores various hazardous chemicals, including flammable and combustible liquids; acids; corrosives; caustics; glycols; compressed gases; aerosols; batteries; hydraulic fluids; solvents; paints; cleaning agents; pesticides and herbicides; petroleum, oils, and lubricants (POLs); fire retardants; photographic chemicals; alcohols; sealants; and ordnance (U.S. Army 2007b).

3.9.1.2 Hazardous Waste Generation, Storage, and Disposal

Several activities routinely performed on the installation generate hazardous waste; however, hazardous wastes that are stored for less than 90 days do not require a permit. Typical hazardous wastes that might be generated would include acids, corrosives, caustics, glycols, compressed gases, aerosols, batteries, hydraulic fluids, solvents, paints, cleaning agents, pesticides, herbicides, lubricants, fire retardants, photographic chemicals, alcohols, insecticides, sealants, various petroleum products, oils, and lubricants, brake fluid, degreasers, fuels (gasoline and diesel), and ordnance.

The Fort Bliss hazardous waste management program includes an Installation Hazardous Waste Management Plan (IHWMP) and Army SOPs for the handling and storage of hazardous waste. These documents are consistent with federal and state regulations and provide detailed information on training; hazardous waste management roles and responsibilities; and hazardous waste identification, storage, transportation, and spill control.

The Fort Bliss Waste Analysis Plan documents procedures for USEPA classification and identification of hazardous wastes to ensure compliant management of all waste streams generated at Fort Bliss. It is intended to ensure compliance with 40 CFR, *Protection of Environment*; 30 TAC 335, *Industrial Solid Waste and Municipal Hazardous Waste*; New Mexico Environment Division, Hazardous Waste Management Regulations; and DoD rules. The Waste Analysis Plan is updated annually or more frequently if there is a change in the waste streams.

Fort Bliss is registered with the USEPA as a “large quantity generator” of hazardous waste, per the Resource Conservation and Recovery Act (RCRA) (42 USC §6901) as defined by 40 CFR §§262 and 264. Because Fort Bliss is located in Texas and New Mexico, it is registered in both states (EPA identification number TX4213720101 and NM4213720101). The installation’s status (large quantity generator or small quantity generator) changes from year to year in the state of New Mexico, depending on the activities at the ranges and the volume of resulting hazardous waste generated. Fort Bliss is permitted by TCEQ to operate a Treatment Storage Disposal Facility (TSDF) (U.S. Army 2007b). Fort Bliss submitted an application for permit renewal to the state regulatory agency in February 2012 and has received a satisfactory status for the completed application from the state. Once approved, the permit will allow continued operations for up to 10 years. The TSDF is permitted to store hazardous waste for up to 1 year. In addition, Fort Bliss operates two 90-day storage facilities in Texas and three 90-day storage facilities in New Mexico.

The Directorate of Public Works-Environment Division (DPW-E) and the Disposition Logistics Agency currently manage the Fort Bliss TSDF, which is located at the Building 11614 area of Biggs AAF (U.S. Army 2007b). Wastes generated throughout Fort Bliss are brought to one of the 90-day storage facilities

or the permitted facility (Building 11614) area for classification, labeling, and storage. The DPW-E inspects containers of waste before the waste is removed from waste accumulation points, and the containers are then taken to a 90-day storage facility or the TSDF. Once containers are transferred to the TSDF, the DPW-E inspects the waste to determine if it can be classified as a material that can be reissued (e.g., unopened containers or expired shelf-life items). If it is determined that the substance is a waste, the DPW-E further characterizes the waste stream by applying documented process knowledge and Material Safety Data Sheet information or obtaining a chemical analysis of a sample of the waste and coordinates proper disposal. Wastes must be characterized and identified as hazardous or non-hazardous to determine proper disposition.

Waste processing at the facility is continual, resulting in a turnaround time of approximately 90 days to ensure that storage capacity is available for wastes generated during training exercises or spills. Several times a month, or more often if necessary, wastes are transported to an off-site Treatment, Storage, and Disposal Facility (U.S. Army 2010b).

Fort Bliss submits an Annual Waste Summary Report to TCEQ detailing the management of each hazardous waste generated onsite during the previous calendar year. A waste minimization report is also submitted to TCEQ in accordance with the installation's hazardous waste permit. In addition, a Biennial Report is submitted to the New Mexico Environment Department in every even-numbered year to describe the activities for the previous odd numbered year, per 40 CFR §262.41. These reports detail information on the hazardous wastes generated, the USEPA hazardous waste identification number, TCEQ waste codes, the quantity of waste, the USEPA identification number of each Treatment, Storage, and Disposal Facility to which the waste was sent, and a description of the Fort Bliss waste minimization program.

All hazardous wastes are disposed of at permitted treatment, storage, and disposal facilities in compliance with all applicable regulations. Specific laws, regulations and management plans govern the disposal of hazardous wastes and specialized waste streams.

3.9.1.3 Pollution Prevention

Pollution Prevention (P2) encompasses activities that reduce the quantity of hazardous, toxic, or industrial pollutants at the source by changing production, industrial, or other waste generating processes. The goal is to reduce the generation of hazardous wastes by significantly reducing the use of products containing hazardous material compounds. Executive orders, Army regulations, and state environmental laws have been enacted to provide the method and means by which federal facilities would prevent pollution and reduce wastes. A basic requirement of these regulations is the creation of a P2 Plan.

The Fort Bliss P2 Plan establishes Fort Bliss' roadmap for achieving federal, state, Army, and installation P2 goals. The Fort Bliss P2 Plan complies with current Army regulations and TCEQ requirements. In accordance with the Texas Waste Reduction Policy Act and Army Regulation 200-1, the Fort Bliss P2 Plan is revised every 5 years or when warranted by a change in function or process at Fort Bliss. The P2 Plan also contains listings of hazardous waste generating activities and Toxic Release Inventory activities at Fort Bliss, along with current inventories.

Fort Bliss has a central recycling center and one drop-off point with containers for cardboard, papers, magazines, newspapers, toner cartridges, cell phones, and plastics. Since 1998, the Fort Bliss HazMart has been the central point for hazardous materials management. The HazMart process includes a free issue program, shelf-life extension service, and household hazardous waste turn-in. Mandatory workplace recycling was implemented in November 1996 and a Fort Bliss Recycling Policy, U.S. Army Garrison Regulation 200-2, was signed on 8 March 2005, making recycling mandatory (U.S. Army 2007b).

From June 2011 through June 2012, the recycling center recycled approximately 226 tons of material a month. Fort Bliss also has recycling programs for used antifreeze, wet lead acid batteries, used tires, used oil, scrap metal, aluminum cans, and solvents.

3.9.1.4 Site Contamination

The Installation Restoration Program (IRP) is the DoD program designed to identify, characterize, and remediate the environmental contamination on military installations. The program was implemented in response to the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA) requirements to remediate sites that posed a health threat. Section 211 of the Superfund Amendments Reauthorization Act amended CERCLA and established the Defense Environmental Restoration Program that ensures that DoD agencies have the right to conduct their environmental restoration programs.

The IRP is an ongoing DoD-administered program for identifying, evaluating, and remediating contaminated sites on federal lands under DoD control. The program was implemented in response to CERCLA requirements to remediate sites that posed a health threat. As noted above, Section 211 of the Superfund Amendments Reauthorization Act amended CERCLA and established the Defense Environmental Restoration Program, which also serves as the mechanism through which DoD funds and conducts its environmental restoration programs.

The Fort Bliss IRP in New Mexico includes the McGregor, Doña Ana, and Meyer Oxidation Ponds, which have been moved into the compliance-related cleanup program for groundwater monitoring. All medium- and low-risk IRP sites in Texas and New Mexico have been remediated and closed, except Area A-1 in Castner Range, where investigation is ongoing. Fort Bliss may be required to maintain a

Corrective-Actions Only Permit because several Solid Waste Management Units in New Mexico have not yet been granted No Further Action status (U.S. Army 2010b).

Ordnance and Explosives

Training exercises and testing activities at Fort Bliss expend a variety of ordnance. Ordnance is expended in a variety of grenades, mortars, howitzers, artillery, rockets, and missiles during training exercises and testing activities. The DoD 6055.9 Standard defines UXO as "explosive ordnance that has been primed, fused, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, Soldiers, or material and remains unexploded either by malfunction or design or for any other cause." Grenades, mortars, and artillery weapons used in live-fire training can produce UXO; all other ammunition is inert.

Ordnance impact areas and buffer zones are off limits to unauthorized Soldiers and the public. In addition, impact areas are posted with warning signs indicating the potential risks of UXO and penalty for trespassing on the impact areas.

- The Fort Bliss explosives ordnance disposal unit eliminates explosives hazards on ranges by detonation in place of UXO, or if safe to do so, by removing the hazard to the explosives ordnance disposal range and detonating there (U.S. Army 2007b). None of the projects under the Proposed Action would be located in areas known to contain UXO.

3.9.1.5 Items of Special Concern

This section provides a description of the materials of special concern at Fort Bliss facilities.

Asbestos Containing Material

Asbestos containing material (ACM) was routinely used in buildings constructed prior to 1980. Many of the buildings at Fort Bliss were built or renovated between 1940 and 1975, when the use of asbestos was common (U.S. Army 2007b). Approximately 80 percent of all buildings on Fort Bliss contain some form of ACM. The majority of the asbestos used was in the form of pipe insulation, most of which has been removed and replaced with nonhazardous material. Several other types of ACM, such as floor tiles, cement siding, and wall/ceiling coverings remain in place throughout Fort Bliss facilities. As long as the ACM remains undisturbed and in good condition, it is not considered a health risk (U.S. Army 2010b).

Fort Bliss has an Asbestos Management Plan for the identification and removal of deteriorating asbestos. It is Fort Bliss policy to presume all buildings built before 1990 contain asbestos. Prior to any renovation or demolition, asbestos surveys are performed and abatement is conducted as required. Limited ACM surveys are conducted for building renovations to comply with the National Emission Standards for

Hazardous Air Pollutants asbestos requirements. Complete ACM building surveys are conducted for buildings identified for demolition (U.S. Army 2010b).

Regulated ACM resulting from renovation and demolition projects is disposed off-site in an approved landfill (U.S. Army 2010b).

Lead

Potential sources of lead at Fort Bliss include lead-based paint (LBP) and lead munitions. LBP was commonly used on buildings constructed prior to 1978. Many of the houses and facilities at Fort Bliss were constructed before 1978 and are likely to contain LBP. Approximately 2,303 of Fort Bliss' 3,070 military housing units were constructed prior to 1978 (U.S. Army 2007b).

LBP is regulated by the Texas Department of State Health Services, the USEPA, the Occupational Health and Safety Administration (OSHA), and the Centers for Disease Control and Prevention. The Army policy is to follow the most stringent federal, state, or local lead regulations.

It is Fort Bliss policy to provide a lead-hazard-free living and working environment for Soldiers and their families. Fort Bliss conducted an LBP inspection of its housing units in 1998. Five major groups of houses built before 1978 were identified as having LBP (U.S. Army 2007b). Lead contamination has been found in soils near older homes where lead in peeling exterior paint has leached into the soil during rain events. A risk-based assessment was conducted on all family housing units at Fort Bliss. As a result, Fort Bliss implemented the encapsulation or abatement of lead-contaminated surfaces on the exterior porches of family housing units, where applicable. All lead wastes were tested and determined to be nonhazardous and were disposed of in the Fort Bliss landfill (U.S. Army 2010b).

Fort Bliss uses a private contractor to conduct LBP inspections and risk assessments, if necessary. The contractor provides the results to the Army and maintains a database that contains a list of the buildings that have been tested, LBP test results, and actions taken to abate potential LBP hazard (U.S. Army 2010b).

Other facilities that are potential sources of lead contamination at Fort Bliss include administrative buildings, warehouses, storage buildings, and water towers. Fort Bliss has instituted a SOP for the review of any type of work that may disturb LBP. An SOP for compliance with OSHA standard is attached to any applicable work order to ensure that OSHA's standard for lead in construction is adhered to during any operation.

Soils with lead contamination are found at gun and artillery practice ranges where lead munitions have been used. High levels of lead in soil have been found around steel structures, such as bridges, water

towers, and shooting ranges (U.S. Army 2010b). The soils with lead are located in impact areas within the practice ranges. The access to these areas is restricted. Only authorized personnel are permitted to enter these areas.

Radon

Fort Bliss is located in an area where the USEPA radon levels are 2 to 4 picoCuries/Liter. The USEPA recommends radon mitigation at levels of 4 picoCuries/Liter or greater. Any building constructed would need to consider radon levels and appropriate actions taken to ensure safe radon levels for personnel.

Medical and Biohazardous Waste

Medical wastes include wastes generated by hospitals, clinics, physicians' offices, dental offices, veterinary facilities, and other medical laboratories and research facilities. The Army complies with MEDCOM 40-35, *Management of Regulated Medical Waste*, for the handing, use, and disposal of medical and dental supplies and wastes.

Biohazardous waste can typically include human blood and blood products, cultures and stocks of infectious agents and associated biological wastes, isolation wastes, contaminated and unused sharps, animal carcasses, contaminated bedding material, and pathological wastes. Fort Bliss generates approximately 13,000 pounds of medical and biohazardous waste per month at the Dental Clinic, two Blood Banks, the Veterinary Clinic, the Troop Clinic, and WBAMC (U.S. Army 2007b). Large-scale training exercises, such as Roving Sands, may add several thousand pounds of waste per month during the exercise. Waste is collected and stored at the generating locations. A licensed medical waste contractor picks up these wastes about once every other day and removes them from the installation (U.S. Army 2010b).

Low-level Radioactive Waste

Various Fort Bliss organizations and WBAMC generate small amounts of low-level radioactive waste. The use of radioisotopes for medical purposes generates short-lived (half-life less than 90 days), low level waste. Other Fort Bliss organizations also generate low-level radioactive waste from commodity items, such as unusable compasses, dials, targeting devices, gauges, rocket sights, and chemical weapons detection equipment. These wastes include the radioactive isotopes tritium, thorium 232, radium 226, americium 241, nickel 63, promethium 141, cesium 137, cobalt 60, and strontium 90. All low-level radioactive waste items are consolidated, inventoried, the radioactive material removed if possible, and temporarily stored in waste containers (U.S. Army 2007b). The consolidated waste is collected for subsequent disposal at an authorized disposal site. The hospital Radiation Safety Officer manages short-lived radiological waste generated by the WBAMC (U.S. Army 2010b).

The Installation Radiation Protection Officer manages all other low-level waste. Low-level waste is segregated at a turn-in point and is stored within a double-fenced, locked area on East and West Bliss. During recent years, Fort Bliss has drastically reduced the amount of low-level radioactive waste generated (U.S. Army 2007b). The Installation Radiation Protection Officer coordinates all radiological waste shipments with Army Material Command. The Army coordinates with waste deposit sites in Nevada to dispose of low-level radioactive wastes from Fort Bliss. After a waste repository site has been designated, a disposal contractor transports the waste from Fort Bliss to the assigned waste deposit site (U.S. Army 2010b).

Pesticides and Herbicides

Pesticides and herbicides are required for insect and rodent control and for the control of unwanted vegetation, including noxious weeds. The Integrated Pest Management Plan (IPMP) establishes authority for pest management activities on Fort Bliss (U.S. Army 2010b).

Fort Bliss has implemented an IPMP. The function of the IPMP is to provide acceptable management of pests; outline the resources necessary for surveillance and control; and describe the administrative, safety, and environmental requirements of the program. Although the IPMP emphasizes the use of nonchemical strategies, chemical control may be used in conjunction with other methods.

Integrated pest management (IPM) is a sustainable approach that incorporates the use of multiple techniques to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control may be an option used in conjunction with other methods. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts.

The IPM Coordinator monitors management requirements and activities, and the DPW executes the pest control Service Orders. DPW, however, does not service all tenants including privatized housing. Major pests include mice, gophers, skunks, termites, mosquitoes, flies, cockroaches, crickets, ants, spiders, wasps and bees, ticks, and noxious weeds. The DPW reviews pest management practices to ensure the safety of Soldiers and their families, protection of natural resources, and compliance with environmental laws.

Pesticides are stored and mixed at two facilities on the Main Post, Buildings 2509 and 3008 (U.S. Army 2007b). Material Safety Data Sheets for the pesticides are kept at each of those buildings. The pesticides and equipment inventories at each of the storage facilities are updated every year, and an Annual Pesticide Use Report is generated. Copies of these inventories are provided to the Fort Bliss Fire Department and the Safety Officer.

Polychlorinated Biphenyls

Transformers manufactured prior to 1976 and light ballast manufactured before 1979 are likely to contain polychlorinated biphenyls (PCBs). The Fort Bliss PCB management program comprises a PCB Management Plan; updated SOPs; and a PCB Compliance Tracking System database, which includes an inventory of all tested electrical and hydraulic equipment with data plate information; an updated inventory of new electrical equipment; and the tracking of out-of-service electrical equipment (U.S. Army 2010b).

Fort Bliss has completed three PCB survey, testing, and labeling projects since 1990 (U.S. Army 2007b). The identified PCB transformers, capacitors, and other PCB items have been removed from service and disposed of properly through the Defense Reutilization and Marketing Office. Approximately 300 PCB-contaminated transformers (equal to or greater than 50 ppm and less than 500 ppm of PCBs) are in service (U.S. Army 2010b). Currently, there are no regulatory requirements to replace those transformers.

Waste PCBs and PCB items are managed through the Defense Reutilization and Marketing Office and sent to a designated off-site facility for disposal in accordance with Toxic Substance Control Act regulations. PCB wastes are stored at a Toxic Substance Control Act-compliant facility, separate from the RCRA Part B facility, before disposal.

Petroleum Storage Tanks

POLs are used throughout the Fort Bliss installation. POLs include engine fuels (gasoline, diesel, JP-8, and jet fuel), motor oils and lubricants, and diesel and kerosene heating fuels.

Fort Bliss has completed a four-phase project to upgrade existing underground storage tanks (USTs) to meet federal and state requirements and reduce total number of USTs on the installation. Records indicate that 98 USTs and 160 aboveground storage tanks (ASTs) are in use for storing diesel fuel, unleaded gasoline, used oil, antifreeze, JP-8 jet fuel, and heating oil (U.S. Army 2007b). One UST and three ASTs are located at the Doña Ana Range–NTA; three USTs and one AST are located at Orogrande Range; and five USTs and 18 ASTs are located on McGregor Range (U.S. Army 2010b). Fort Bliss identified 36 sites that formerly had leaking petroleum storage tanks, of which four were ASTs. All have been remediated and closed.

3.9.2 Environmental Consequences

Table 3-1 includes significance thresholds for hazardous materials, hazardous waste, and safety impacts.

3.9.2.1 Alternative 1 – No Action

Under Alternative 1, Fort Bliss would not pursue additional Net Zero initiatives beyond those policies and procedures that are currently in place. Fort Bliss would continue to follow current policies and SOPs regarding the management of hazardous materials and hazardous waste, and the regulatory requirements. No impacts are expected related to hazardous materials and hazardous waste management under this alternative. No beneficial impacts from the reduction of waste generation would occur.

3.9.2.2 Alternative 2 – Conservation Policies and Procedures

Fort Bliss would continue to implement policies, procedures, and BMPs that would include efforts to limit or reduce waste generation and maximize resource reutilization. These policies and procedures would help ensure that all personnel are following the same procedures and that the maximum amount of waste reduction occurs. Beneficial impacts are expected due to the reduction in waste generation. No adverse impacts are expected.

3.9.2.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, Fort Bliss would construct 23.7 miles of water reclamation pipeline on East and West Bliss. There would be potential for minor petroleum leaks from equipment during the construction of the water reclamation pipeline. However, construction would comply with the Fort Bliss SWPPP. As a result, anticipated adverse impacts would be less than significant.

3.9.2.4 Alternative 4 – Waste-to-Energy Plant

Fort Bliss would pursue the construction and operation of a WTE plant and recyclables would be separated to reduce landfill waste among other benefits. Incinerator ash waste would be generated from the direct burning of MSW and would be disposed of in accordance with regulatory requirements, but most likely in an offsite city of El Paso landfill. Impacts would be similar for Alternatives 4A and 4B.

Wastes produced by WTE facilities include solid waste called ash, which can contain any of the elements that were originally present in the waste. There are different categories of incinerator ash, which can come from multiple sources as described below:

- Bottom ash as discharged from the bottom of the furnace (mainly the grate) and fallen through the furnace grates;
- Heat recovery ash (HRA) as collected in the heat recovery system including boiler, economizer and superheater. HRA is frequently discharged into the bottom ash stream and thus is often included in a broader definition of bottom ash;

- Fly ash carried over from the furnace and removed before sorbents are injected to clean the flue gases;
- Air pollution control (APC) residues as collected in the APC equipment (i.e. scrubbers, electrostatic precipitators, and baghouses) including fly ash, sorbents, condensates and reaction products. The term “fly ash” usually includes APC residues;
- Combined ash as a mixture of the above categories.

The amount of each ash residue produced at an incinerator, depends on several factors such as feed waste composition, incinerator technology and operation, and air pollution control system technology and operation. The major constituents of concern in municipal waste combustion ash are heavy metals, such as lead, cadmium, zinc, and mercury. These metals may impact human health and the environment if improperly handled, stored, transported, disposed of, or reused.

Incinerator ash is usually disposed of in an MSW landfill or an ash-only landfill known as an ash monolandfill, specially designed to reduce the ability of heavy metals to migrate from the ash into the environment. However, depending on where it is landfilled, incinerator ash may require the use of treatment technologies such as vitrification or chemical transformation methods for solidification/stabilization of fly ash and transformation to a material with reduced release of contaminants before it is landfilled. Ash inspections would occur as part of normal operations at the facility. Under current regulations, MSW ash must be sampled and analyzed regularly to determine whether it is hazardous or not. Hazardous ash would be managed and disposed of as hazardous waste. Non-hazardous ash would be disposed of in a MSW landfill. In addition to Fort Bliss’ waste streams, the WTE plant would also receive waste from the city of El Paso. Trash that cannot be burned, such as most metals, would also go to landfill. Any potential toxic waste mixed in with the municipal waste intended for the WTE plant would need to be separated and removed and properly disposed of.

There would potentially be leaks and spill of chemicals and petroleum products related to the construction and operation of these facilities. Adherence to proper management procedures and SOPs are anticipated; therefore, impacts would be less than significant.

3.9.2.5 Alternative 5 – Geothermal Energy Facility

The project would involve the construction of a facility within one of the two 20-acre footprints at the Davis Dome site and at least one injection and production well. Hot water from geothermal sources could contain trace amounts of metals, such as mercury, arsenic, and antimony. Sludge generated when hydrothermal steam is condensed could contain high levels of silica compounds, chlorides, arsenic, mercury, nickel, and other toxic heavy metals. If these materials are generated, proper management and

SOPs would be followed. Care would be taken to ensure material pumped into injection wells does not introduce any contaminants.

There would potentially be leaks of petroleum products related to the construction and operation of these facilities. However, with adherence to proper management procedures and SOPs anticipated adverse impacts would be less than significant.

3.9.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Fort Bliss would develop up to 300 acres for dry-cooled CSP technology in the STA. This technology would use fans as a cooling mechanism instead of water. Therminol heat transfer fluid would likely be used in the CSP to absorb concentrated sunlight. Therminol would need to be stored according to guidelines on material safety data sheets. Any leaks in the system could potentially affect surrounding soils and would also need to be contained and cleaned up in accordance with material recommendations. Used Therminol would be disposed of as a hazardous waste in accordance with the Resource Conservation and Recovery Act. There could potentially be leaks and spill of chemicals and petroleum products related to the construction and operation of the transmission line. The impacts from these activities are anticipated to be less than significant if policies and procedures are followed.

3.9.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. In some instances, combined cycle natural gas turbines may be used to effectively implement solar or other renewable technologies. The gas turbines may be used for generating a consistent amount of energy flowing into the electrical. The turbines would primarily be fueled by natural gas and would operate continuously at idle and boost output when required. Impacts from implementing this alternative are expected to be similar to those under Alternatives 5 and 6, depending on which technology is selected. Impacts associated with wind energy development are also anticipated to be similar that described for Alternative 5 and 6. Adherence to screening criteria described in Section 2.2 including locating future projects at sites that would minimize exposure to UXOs would minimize impacts. The effects from these activities are anticipated to be less than significant.

3.9.2.8 Alternatives Combined

Combining alternatives would result in impacts similar to those under Alternatives 4, 5, and 6. Compliance with established policies and procedures would be necessary to prevent potential release of

hazardous materials related to the implementation of each technology. If policies and procedures are followed, less than significant impacts are expected.

3.10 Land Use

This section summarizes the existing configuration, land use categories, and management of Fort Bliss lands and the compatibility of these uses with other installation lands and with surrounding land uses. General land use patterns characterize the types of uses within a particular area and can include urban, agricultural, residential, scenic, natural, military, and recreational. Land ownership is a categorization of land according to type of owner. The major land ownership categories include federal, Indian reservations, state/local, and private. Land management plans include those documents prepared by agencies to establish appropriate goals for future use and development. As part of this process, agencies often identify sensitive land use areas as being worthy of more rigorous or protective management.

3.10.1 Affected Environment

Fort Bliss is a microcosm of urban land uses with actual land uses ranging from administrative and maintenance to community and residential uses, primarily on East and West Bliss. Areas surrounding Fort Bliss typically have similar land uses and zoning corresponds to the current land use (U.S. Army 2000). Most of the lands within Fort Bliss are defined as training areas, maneuver areas, impact areas, or safety zones. Fort Bliss is divided into five different components/areas: East and West Bliss, Castner Range, the STA, Doña Ana Range-NTA, and the McGregor Range. Within these five different areas, the installation presents two major settings: East and West Bliss and the FBTC. East Bliss is developed and includes Biggs AAF, as well as supply/storage, troop and family housing, and community facilities. West Bliss also is developed and adjacent to the urban and suburban areas of the city and county of El Paso, Texas. West Bliss includes the Main Post, WBAMC, and Logan Heights and primarily house maintenance, supply/storage, troop housing, family housing, community facilities, and administrative facilities. . Land uses on-installation at Fort Bliss are generally compatible with surrounding land uses, with the majority of conflicts arising from residential areas being located next to training, maintenance, or industrial areas.

The Castner Range, STA, Doña Ana Range-NTA, and McGregor Range make up the other setting present at Fort Bliss and are surrounded primarily by undeveloped, publically owned lands. These areas primarily are used for training activities but, to a small extent, house the same land uses as East and West Bliss, with these uses occurring at the base camps at the Doña Ana Range-NTA and McGregor Range. Castner Range is no longer used for training activities; however, it does support tenant activities.

All areas used for training activities are divided into training blocks known as training areas. These training areas and Castner Range comprise approximately 98 percent of the installation. The extent of each area within Fort Bliss is presented in Table 3-23.

Table 3-23. Fort Bliss Installation Areas

Component	Square Kilometers	Percent of Total
East and West Bliss	96	>2
Castner Range	27	<1
South Training Areas	373	8
Doña Ana Range-North Training Areas	1,196	27
McGregor Range	2,814	62
Total	4,506	100

Source: U.S. Army (2010b)

Land use on East and West Bliss has expanded based on mission growth and has required additional facilities and the expansion of East Bliss in the form of housing, retail and administrative uses. This expansion and land use on East and West Bliss as a whole are broken down into categories based on the Fort Bliss Real Property Master Plan Long Range Component and includes: Garrison operations, medical, open space/recreation, residential/commercial, school/research, tactical, and transportation/supply/storage/maintenance (U.S. Army 2010b).

East and West Bliss contain the heaviest concentration of facilities and mission-support activities and, as previously mentioned, includes the Main Post, Biggs AAF, family housing, and the WBAMC. The Main Post comprises a variety of support services including administration, maintenance, service, storage and supply buildings, housing, and medical and community facilities. Biggs AAF is the largest active army airfield in the world and the center of air operations at Fort Bliss. The airfield provides full services for all U.S. Military services, Department of Justice, and other government flight detachments and serves as an aerial departure point for all deployable units at Fort Bliss as well as other Army Reserve and National Guard units. Biggs AAF has a 13,572-foot-long, Class B, concrete runway. Family housing in the area includes Logan Heights and the Balfour Beatty; both are used primarily for troop and family housing, community facilities, and recreation. The WBAMC is an active DoD medical facility providing comprehensive care to all active duty military, their family members, and retirees. In addition, the WBAMC includes family housing and community services. Alternative 3 would be located on East and West Bliss; however, military land use restrictions do not apply in this area (U.S. Army 2010b).

Castner Range, located north of Logan Heights and adjacent to the Franklin Mountains, is a former firing and training area. Training and firing at the location has resulted in the accumulation of UXO throughout

most of the range. The range also has a Border Control facility and two museums that were conveyed in fee to the City of El Paso. The range also hosts Girl Scout facility, Chapin High School, Texas Department of Transportation (DOT) equipment yard via lease and an easement for Transmountain Road. No proposed projects are located in this area (U.S. Army 2010b).

Land use in the STA, Doña Ana Range-NTA, and McGregor Range is broken down into military and non-military land uses and then is further broken down into numbered training areas, which allow land use to be more easily managed and to provide greater flexibility in land use management. Military land uses include 12 categories, as presented in Table 3-24. The approximate size of each of the military uses in these areas is presented in Table 3-25. Non-military use also occurs in these training areas and includes public access through activities such as public utilities, outdoor recreational use, including hunting, hiking, camping, and off-road recreational biking; however, each of these uses must be compatible with ongoing military activities (U.S. Army 2010b).

Table 3-24. Fort Bliss Training Center Military Uses

Military Use	Description
Off-road vehicle maneuver: heavy	Space for ground units to practice movements and tactics. Different unit types may work in support of one another (combined arms), or a unit may operate on its own to practice a specific set of tasks. The "Heavy" designation refers to areas where maneuver may consist of all types of vehicles and equipment, including both tracked and wheeled vehicles. This category includes fixed sites (e.g., bivouac, assembly, command, and logistic support), limited digging (e.g., fighting positions), and other miscellaneous training activities.
Off-road vehicle maneuver: light	Same definition as above, except that the "Light" designation refers to areas where vehicle maneuver is restricted to light, wheeled vehicles (e.g., High Mobility Multipurpose Wheeled Vehicles). This category includes fixed sites (e.g., bivouac, assembly, command, and logistic support), limited digging (e.g., fighting positions), and other miscellaneous training activities
Dismounted maneuver	Same definition as above, except that the "Dismounted" designation refers to areas where maneuver is restricted to foot traffic only. This category includes fixed sites (e.g., bivouac, assembly, command, and logistic support), limited digging (e.g., fighting positions), and other miscellaneous training activities.
On-road vehicle maneuver	Use of wheeled or tracked vehicles on an existing road.
Aircraft operations	Fixed-wing and rotary-wing over flights and air-to-air training.
Controlled field training exercise (FTX)	Fixed sites (e.g., bivouac, assembly, command, logistic support), limited digging (e.g., fighting positions), and concentration of troops and vehicles may occur only at designated locations. Controlled FTX allow for fixed sites and specified activities described in this military use at designated locations regardless of the underlying maneuver use.
Mission support facilities	Ranges (including live-fire); test facilities; landing zones/pads/strips; drop zones; and radar facilities.
Live-fire	Firing of individual and crew-served weapons systems (surface-to-surface, surface-to-air, and air-to-surface); launch sites and firing points; and laser certified ranges. These activities occur under controlled conditions.

Military Use	Description
Safety danger zone/safety footprint	Target debris areas and safety footprints for weapons and laser use.
Surface impact	Areas in which range activities are expected to produce unexploded ordnance.
Range camps	Built environment providing limited administrative, living, quality of life, and other support services closer to training locations.
Environmental management	Environmental management and training area maintenance activities; conservation efforts.

Source: U.S. Army (2010b)

Table 3-25. Approximate Size of Each Military Use at the Fort Bliss Training Areas

Military Use	Acres	Percentage of Fort Bliss Training Areas
Off-road vehicle maneuver	745,199	67
On-road vehicle and dismounted maneuver	1,022,023	91
Aircraft operations	1,116,539	100
Controlled field training exercise	15,949	1
Mission support facilities	828,080	74
Live-fire	854,462	76
Safety danger zone/safety footprint	1,116,539	100
Surface impact	57,806	5
Range camps	2,160	<1
East and West Bliss	23,929	2
TOTAL	1,116,539	100

Source: U.S. Army (2010b)

War Highway divides the NTA from the Doña Ana Range. Military land use in the Doña Ana Range-NTA is primarily focused on on-and off-road vehicle maneuvering. Also occurring within the NTA are aerial drop zones and artillery firing areas. Within the Doña Ana Range is a complex of weapon firing ranges, with its impact area located in the foothills of the Organ Mountains. Doña Ana Range Camp provides mission support facilities to units using its firing ranges and training areas. Also, within both areas are the digital multi-purpose training ranges, scout/reconnaissance qualification ranges, and light demolition range and infantry squad/platoon battle courses. Non-military uses are limited to utility easements and some recreational uses. Utility easements include aboveground transmission lines and underground natural gas and petroleum pipelines. Recreation in the area is low and is only permitted when the training areas are not being used for military activities (U.S. Army 2010b). None of the proposed projects occur in this area.

The McGregor Range receives the most extensive military use including a variety of military training, such as heavy, light, and dismounted maneuver, individual and collective firing ranges, and missile training and testing programs. Approximately half of McGregor Range is used for heavy off-road vehicle maneuver. Two companies of firing ranges exist: Orogrande Range Complex east of town of Orogrande, and McGregor/Meyer Range Complex adjacent to the McGregor Range Camp north of the Texas/New Mexico border. The Orogrande Range Complex allows platoon or larger gunnery exercises on a Digital Multi-purpose Range Complex and a Digital Air Ground Integration Range and has a Combined Arms Collective Training Facility, urban assault course, machine gun range, and a live fire shoot house. The McGregor/Meyer Range Complex provides individual weapons training, small arms weapons qualification ranges, a convoy live fire course, a live fire/breach facility, shoot houses, and an urban assault course. McGregor Range also includes the 5,200-acre Centennial Bombing Range and the Wilde Benton airstrip. Non-military land uses in the area is livestock grazing, recreation, utility corridors (oil and gas pipeline, power transmission line; and right-of-way corridors) (U.S. Army 2010b). Fort Bliss and the BLM co-manage public lands withdrawn from the public domain for military use within McGregor Range. Fort Bliss and the BLM signed a memorandum of understanding in 2006 regarding the BLM's Resource Management Plan Amendment, which details management responsibilities. Detailed information regarding withdrawn land in McGregor Range can be found in the Fort Bliss Army Growth and Force Structure Realignment EIS (U.S. Army 2010b) or the Fort Bliss Mission and Master Plan, Final Supplemental Programmatic Environmental Impact Statement (U.S. Army 2007b).[11] Under Alternative 5, Fort Bliss would develop a geothermal energy facility to occur in Training Area 32B. Training Area 32B is in military land use category A.

In addition, to land use restrictions in place by Fort Bliss, a number of off-limit areas and limited-use areas exist. Off-limit areas include endangered species habitat, archaeological sites, and specific mission activities where training does not occur. Limited-use areas occur in areas because of biological or cultural issues or operational issues to maintain sustainability of these lands for training. It is expected that all proposed projects would avoid all off-limit and limited-use areas.

[11] See Fort Bliss web site at: https://www.bliss.army.mil/DPW/Environmental/EISDocuments2.html.

3.10.2 Environmental Consequences

Table 3-1 includes significance thresholds for land use impacts.

3.10.2.1 Alternative 1 – No Action

Under Alternative 1, the current conditions in the project area would persist and Fort Bliss would not pursue additional Net Zero initiatives, beyond those policies and procedures that are currently in place, resulting in no change to the current site or surrounding land uses and resulting in no impacts.

3.10.2.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement policies, procedures, and BMPs to maximize resource re-use, limit waste generation, increase resource re-purposing, and increase water and energy use efficiencies in new and existing facilities. Also, under this alternative, Fort Bliss would install water and energy meters, improve the water distribution system, and install smart grid energy technologies. No changes to existing land uses are anticipated under this alternative because existing land use would most likely not be changed, resulting in negligible impacts.

3.10.2.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, Fort Bliss would pursue the construction and use of a water reclamation pipeline and water tower to provide Fort Bliss with reclaimed water for secondary uses at the installation. Land use in the location of the purple pipe expansion is primarily development, ranging from residential to commercial as well as some open space. Construction and related activities associated with the extension of the pipeline would result in temporary impacts to land use in the construction staging areas and in the footprints of proposed construction; however, these results would be short term in nature and less than significant. After construction of the purple pipe, all disturbed land is expected to be returned to its previous condition, resulting in no permanent alterations to existing land use because the pipeline is expected to be 7 feet below grade, resulting in no long-term impacts to land use. Overall, implementation of Alternative 3 would result in minor impacts to land use.

3.10.2.4 Alternative 4 – Waste-to-Energy Plant

Alternative 4A – STA Site

Under Alternative 4A, Fort Bliss would pursue the construction and operation of a WTE plant. The proposed WTE plant would be located in the southeast portion of Fort Bliss in Training Area 2E. While the project footprint would be close to some developments, land use directly adjacent is primarily devoid of development. Residential areas currently exist to the west and south as does a petroleum storage plant. Construction associated with Alternative 4 would include a WTE plant on approximately 40 acres, as well

as associated transmission lines and access roads. Construction activities associated with each of these aspects would affect land use during the construction period; however, it is expected that these impacts would be short term and less than significant. The construction of each of these aspects would permanently change the land use from open space to developed land, resulting in impacts to land use. The amount of open space affected is relatively small compared to the amount of open space in the STA and Fort Bliss and therefore result in less than significant impacts. In addition, Fort Bliss has screened each of these aspects of this alternative to ensure that construction and operation would not adversely impact mission compatibility and would adhere to all setback requirements; therefore, overall impacts of the WTE plant would result in less than significant impacts to land use.

Approximately 6 miles of access roads and approximately 13-14 miles of transmission line to the WTE plant are also proposed to be constructed. Land use in the area of the access roads would be permanently altered from its existing open space; however, based on the relatively small area affected when compared to the amount of existing open space in the STA, overall impacts to land use from the construction of the access roads would be less than significant. The construction of an underground transmission line would create short-term, less than significant impacts to land use from construction activities. It is expected that all disturbed areas would be returned to their previous conditions to the extent possible, resulting in less than significant impacts to land use. Maintenance activities associated with an underground transmission line would disturb the land and alter land use in the short term; however, it is expected that any impacts to land use would be less than significant. An aboveground transmission line would also cause temporary non-significant impacts due to construction activities. All land directly within the footprint of the proposed transmission line would be permanently altered from its current open space; however, based on the small amount of land disturbed, impacts to land use as a result of an aboveground transmission line would be less than significant.

Alternative 4B – Railroad Drive Site

The construction and operation specifications and requirements of a WTE plant associated with Alternative 4B would be the same as those presented under Alternative 4A. The proposed WTE plant would be located in the southwest portion of Fort Bliss in northwest part of Biggs AAF and the western portion of Training Area 1B. While the project footprint would be close to some developments, land use directly adjacent is primarily devoid of development, minus an existing landfill and the Fort Bliss Rod and Gun Club. Residential areas currently exist to the west, Solider barracks to the east and Biggs AAF to the southeast. Impacts associated with construction would be the same as those presented for Alternative 4A with less than significant impacts to land use during and after construction as a result of the relatively small area impacted and Fort Bliss alternative screening criteria.

The WTE plant would require access roads and transmission lines. Although conceptual routes have not been identified, impacts are considered to be similar to that for Alternative 4A. The amount of land disturbed would vary on the WTE plant location; however, it is expected that the amount of land disturbed would be relatively small especially when compared to Fort Bliss as a whole, resulting in less than significant impacts. All impacts as a result of maintenance activities would be the same as those presented for Alternative 4A.

3.10.2.5 Alternative 5 – Geothermal Energy Facility

Under Alternative 5, Fort Bliss would pursue the construction and operation of a geothermal facility for the production of energy and/or hot water. The facility would occur within one of the two 20-acre footprints at the Davis Dome site, involving at least one injection and production well, as well as less than 2 miles of transmission line and a CST array to increase geothermal temperatures. The site and surrounding area of the proposed geothermal facility has a mixture of developed and undeveloped land. Construction activities associated with the development of the geothermal facility, CST array, and transmission line would temporarily alter existing land uses; however, these short-term changes would be less than significant. The construction of the geothermal facility, CST array, and transmission line would permanently change existing land uses from open space to developed footprints. While, the changes, are relatively small in scale compared to the amount of open space in the McGregor Range and therefore impacts would be less than significant. In addition, the facility needed for the geothermal activity, CST array, and transmission line would be consistent with surrounding land uses, and Fort Bliss has screened the site to ensure it does not adversely impact mission compatibility, overall, resulting in less than significant impacts to land use.

3.10.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Under Alternative 6, Fort Bliss would develop up to 300 acres in the STA for CSP technology and the required underground transmission lines. Development in the proposed area of the CSP array is minimal with housing existing to the east and south and petroleum storage tanks to the south. Construction activities associated with the development of a CSP array and transmission line would temporarily alter existing land uses and would take valuable training land; while the size of the area affected is relatively small, impacts would still be significant. Similarly, while there is a vastness of undeveloped land in the area, all training land is considered valuable and needed to meet the military mission and although Fort Bliss screened the area and found it to be compatibles with the mission, Alternative 6 would result in significant impacts to land use.

3.10.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Based on these criteria, it is assumed that any potential future renewable energy development would occur in a way that would be consistent with existing land uses and predictable future land uses as well as mission compatibility and would result in less than significant impacts to land use.

3.10.2.8 Alternatives Combined

As part of this document and the Net Zero initiative, Fort Bliss may choose to select one or more of the proposed alternatives to reach Net Zero status. As a result, the effects of a combination of these alternatives have the potential to have greater impacts to resource sections than individual alternatives on their own. Each alternative would change undeveloped, open space land to developed land at Fort Bliss, and while the selection of a combination of alternatives would alter more land use than individual alternatives the amount of land affected would still be relatively small compared to the amount of open space land available in the individual training areas/ranges and at Fort Bliss as a whole. Also, where applicable all affected land would be returned to pre-construction conditions. Fort Bliss has screened all proposed alternatives as being consistent and compatible with existing land uses and mission activities. Impacts to land use from the alternatives combined would be significant due largely to the anticipated impacts from Alternative 6.

3.11 Noise

Noise is defined as unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Noise may be intermittent or continuous, steady or impulsive, stationary or transient. Receptors have a wide diversity in responses to noise that not only vary according to the type of noise and the characteristics of the sound source but also according to the sensitivity and expectations of the receptor, time of day, and distance between the noise source (e.g., a bulldozer) and the type of receptor (e.g., a person or animal).

Noise levels are measured in decibels (dB), which are represented on a logarithmic scale of about 20 to 120 dB. On this scale, everyday noises range from 30 dB for a quiet room to 100 dB for a loud power lawn mower at close range. At a constant level of 70 dB, noise can be irritating and disruptive to speech; at louder levels, hearing loss can occur. The risk of hearing loss starts at 85 dB over an eight hour period and represents the OSHA standard for daily exposure. A difference of 3 dB represents a doubling of

sound levels in terms of energy. However, because of how humans detect sound, it is necessary to have a 10-dB increase to be perceived as a doubling in sound. Noise measurements are usually on an "A-weighted" scale that filters out very low and very high frequencies to replicate human sensitivity. It is common to add the "A" to identify that the measurement has been made with this filtering process (A-weighted decibel measurement, or dBA). One noise source that does not get A-weighted is blast noise because it is impulsive and includes very low frequencies that would not be appropriate to filter using A-weighting. Blast noise from large caliber weapons use a "C-weighted" scale and is abbreviated dBC.

The following noise metrics are typically used in analyzing noise:

Maximum Sound Level (Lmax) – The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleeping, or other common activities.

Equivalent Noise Levels (Leq) – While maximum noise levels provide a measure of the loudest level during a noise event, noise levels vary throughout an event or could be repetitive over a span of time. As an example for construction noise, equipment is rarely used continuously at its highest power (noise) level throughout the day. Periods of preparation work also occur, positioning and repositioning of equipment, breaks, maintenance, and other factors when the machinery would be used at lower, quieter power levels. Consequently, the appropriate noise metric to use is the noise level averaged over a given period denoted as equivalent noise level and is expressed as dBA Leq. Typical periods for Leq are 1 hour, 8 hours, and 24 hours. If detailed noise levels are known for each hour within an 8- or 24- hour period, then Leq would be calculated for 8 hours or 24 hours, respectively. On the other hand, if each hour within a given period is the same as any other hour in that period, then the average for 1 hour would be the same as 8 or 24 hours. Unless otherwise denoted, noise levels in this EIS are 1-hour equivalent noise levels.

Day-Night Average Sound Level – Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10 dB penalty to events that occur after 10:00 p.m. and before 7:00 a.m. If L_{eq} is computed over a 24-hour period with this nighttime penalty applied, the result is the day-night average sound level (DNL). DNL is the community noise metric recommended by the USEPA (USEPA 1974) and has been adopted by most federal agencies (Federal Interagency Committee on Noise 1992). It has been well established that DNL correlates well with long-term community response to noise (Schultz 1978, Finegold et al. 1994).

To assess the potential impacts of construction noise, estimated onsite equipment usage was modeled using the Federal Highway Administration's Roadway Construction Noise Model (RCNM) (U.S. Department of Transportation [USDOT] 2006). The project-related noise assessment for construction activities focuses on the output of the RCNM model. The results calculated by the model are conservative. Noise levels in the model originated from data developed by the USEPA and were refined using an "acoustical usage factor" to estimate the fraction of time each piece of construction equipment would be operating at full power (i.e., its loudest condition) during the project (USDOT 2006). RCNM also was used to predict operational noise levels by activities that would use similar equipment, i.e., WTE waste handling operations.

The Federal Transit Administration has a screening tool (a noise impact assessment spreadsheet) for assessing potential impacts from linear transportation corridor noise from locations such as roadways and railway systems. This tool is geared for preliminary noise assessments when a general alignment of a corridor is known but detailed engineering has not been undertaken (Federal Transit Administration 2006). The 1-hour A-weighted Leq metric is used to assess roadway and railroad noise.

The DoD and the Army use three models—Noisemap, Small Arms Range Noise Assessment Model (SARNAM), BNoise2—to analyze typical Army operations that generate noise due to aircraft noise, small arms range noise, and blast noise from large caliber weapons, respectively. The Proposed Action in this EIS does not include any of these activities, but these models were used in reference documents (U.S. Army 2010b) that established existing noise levels used in this EIS. Each of these models use data to predict noise levels given certain operational parameters, such as timing, location, and intensity, and produce predictive lines of equal noise levels referred to as "noise contours." The area between the contour lines comprise the Land Use Planning Zone (LUPZ), Zone I, Zone II, and Zone III used for land use planning and zoning. Because blast noise from large caliber weapons is impulsive and more startling than aircraft noise, their noise zones are a few dB less than for aircraft noise. Table 3-26 shows the noise zones and levels for both aircraft and large caliber weapons.

Table 3-26. Army Noise Zones and Land Use Planning Zone

Noise Zones	Large Caliber Weapons [dB(C) DNL]	Aircraft Operations [dB(A) DNL]
I	< 62	<65
II	62–70	65–75
III	> 70	>75
Land Use Planning Zone	57–62	60–65

Source: U.S. Army (2010b)

Notes: dB(A)DNL = A-weight day-night average sound level, dB(C) DNL = C-weighted day-night average sound level

In an elevated noise environment, people react in different ways. When hearing the noise, the reactions of people can be affected by a number of variables:

- Intensity (how loud the noise is)
- Duration (does it last a second or an hour)
- Repetition (does it occur every day or once a month)
- Abruptness of the onset or stoppage of the noise (does it startle or come about at unpredictable times)
- Background noise levels (does the person hearing the noise live in an urban or rural environment)
- Interference with activities (does it interrupt phone conversations or listening to the radio or television)
- Previous community experience with the noise (some neighbors may be new or have lived there for most of their lives)
- Time (does noise occur in the middle of the day or night)
- Fear of personal danger from the noise sources (can the noise be associated with ammunition escaping from the installation boundary)

All of these factors play into how annoyed the community may feel at any one time when noise is generated at an installation like Fort Bliss. To assist the community in land-use planning and zoning, the Army uses the aforementioned planning zones, LUPZ, Zone I, Zone II, and Zone III, where noise levels are separated into these four categories associated with noise level contours.

3.11.1 Affected Environment

Fixed-wing aircraft from Biggs AAF and El Paso International Airport along with the rotary-wing aircraft stationed at Biggs AAF are the primary noise sources affecting East and West Bliss. The LUPZ extends off-installation to the southwest of East and West Bliss with noise levels in residential areas between 60 and 65 dBA DNL. None of the alternatives would affect these residential areas. Road, railroad, and construction noise are also present. Fort Bliss is surrounded by a network of major roadways. Noise levels generated from vehicular traffic are more noticeable at the perimeter of East and West Bliss.

3.11.1.1 Aircraft Noise

The LUPZ 60 day-night average sound level for A-weighted noise (ADNL) contour extends off the northern and southwestern boundaries of Fort Bliss into El Paso. The Noise Zone II 65 ADNL contour extends off the northern boundary of Fort Bliss into El Paso. Additionally, the Noise Zone II contour also extends along U.S. 54, reflecting the increased operations to and from Biggs AAF and the ranges. Table 3-27 presents the acreage underlying the Noise Zone contours and the populations that are currently affected.

Table 3-27. Off-Installation Acreage and Populations Exposed to Aircraft Noise

Contour Level dB(A) DNL	Off-Installation Acreage	Rural Population Underlying Noise Contour	Urban Population Underlying Noise Contour	Total Population Underlying Noise Contour
Land Use Planning Zone (60–65)	3,361	388	2,380	2,768
Noise Zone II (65–75)	889	34	128	162
TOTAL	4,250	422	2,580	2,930

Source: U.S. Army 2010b

Notes: dB(A) DNL = A-weight day-night average sound level

Acreage listed from operations in U.S. Army (2010b), the actual acreage may be slightly different due to mission changes, but most of the changes to flight paths are between the airfield and the training areas within restricted airspace.

Approximately 3,361 acres (13.6 square kilometers) of off-installation land are exposed to noise levels between 60 and 65 dB(A) DNL, and 889 acres (3.6 square kilometers) are exposed to noise levels between 65 and 75 dB(A) DNL. The area in Noise Zone II (65 dB(A) to 75 dB(A)) includes some residents, although most housing is to the west of the corridor along U.S. 54 that is used by helicopters transitioning to the restricted airspace. Commercial and industrial parcels in the affected area are generally compatible with noise levels.

In the range areas of Fort Bliss, existing sources of noise include military aviation activities, small arms ranges, use of artillery, large caliber weapons training, combat demolition activities, and vehicular traffic, and

these sources of noise would continue. Aviation activities occur en route between Biggs AAF and the McGregor and the Doña Ana ranges, along a flight track that generally flies over U.S. 54. Impulse noise from small arms artillery and large caliber weapons training also occur at the McGregor and Doña Ana ranges.

3.11.1.2 Large Caliber Weapons Noise

The edge of the LUPZ (57 dB(C) DNL) under existing conditions extends off the installation at the northern, southern, and western boundaries of Doña Ana Range, southeast of the boundary where the STA and McGregor Range meet, and east of Training Area 23. The Noise Zone II 62 (C) DNL contour extends off the northern, southern, and western boundaries of Doña Ana Range and south of McGregor Range.

The LUPZ noise levels are generally compatible with residential use although they are calculated and presented because potential effects from operational noise in this area warrant additional consideration in the land use planning process. Noise sensitive land uses are normally not recommended in Noise Zone II.

3.11.2 Environmental Consequences

Noise analyses for this EIS focus on the construction and operation of each alternative. Construction noise is generated by the use of heavy equipment on job sites and is short term in duration (i.e., the duration of the construction period). Commonly, use of heavy equipment occurs sporadically throughout daytime hours. Table 3-28 provides a list of representative samples of construction equipment and associated noise levels, adjusted for the percentage of time equipment would typically be operated at full power at a construction site. Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment, or impact devices (e.g., jackhammers, pile drivers).

Noise associated with the operation of machinery on construction sites is typically short term, intermittent, and highly localized. The loudest machinery generally produces maximum sound pressure levels ranging from the mid-70s to the low 100s dBA at 50 feet from the source (Table 3-28). The dB level of a sound decreases (or attenuates) exponentially as the distance from the source increases. For a single point source, like a construction bulldozer, the sound level decreases by approximately 6 dBs for each doubling of distance from the source. Sound that originates from a linear, or “line” source, such as a passing aircraft or a busy roadway, attenuates by about 3 dBs for each doubling of distance where no other features such as vegetation, topography, or walls absorb or deflect the sound. Depending upon their nature, the ability of such features to reduce noise levels may range from minimally to substantially. Additionally, interior noise levels would be reduced by 18 to 27 dBA due to the noise level reduction properties of the building’s construction materials (FAA 1992). Noise levels from construction activities

are intermittent in nature and the USDOT developed an "acoustical usage factor" that represents a percentage of time a piece of equipment runs generating maximum sound levels.

Table 3-28. Samples of Construction Noise Equipment

Equipment Description	Impact Device[a]	Acoustical Usage Factor[b] (%)	Actual Measured L_{max} @ 50 feet[c] (dBA, slow) (samples averaged)	Number of Actual Data Samples[d] (count)
All other equipment > 5 HP	No	50	NA	0
Backhoe	No	40	78	372
Clam shovel (dropping)	Yes	20	87	4
Compactor (ground)	No	20	83	57
Compressor (air)	No	40	78	18
Concrete mixer truck	No	40	79	40
Concrete saw	No	20	90	55
Crane	No	16	81	405
Dozer	No	40	82	55
Dump truck	No	40	76	31
Excavator	No	40	81	170
Front-end loader	No	40	79	96
Generator	No	50	81	19
Grader	No	40	NA	0
Impact pile driver	Yes	20	101	11
Jackhammer	Yes	20	89	133
Pavement scarifier	No	20	90	2
Paver	No	50	77	9
Roller	No	20	80	16
Scraper	No	40	84	12
Tractor	No	40	NA	0
Vibratory pile driver	No	20	101	44

Source: USDOT (2006)

Note: NA = not applicable

[a] Indication whether or not the equipment is an impact device.

[b] The acoustical usage factor refers to the percentage of time the equipment is running at full power on the job site and is assumed at a typical construction site for modeling purposes.

[c] The measured "Actual" emission level at 50 feet for each piece of equipment based on hundreds of emission measurements performed on Central Artery/Tunnel, Boston, MA, work sites.

[d] The number of samples that were averaged together to compute the "Actual" emission level.

With the exception of safety standards for construction workers, the Army does not have a formal policy for managing construction noise. Construction noise is typically confined within an installation boundary,

occurs during daylight hours, and is only present during the period of construction. On a well-traveled highway, motor vehicles can be described as an acoustic line source. While the noise from an individual vehicle is transient in nature, the heavy use on busy roadways makes the road a fairly continuous noise source.

Army Pamphlet 40-501, *Hearing Conservation Program* (U.S. Army 1998), and Technical Guidance TG250, *Readiness through Hearing Conservation* (USACHPPM Undated), describe the hearing conservation measures required for Army personnel, active duty and civilian, exposed to elevation noise environments. Some of the guidelines would be: 1) implementing engineering controls, such as sound barriers, or replacement with quieter machinery, to reduce noise; 2) properly applying and using hearing protection, including earplugs and earmuffs; 3) monitoring hearing, such as annual hearing testing; and 4) hearing conservation education.

When evaluating noise effects, several aspects are examined, including: 1) the degree to which noise levels generated by construction and operations, which are higher than the ambient noise levels; 2) the degree to which there is annoyance; and 3) the proximity of noise-sensitive receptors (i.e., residences) to the noise source. An environmental analysis of noise includes the potential effects on the local population. Such an analysis estimates the extent and magnitude of the noise generated by the various alternatives. As shown in Table 3-29, the City of El Paso has set noise limits codified in City Code Chapter 9.40 as 55 dBA in residential areas between the hours of 7:00 a.m. to 10:00 p.m.

Table 3-29. El Paso Noise Standards from Chapter 9.40.040A

Noise Zone[1]	Time Interval	Allowable Exterior Noise Level
I[a]	10:00 p.m. to 7:00 a.m. 7:00 a.m. to 10:00 p m.	50 dBA 55 dBA
II[b]	10:00 p.m. to 7:00 a.m. 7:00 a.m. to 10:00 p m.	60 dBA 65 dBA
III[c]	10:00 p.m. to 7:00 a.m. 7:00 a.m. to 10:00 p m.	65 dBA 70 dBA

Source: City of El Paso (Undated,a)

Notes: These zones are from City Code Chapter 9.40.030 and differ from Army noise zones.

[a] Noise Zone I: All single, double and multiple-family residential structures or property.

[b] Noise Zone II: All commercial properties.

[c] Noise Zone III: All manufacturing or industrial properties (Prior code §§12–109).

The City of El Paso allows for increased levels above the listed standard for short-term periods of elevated noise levels but cumulatively no more than the times and noise levels shown in Table 3-30. For

example, noise generated in Noise Zone I during the day would have a limit of 55 dBA, but for a cumulative period of 15 minutes during any 1 hour, 60 dBA would be allowed.

Table 3-30. El Paso Noise Cumulative Period Allowances per Chapter 9.40.040B

Noise Zone		Allowable Cumulative Noise per 9.40.040B (minutes/allowance)				
		30 min./ 0 dBA	15 min./ 5 dBA	5 min./ 10 dBA	1 min./15 dBA	Any/20 dBA
I	Night	50	55	60	65	70
	Day	55	60	65	70	75
	Construction day[a]	65	70	75	80	85
II	Night	60	65	70	75	80
	Day	65	70	75	80	85
III	Night	65	70	75	80	85
	Day	70	75	80	85	90

Source: City of El Paso (Undated,a)

Note: dBA = A-weighted decibel

[a] Noise levels presented in the table are general noise impacts. Chapter 9.40.120 raised the standard limits for daytime, construction noise in residential areas to 65 dBA as well as the cumulative period allowances to those presented.

Base housing on Fort Bliss is also subject to City of El Paso noise level standards, and construction activities would be required to comply with the standards. These levels would not necessarily determine significant impact but are thresholds where higher levels need to be investigated further. Construction activities near residences are normally avoided during nighttime hours and would likely occur only during 7 a.m. and 10 p.m., so equivalent noise level works well for construction noise. In this case, USEPA standards provide a good basis for comparing noise levels, for long-term noise exposure. The USEPA noise standards for 8-hour equivalent noise levels are 75 dBA for the general population and drops to 70 dBA if operations are on a continuous basis (USEPA 1979). Table 3-1 includes the significance thresholds for noise impacts. For this analysis, a noise impact off-installation was considered significant if noise levels would exceed the City of El Paso standards, as presented in Tables 3-29 and 3-30. Noise impacts on-installation were considered significant if they would exceed the USEPA standards. Occupational noise levels below 85 dB for an 8-hour day would be considered less than significant.

3.11.2.1 Alternative 1 – No Action

Under the No Action alternative, none of the Net Zero initiatives would be implemented and noise levels would remain as the current conditions within the ROI of each of the alternatives, resulting in no impacts.

3.11.2.2 Alternative 2 – Conservation Policies and Procedures

As discussed in Section 3.10.1, under Alternative 2, conservation policies and procedures anticipated would not require heavy construction activities or noise intensive operations. Noise generated from activities such as replacement of existing HVAC facilities or small-scale, renewable energy projects would be temporary and largely confined to the building where the work is being performed. Under this alternative, the existing noise environment would remain and negligible impacts would occur.

3.11.2.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, Fort Bliss would construct a water reclamation pipeline. The ROI for construction associated with the installation of the pipeline would be along the construction lateral, which includes several housing areas on the installation. These housing areas are currently affected by noise from aircraft operations, are adjacent to the intersection of Sheridan Road and Merritt Road, and are in LUPZ with noise levels between 60 and 65 dBA DNL, but the remainder of the potentially affected residences is in areas outside the LUPZ with noise levels less than 60 dBA DNL. The water reclamation pipeline lateral runs adjacent to numerous on-installation residences along Sheridan Road, Border Road, Club Road, Pershing Road, and Doniphan Road. At several points along the lateral, the pipeline would come as close as 50 feet to the nearest residence. The loudest piece of equipment used for the pipeline would be an excavator and a dump truck. Assuming the space available for digging operations allows only one excavator and dump truck to be about 50 feet from a residence, noise levels for one excavator and one dump truck would be 78.1 dBA Leq. Because the equipment would be so close, this exceeds the City of El Paso noise standards; however, the noise levels at any individual residence would last a very short period, only when the equipment is immediately adjacent to the residence. As the distance from the noise increases, noise levels would be reduced, and at a distance of 75 feet, the noise level would drop below the USEPA standard of 75 dB Leq. As the trenching occurs, the equipment would move along a linear path as the construction proceeds. On a path 50 feet from a residence, noise levels above 75 dBA would occur during 110 linear feet of trenching from when the equipment would approach 75 feet from the structure to the point when it would be past 75 feet from the residence. Assuming that a Caterpillar 330BL or John Deere 350 excavator would be used and an experienced excavator operator can trench about 300 feet per workday (Gabe Mendez Excavating, Inc. 2012), it is anticipated that elevated noise levels at any particular residence would occur for approximately 3 hours and therefore would be less than significant. This level would also be below the occupational noise level standard of 85 dB.

3.11.2.4 Alternative 4 – Waste-to-Energy Plant

Alternative 4A – STA Site

Under Alternative 4, Fort Bliss would construct and operate a WTE plant. The ROI for a WTE plant in the STA would be approximately the same for both construction and operational activities. The nearest receptors would be in the Homestead Meadows North residential area along Flagler Avenue located off of the installation. In addition, construction traffic and waste hauling traffic are expected to use Montana Avenue, and the focus of the analysis would be any sensitive receptors along Montana Avenue. Noise impacts associated with this alternative would occur during construction of the WTE and access road. Operational noise impacts would occur from trash hauling and WTE operations including movement of MSW and power generation (turbine) noise. The proposed site of the WTE would comprise approximately 40 acres in the STA.

Construction for the WTE would include numerous pieces of construction equipment including graders, excavators, dump trucks, concrete batch plant, concrete mixing trucks, backhoes, pavers and rollers just to name a few of the louder equipment. Activities at the east boundary of the site would generate the most noise at receptors in the Homestead Meadows North residential development east of the site. The exact site of the WTE has not been selected but would be within the identified project footprint. The proposed haul route is planned to be roughly 2,000 feet west of Homestead Meadows and using a representative distance of the closest portion of the WTE site would be about a quarter mile (1,320 feet) from Homestead Meadows. Working all of the equipment at the same location on the site would be impractical but provides the worst case from a noise assessment point of view. With 20 pieces of equipment operating simultaneously, noise levels at Homestead Meadows North would be approximately 63 dBA and below City of El Paso noise standards of 65 dBA for construction, representing a less than significant impact. If the WTE site is located closer than 1,320 feet, use of construction equipment could be sequenced such that only a few pieces of equipment would be used in areas nearest the residential areas. Other measures include sound mufflers on heavy equipment and the use of sound walls between the work areas and the residential areas.

Transmission lines would be installed south of the site to an EPEC substation passing approximately 300 feet from a household on Lopez Road. The transmission line may be underground at this location and an excavator and a dump truck would likely be the loudest piece of equipment onsite during the construction period. The noise levels at the household on Lopez Road would be 62.6 dBA and below the El Paso construction noise standard of 65 dBA, representing a less than significant impact. Following construction of the plant, daily operations would include WTE operations and waste hauling to the WTE plant.

Noise associated with WTE operations would occur as a result of plant machinery operations, including the turbine, pumps, and cooling fans. A study for a dual 162-MW gas turbine cogeneration plant, which is larger than the proposed WTE but has many of the same noise generating elements as a WTE plant, indicated that the plant would generate noise levels of about 60 dBA at about 330 feet (100 meters) from the turbines (SVT Engineering 2006). This noise level includes the sound attenuation from turbine enclosure and the building that houses the turbine. The WTE could be located anywhere along the southeast portion of the STA, but using a representative distance of 1,320 feet (400 meters) to the nearest receptor at Homestead Meadows North where noise levels would attenuate to below the 50 dB El Paso standard for Zone I levels. Regardless of the distance to the edge of the property, during the design of the facility, requirements would be specified for sound attenuation measures to keep sound levels to below the City of El Paso standards at the property line. Such measures would be up to the designers but could include a combination of sound insulation and application of sound deadening materials to both the turbine enclosure and to the plant building. Dozers and dump (waste) trucks performing waste handling operations would also generate noise during WTE operations. Because the type of equipment and distance to receptors is similar to WTE construction, noise levels are expected to be 50 dBA or less and below the El Paso standard for non-construction activities at Homestead Meadows and therefore would be less than significant.

Another aspect of Alternative 4 that has the potential for noise impacts is the haul route and traffic on Montana Avenue and on the new access road. Current traffic counts on Montana Avenue near where waste hauling is expected are 1,683 vehicle operations per hour (U.S. Army 2010b). Waste hauling operations would include 67 to 100 trips per day to the WTE. The trucks would proceed directly from picking up municipal waste to the WTE, and this activity would occur primarily during daylight hours. A worst-case scenario would be an increase of about 10 truck operations per hour on Montana Avenue. This number of operations would result in an increase of 0.1 dBA above current levels, which is imperceptible and would result in no impacts.

Construction and operations for the WTE would generate localized noise levels sufficiently high to warrant hearing protection for workers within certain areas of the plant. Regulations and guidelines developed by OSHA and Army (U.S. Army 1998, USACHPPM Undated) would be followed for hearing protection and conservation. No occupational hearing impacts would occur following proper and mandatory requirements.

Alternative 4B – Railroad Drive Site

Under this alternative, neither the site location and nor the haul routes to access this alternative location have been determined. However impacts due to this alternative are expected to be similar to Alternative

4A. Construction noise would use the same equipment and resulting noise impacts would be similar. Operations would also be the same and noise impacts would be similar if the distance to nearest receptors is similar. Noise impacts resulting from operations and truck traffic have not been assessed at this time because the location of truck routes under Alterative 4B has not been identified. Although impacts are anticipated to be similar to Alternative 4A, future NEPA analysis may be required once truck routes are identified.

3.11.2.5 Alternative 5 – Geothermal Energy Facility

Under Alternative 5, Fort Bliss would construct and operate a geothermal energy facility. The ROI for this alternative would be in the vicinity of the proposed geothermal plants. Only construction noise is anticipated under this alternative. Geothermal energy facility would be located in Training Areas 32A and/or 32B well away from any noise sensitive receptors. Noise levels due to construction activities would be similar to those described above for the WTE plant. In this case, the receptors would be located at McGregor Range Camp about 1 mile away. The area is also within the Zone II noise contours (62 to 70 dB DNL). Therefore, noise levels would be unnoticeable compared to existing conditions. Similar to Alternative 4, localized noise levels would be sufficiently high to warrant hearing protection for plant workers. Regulations and guidelines regarding hearing protection would be strictly enforced. Therefore, anticipated impacts would be less than significant.

3.11.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Under Alternative 6, Fort Bliss would construct and operate dry-cooled CSP technology. The ROI for dry-cooled CSP technology would be in the STA, but not on any steep slope. Dry-cooled CSP technology would be employed at the site, and construction traffic, transmission line installation, and operational activities to build the power plant would be similar to the WTE plant without the waste-handling features. It is expected that if the CSP is at least as far away from the nearest receptor, then noise impacts would be similar or less and less than significant.

Noise levels and hearing protection requirements for construction workers described for Alternative 4 would also apply to this alternative.

3.11.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Additional renewable energy development projects are proposed programmatically

rather than by specific projects. Because the location of the additional projects have not yet been developed, the ROI could be anywhere on the installation or range. Noise levels are calculated programmatically for this alternative. Construction noise assumes two scenarios: 1) moderate construction activity involving approximately eight pieces of construction equipment, including graders, dozers, concrete trucks, and other equipment; and 2) heavy construction involving 20 pieces of equipment with additional pavers, graders, dozers, and a batch plant added to the moderate scenario. Under the moderate scenario, a distance of 625 feet from the project to the nearest residence would be required to maintain the El Paso construction noise standard of 65 dBA for receptors off-installation. The distance calculated for the heavy construction scenario would be 1,000 feet.

Operational noise from renewable energy projects would vary greatly depending on the type, size, power output, input requirements, and other factors. As a result, project-specific analyses would be necessary once projects are defined. However, most noise generating aspects of renewable energy projects involve the power generating unit itself and are usually located within a building. Noise absorption enclosures would be designed as part of the project and can be designed such that noise levels at the nearest receptors can be maintained to El Paso noise standards.

3.11.2.8 Alternatives Combined

When considering noise impacts combined, the timing of the source of the noise is compared to the receptor's locality. Combined noise effects to a receptor have to occur within the same equivalent noise level measuring period, during the same hour for Leq(1) or same day for Leq(24). None of the ROIs for alternatives combined have the potential to be heard by the same receptor at the same time. All of the alternatives are sufficiently separated geographically that noise impacts from one alternative would not interact with any other alternative.

3.12 Socioeconomics and Environmental Justice

3.12.1 Affected Environment

The Proposed Action would occur on Fort Bliss, which is located within El Paso County, Texas, and Doña Ana and Otero counties, New Mexico. These counties encompass the entirety of Fort Bliss as well as the population and services that serve the installation. It is anticipated that these counties would contain a majority of the population that would serve as the construction workforce for the projects being considered under the action alternatives. Therefore, the ROI for socioeconomic analysis encompasses these three counties. The ROI is defined as the geographic area within which the principal direct and secondary socioeconomic effects of actions associated with activities at Fort Bliss would likely occur and where most consequences for local jurisdictions are expected. The range of the ROI can also vary

depending on the impact to specific socioeconomic resources, such as employment, law enforcement, and housing; thus, the geographic extent of the ROI may vary from one socioeconomic resource to another.

3.12.1.1 Population

Approximately 1,073,677 persons lived in the three-county ROI in 2010, with a majority (75 percent) of those persons presently residing in El Paso County (Texas State Data Center 2012). The rate of population growth in the ROI has steadily declined between 1980 and 2010 (Texas State Data Center 2012, U.S. Department of Commerce 1990a, and b). Population growth slowed in the ROI from 25 percent growth between 1980 and 1990 to 18 percent between 1990 and 2000 and to 16 percent between 2000 and 2010 (Table 3-31) (New Mexico Bureau of Business and Economic Research 2012, Texas State Data Center 2012, U.S. Department of Commerce 2000a).

Table 3-31. Historic Population for ROI, 2010

Geography	1980	1990	2000	2010
El Paso County, TX	479,899	591,610	679,622	781,932
Dona Ana County, NM	96,340	135,510	174,682	215,828
Otero County, NM	44,665	51,928	62,298	66,292

Source: New Mexico Bureau of Business and Economic Research (2012), Texas State Data Center (2012), U.S. Department of Commerce (2000a)

Population forecasts for the study area were developed by the University of Texas and the University of New Mexico for the years 2020 and 2030. The total population in the ROI is projected to increase by 13 percent between 2010 and 2020 and increase again, by an additional 10 percent, between 2020 and 2030. A majority of this population growth is anticipated to occur in El Paso County during this time. The population growth levels are higher than the state of Texas' projected population increases of 7 and 5 percent, respectively between the same years, but lower than New Mexico's projected population increases of 17 and 13 percent, respectively (Table 3-32) (New Mexico Bureau of Business and Economic Research 2012, Texas State Data Center 2012).

Table 3-32. Population Forecast for the ROI, State of New Mexico and State of Texas

Geography	2010	2020	2030	2010 to 2020	2020 to 2030
State of Texas	2,802,983	24,330,687	25,449,114	7%	5%
El Paso County, TX	781,932	870,831	949,960	11%	9%
New Mexico	2,162,331	2,540,145	2,864,796	17%	13%
Otero County, NM	66,292	71,051	73,436	7%	3%
Dona Ana County, NM	215,828	256,619	291,895	19%	14%

Source: New Mexico Bureau of Business and Economic Research (2012), Texas Data Center (2012)

The total number of military personnel stationed at Fort Bliss was approximately 35,411 people in FY 2012 (Pacific Northwest National Laboratory [PNNL] 2012). Between 15 January 2012 and 21 January 2012, 7,926 military personnel were living in the barracks. The number of military personnel living in family housing on-installation was estimated to be 3,500, and the number of military personnel living off-installation was determined to be 20,955. The number of dependents living on-installation was estimated to be approximately 10,600 persons (PNNL 2012). The number of civilian and contractor personnel working on installation in FY 2012 was 10,783 (PNNL 2012).

3.12.1.2 Income

In 2010, median household incomes in Doña Ana and Otero counties were $35,869 and $37,342, respectively, between approximately 21 and 17 percent lower than the state of New Mexico's median income. El Paso County's median household income in 2010 was $36,647, which is approximately 35 percent lower than the state of Texas' median household income (U.S. Department of Commerce 2010a).

3.12.1.3 Labor Force, Unemployment, and Employment by Industry

In 2010, the total labor force in the study area was 438,203 persons. The ROI had an unemployment rate of 9 percent during this period. Much of Doña Ana County's workforce resides in Las Cruces, New Mexico, and along the Interstate 25 corridor between Las Cruces and El Paso, Texas, while a large amount of Otero County's workforce resides in Alamogordo, New Mexico. Much of El Paso County's workforce resides in the cities of El Paso and Socorro, Texas, located along the border with Mexico, just to the southeast of the city of El Paso (U.S. Department of Commerce 2012a).

Average annual employment in the construction industry in the Upper Rio Grande Workforce Development Area, which includes El Paso County along with five other counties, is expected to increase from 14,650 in 2008 to 17,240 in 2018 (Texas Labor Market & Career Information Department 2012a). The growth rate in employment in this industry is being fueled to a large degree by the construction laborers and pipe layers occupations, which are expected to grow by 23.6 and 26.7 percent during this period, respectively (Texas Labor Market & Career Information Department 2012b,c). The New Mexico Department of Workforce Solutions projects that employment in construction and extraction industry in the Las Cruces Metropolitan Statistical Area will grow from 4,690 in 2008 to 5,150 in 2018, a growth of 9.9 percent. Employment in the professional, scientific, and technical industries is expected to increase by 21.2 percent during this period and the utilities industry is expected to grow by 6 percent during this period (New Mexico Department of Workforce Solutions 2012).

Unemployment

As mentioned above, in 2010, the ROI had an unemployment rate of 9 percent, which is slightly higher than the states of New Mexico and Texas' unemployment rates, both at 8 percent in 2010. El Paso County had a higher unemployment rate, at 10 percent, than Doña Ana County and Otero County in 2010 at 8 and 7 percent, respectively in 2010. The unemployment rates in each of these counties have increased by between 3 and 4 percent between 2008 and 2010, reflecting the national economic downturn that occurred during this time. The state unemployment rates also have increased by this same amount between 2008 and 2010 (U.S. Department of Labor 2012a).

Employment by Industry

In 2010, the latest year for which employment by industry data were available at the time of this analysis, the health care and social assistance and retail trade industries made up the largest percentage of total employment in the study area, each representing 11 percent of the total employment in the ROI. Employment in state and local government made up 15 percent of total employment during this time. Employment in the military represented 1 percent of total employment in Doña Ana County, 6 percent of total employment in El Paso County, and 16 percent of total employment in Otero County in 2010. Employment in the professional, technical, and scientific services industry made up 4 percent of total employment in the study area during this time. Employment in the construction industry represented approximately 7 percent of total employment in the study area during 2010; additionally, employment in this industry remained relatively stable between 2007 and 2010 (Table 3-33) (U.S. Department of Commerce 2012b).

Table 3-33. Employment by Industry, 2010

Line Title	Region of Influence			State of Texas			State of New Mexico		
	2010	Percent Change 2007 to 2010	Percent of Total, 2010	2010	Percent Change 2007 to 2010	Percent of Total, 2010	2010	Percent Change 2007 to 2010	Percent of Total, 2010
Total employment	510,701	4	510,701	14,285,773	2	14,285,773	1,064,452	–3	1,064,452
Farm employment	4,353	–6	1	263,684	0	2	24,710	–4	2
Forestry, fishing, and related activities	1,881	19	0	54,546	0	0	5,327	3	1
Mining	922	24	0	369,496	15	3	25,938	3	2
Utilities	1,599	9	0	53,626	5	0	4,560	3	0
Construction	33,417	–1	7	922,121	–11	6	62,460	–29	6
Manufacturing	22,027	–19	4	874,993	–13	6	35,711	–20	3
Wholesale trade	13,807	–8	3	548,926	–4	4	26,803	–8	3
Retail trade	54,274	–3	11	1,419,381	–3	10	111,810	–6	11
Transportation and warehousing	20,612	–6	4	508,828	–5	4	23,705	–15	2
Information	7,182	–1	1	234,258	–12	2	16,867	–11	2
Finance and insurance	18,559	19	4	875,365	18	6	36,640	9	3
Real estate and rental and leasing	16,289	–3	3	565,738	0	4	39,701	–7	4
Professional, scientific, and technical services	20,301	5	4	913,179	2	6	79,161	–3	7
Management of companies and enterprises	1,524	18	0	115,289	25	1	5,511	–10	1
Administrative and waste management services	38,193	12	7	934,722	–1	7	55,493	–9	5

Line Title	Region of Influence			State of Texas			State of New Mexico		
	2010	Percent Change 2007 to 2010	Percent of Total, 2010	2010	Percent Change 2007 to 2010	Percent of Total, 2010	2010	Percent Change 2007 to 2010	Percent of Total, 2010
Educational services	6,176	16	1	217,711	13	2	16,699	6	2
Health care and social assistance	54,214	9	11	1,377,681	10	10	120,088	7	11
Arts, entertainment, and recreation	6,472	6	1	232,323	7	2	23,407	2	2
Accommodation and food services	37,456	5	7	986,366	3	7	81,622	–4	8
Other services, except public administration	26,510	–4	5	804,343	–1	6	50,933	–5	5
Government – federal, civilian	18,818	16	4	210,325	11	1	33,722	10	3
Government – military	28,866	29	6	183,641	3	1	17,136	12	2
Government – state and local	76,357	3	15	1,619,231	6	11	166,448	1	16

Source: U.S. Department of Commerce (2012b)

3.12.1.4 Housing

Approximately 4,300 housing units were available for rent in El Paso County in 2010. Approximately, 858 housing units in Otero County and 2,000 units in Doña Ana County were available for rent in 2010 (U.S. Department of Commerce 2010b). Therefore, the total number of rental units available in the ROI in 2010 was 7,273. This represents an approximately 29 percent decrease in the number of rental housing units available between 2000 and 2010 as approximately 10,218 housing units were available for rent in ROI in the year 2000 (Table 3-34) (U.S. Department of Commerce 2010b, 2000a).

Table 3-34. 2010 Housing Supply

Census Unit	State of New Mexico	State of Texas	Doña Ana County, New Mexico	Otero County, New Mexico	El Paso County, Texas
Total Number of Housing Units (2010)	901,388	9,977,436	81,492	30,992	270,307
Percent Change in Number of Housing Units (2000 to 2010)	15%	22%	25%	6%	20%
Total number of rental units	271,423	3,631,890	29,072	8,742	99,223
Total Number of Units Available for Rent	22,150	394,310	2,054	858	4,361
Percent of Rental Units Available for Rent	8%	11%	7%	10%	4%

Source: U.S. Department of Commerce (2010b)

3.12.1.5 Government and Emergency Services

Law enforcement on all areas of Fort Bliss is conducted by federal, state, and city personnel as applicable. The Fort Bliss Fire Department provides fire protection services for the installation and works cooperatively with the BLM to fight fires on the McGregor Range. Each of the counties located within the study area has its own sheriff's department, and the police departments within the cities of El Paso, Las Cruces, and Anthony are also responsible for police protection within their respective municipalities (U.S. Army 2000).

The WBAMC provides care for military personnel and their families residing both on and off Fort Bliss and serves as a trauma center for the surrounding community. Additionally, El Paso County has several acute care hospitals and specialty medical centers, Las Cruces has two hospitals, and Alamogordo has one hospital. The city of El Paso has the University Medical Center of El Paso, which is the only Level 1 trauma facility within a 250-mile radius of El Paso. This hospital serves approximately 61,800 patients annually (University Medical Center of El Paso 2012). Given its proximity to Fort Bliss, it is likely that construction workers associated with constructing facilities under the action alternatives would be treated at this hospital if they require emergency medical attention.

A number of Independent School Districts (ISD) serve the Fort Bliss installation. In Texas, this includes both the El Paso ISD, which serves the majority of the students on the installation in addition to the Socorro ISD. Hughey Elementary, Bliss Elementary, Bassett Middle School, Ross Middle School, Chapin High School, Austin High School, and Burges High School served the population living on Fort Bliss in 2011. Powell Elementary, Logan Elementary, Ross Middle School, Chapin High School, and Irvin High School served the area of Logan Heights (El Paso ISD 2012). Milam Elementary, Ross Middle School, Austin High School, and Chapin High School service the area of East Bliss. Bliss, Powell, Logan, and Milam Elementary Schools as well as Chapin High School are located on the installation. These schools' catchment areas service portions of the population of the El Paso area residing both on and off the installation.

The Ysleta, Socorro, and Clint ISDs also serve students that reside in the city of El Paso who may be dependents of personnel serving or working on Fort Bliss. Doña Ana County and the installation are also served by the ISDs of Las Cruces and Gadsden. The Alamogordo ISD serves Otero County; however, some students residing in the southwest corner of Otero County, near Chaparral, attend schools in the Gadsden ISD under a cost agreement between the two school districts (U.S. Army 2010b).

Several Child Development Centers are also located within the Main Post, Logan Heights and East Bliss (Fort Bliss Family, Morale, and Welfare & Recreation 2012). In addition to these Child Development Centers, several daycare centers are located close to, but outside of, the installation.

3.12.1.6 Utilities – Electrical, Water, and Waste

EPEC services Fort Bliss in both Texas and New Mexico on the grid system coordinated by the Western Electricity Coordinating Council which serves as a regional coordinator for power reliability in the western United States. EPEC provided 290,368 MWh to Fort Bliss in 2010 and 339,086 MWh in 2011 (EPEC 2012b). EPEC has indicated that a majority of the locally generated power that is supplied to Fort Bliss is generated from natural gas; however, as EPEC's electrical grid is tied into the national electrical grid it is possible that some electricity generated by other means, including coal, solar, and nuclear energy, among others, could also be used to power Fort Bliss (EPEC 2012b). Currently, Fort Bliss consumes approximately 3 percent on average of all power sold by the EPEC (Favela 2012). Fort Bliss does not pay sales tax on the power that it purchases from EPEC as it is a federal entity. However, EPEC may pay some taxes on energy that EPEC buys which EPEC then in turn charges their customers, such as Fort Bliss, a reimbursement fee (Office of Texas Comptroller 2012a).

Potable water at Fort Bliss is supplied by a combination of on-site wells and purchased water from the City of El Paso (PNNL 2012). From FY 2008 to FY 2011, Fort Bliss withdrew an average of 1.4 billion

gallons of water per year from wells and purchased an average of 390 million gallons of water per year from EPWU (PNNL 2012). Fort Bliss has water rights to withdraw water from wells; therefore, the cost of withdrawing this water is limited to those costs associated with pumping and chemical treatment. Fort Bliss purchases any additional water that it requires from EPWU. Wells supplied approximately 94 percent of Fort Bliss' total potable water in FY 2008. This percentage declined to 68 percent for FY 2011 (PNNL 2012). The cost of water purchased from EPWU varied greatly from FY 2008 to FY 2011. However, these costs stabilized during FY 2011. In FY 2011, the monthly low cost for purchased water was $1.00/thousand gallons (kgal), the monthly high cost was $1.21/kgal, and the average cost for the year was $1.10/kgal (PNNL 2012). Fort Bliss' major water uses are for irrigation requirements. Golf course irrigation is the largest consumer of water, followed by family housing irrigation, and miscellaneous on-installation irrigation. Use of water in domestic plumbing makes up the remaining major water use category on the installation. The use of water for these categories comprises approximately 89 percent of accounted for water consumption on the installation (PNNL 2012).

EPWU has undertaken several efforts to make water supply more sustainable in the area, including construction of several water reclamation facilities that supplies 5.83 million gallons per day of reclaimed water for secondary uses, including irrigation, agriculture, cooling towers, fire protection, and other uses (EPWU 2012b). The Fred Hervey Water Reclamation Plant located in Northeast El Paso uses tertiary treatment to produce reclaimed water to drinking water quality level. Although not used for drinking (potable) purposes, the reclaimed water is re-injected into the Hueco Bolson through a series of injection wells and infiltration basins in northeast El Paso for aquifer replenishment. In 2010, more than 500 million gallons of reclaimed water were returned to the Hueco Bolson. As noted in Chapter 2, reclaimed water is treated to remove pathogens, although it tends to have higher salinity than potable drinking water, but has been used successfully for irrigation and other similar uses.

The utility has also increased its freshwater production using previously unusable brackish groundwater through the construction and operation of one of the largest inland desalination plants in the world. The plant produces 27.5 million gallons of freshwater per day by treating brackish water from the areas aquifers and from the Rio Grande. The plant is projected to provide storage volume sufficient for 50 years of operation (EPWU 2012c).

In the FY 2009/2010, Fort Bliss generated and disposed of 14,113 tons of solid waste (R.W. Beck 2011). During this same FY, Fort Bliss recycled 3,470 tons of material of which 1,650 tons were recovered through the single stream recycling program (R.W. Beck 2011). The amount of waste recycled or diverted on Fort Bliss has more than tripled in the last 3 years. Fort Bliss uses three landfills, and, of these, the Fort Bliss Sanitary Landfill is the only one of the three landfills currently located on the installation, and it is

expected to reach capacity in 2012. Fort Bliss currently also uses two off-installation landfills—the City of El Paso Clint Landfill and the Camino Real Landfill (R.W. Beck 2011). Approximately 1,500 tons of MSW are disposed of each day at the Clint Landfill from the city's residential garbage collection operations, private haulers, surrounding communities, and the general public (City of El Paso Undated,b).

3.12.1.7 Environmental Justice and Protection of Children

Environmental Justice

On 11 February 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Executive Order 12898 directs agencies to address environmental and human health conditions in minority and low-income communities so as to avoid the disproportionate placement of any adverse effects from federal policies and actions on these populations. The general purposes of this executive order are to:

- Focus the attention of federal agencies on human health and environmental conditions in minority communities and low-income communities with the goal of achieving environmental justice
- Foster nondiscrimination in federal programs that substantially affect human health or the environment
- Improve data collection efforts on the impacts of decisions that affect minority communities and low-income communities and encourage more public participation in federal decision-making by ensuring documents are easily accessible (e.g., available in multiple languages and made readily available)

As defined by the *Environmental Justice Guidance Under NEPA* (CEQ 1997a), "minority populations" include persons who identify themselves as Asian or Pacific Islander, Native American or Alaskan Native, Black (not of Hispanic origin), or Hispanic. Race refers to census respondents' self-identification of racial background. Hispanic origin refers to ethnicity and language, not race, and may include persons whose heritage is Puerto Rican, Cuban, Mexican, and Central or South American.

A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. Low-income populations are identified using the Census Bureau's statistical poverty threshold, which is based on income and family size. The Census Bureau defines a "poverty area" as a census tract with 20 percent or more of its residents below the poverty threshold and an "extreme poverty area" as one with 40 percent or more below the poverty level. A census tract is a small geographic subdivision of a county and typically contains between 1,500 and 8,000 persons (U.S. Department of Commerce 2000b).

There are 218 census tracts within the ROI as of the year 2010. A total 99 census tracts within El Paso County have at least 20 percent of their population living below the poverty level, and 33 of these tracts have at least 40 percent of their population living below the poverty level. Otero and Dona Ana counties had 5 and 22 census tracts, respectively, with at least 20 percent of their populations living below the poverty level in 2010, while a total of 3 and 6 of these, respectively, had at least 40 percent of their total population living below the poverty level. The ROI has 189 census tracts with minority populations whereby the percentage of respondents identifying themselves as a minority either exceed 50 percent of the total population of their census tract or make up a proportion of their census tract that is at least 10 percent or higher than the minority population at the state level. El Paso County had 154 census tracts that had proportionately high minority populations. These 154 tracts represent approximately 96 percent of all census tracts within the county. Otero County, New Mexico, had four census tracts with proportionately high minority populations, while Dona Ana County had 31 tracts with proportionately high minority populations levels (Table 3-35) (U.S. Department of Commerce 2010c, d).

Several census tracts reside entirely within the installation of Fort Bliss. The potential environmental justice status of these tracts is identified in parentheses next to their census tract number. East and West Bliss reside within census tracts 101.02 (No Potential EJ Community) and 101.03 (Potential Poverty Area) within El Paso County. The rest of the census tracts that comprise the entirety of Fort Bliss are tracts 106 (No Potential EJ Community), 101.01 (Potential Minority Area), and portions of tract 102.11 (No Potential EJ) in El Paso County; tract 9.02 (Potential Minority and Extreme Poverty Area) in Otero County; and tract 19 (No Potential EJ Community) in Dona Ana County (U.S. Department of Commerce 2010c,d). Several of these census tracts, including tract 9.02 in Otero County and tract 19 in Dona Ana County, are sparsely populated. Several tracts surrounding the installation, including tract 103.19 in El Paso County are also sparsely populated compared to surrounding census tracts.

Figure 3-7, below, shows those census tracts within which Fort Bliss resides as well as census tracts surrounding the proposed alternatives identified in Chapter 2 (U.S. Department of Commerce 2010c,d).

Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health and Safety Risk*, requires federal agencies, to the extent permitted by law and mission, to identify and assess environmental health and safety risks that might disproportionately affect children. This Executive Order, dated 21 April 1997, further requires federal agencies to ensure that their policies, programs, activities, and standards address

Table 3-35. Minority Population, Poverty Level, and Median Household Income, 2010

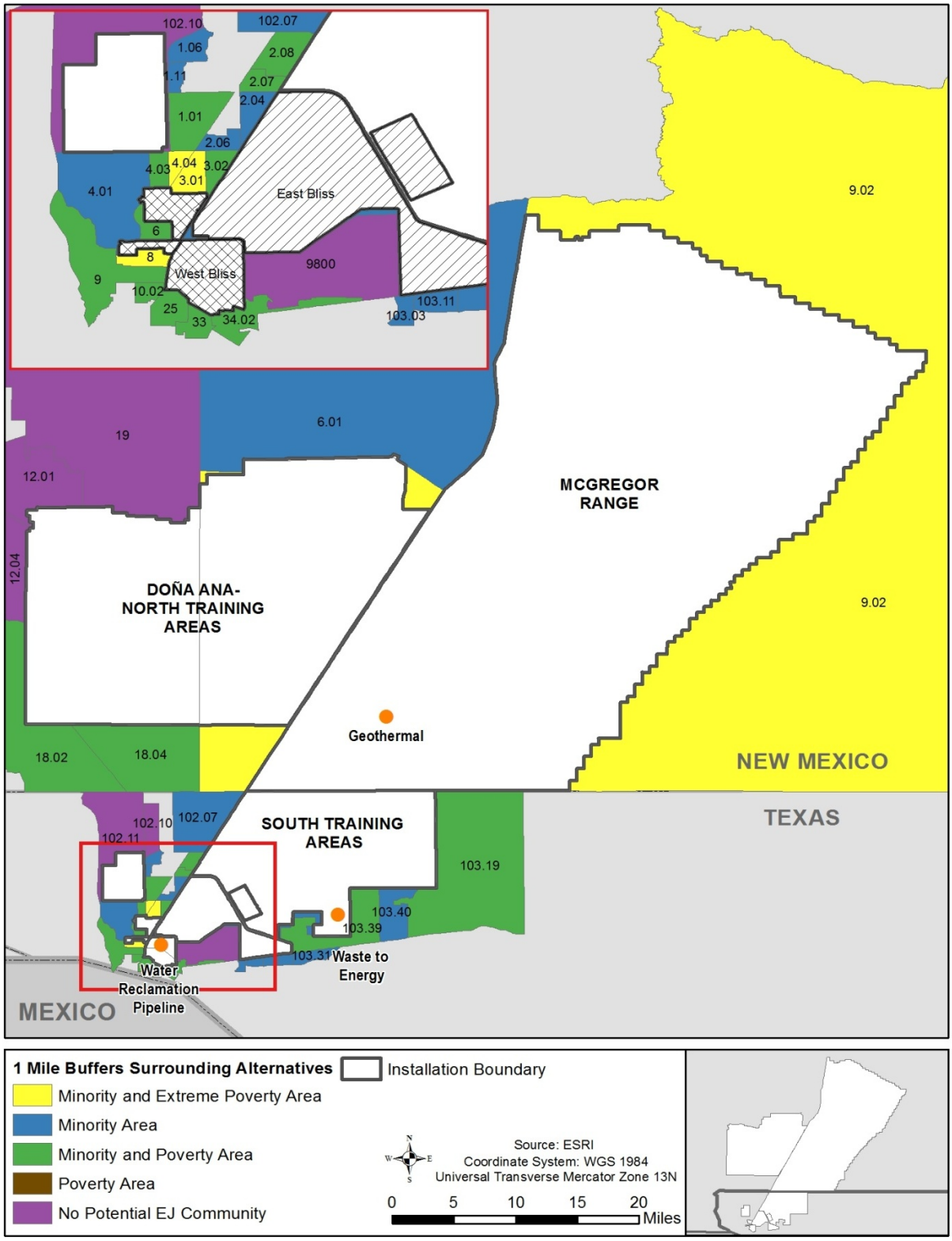
Geographic Area	Total Population	Number of Census Tracts	Percent Minority[a]	Percent Latino	Number of Census Tracts that have 10% or higher than state average minority population	Number of Census Tracts Below Poverty Level[b]	Number of Census Tracts Below Extreme Poverty Level	Percent of Poverty Level	Median Household Income
Region of Influence	25,348,623	218	81%	76%	189 (86.7%)	84 (38.5%)	42 (19.3%)	25.0%	N/A
State of New Mexico	2,013,122	--	68%	45%	--	--	--	18.4%	$43,820
Doña Ana County, NM	201,670	41	70%	65%	31 (75.6%)	22 (53.6%)	6 (14.6%)	24.5%	$36,657
Otero County, NM	62,782	16	46%	34%	4 (25%)	5 (31.3%)	3 (18.8%)	20.0%	$39,615
State of Texas	24,311,891	--	80%	37%	--	--	--	16.8%	$49,646
El Paso County, TX	772,280	161	87%	82%	154 (95.7%)	99 (61.5%)	33 (20.5%)	25.6%	$36,333

Source: U.S. Department of Commerce (2010c,d)

Note: Percentages within parentheses represent the percentage of all census tracts within that geographic level that are impacted under a column.

[a] Percent Minority includes Percent Latino.

[b] Census tracts below poverty level include census tract below the extreme poverty area as well.



Source: U.S. Department of Commerce (2010c,d)

Figure 3-7. Potential Environmental Justice Census Tracts

these disproportionate risks. Executive Order13045 defines environmental health and safety risks as "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink and use for recreation, the soil we live on and the products we use or are exposed to)."

Children reside in neighborhoods and schools within proximity to Fort Bliss and walk along the sidewalks of the roadways that could potentially be used by construction and waste truck traffic associated with the identified alternatives. Children also attend daycares both on and off the installation and reside on the installation within family housing. Impacts to children specific to the action alternatives are identified in the following impacts analysis.

3.12.2 Environmental Consequences

Socioeconomic impacts associated with the proposed alternatives are examined separately, and as one, in the subsequent sections. Impacts from the alternatives on the ROI's demographics, economy, housing, and quality of life are examined as well as impacts that could occur to public services, such as law enforcement, fire and rescue, schools, and medical services. Environmental justice impacts and impacts to children are also addressed where applicable. Separate analyses were undertaken for the construction activities and the increased employment associated with the facility operation of alternatives that are anticipated to require new full time operations period employees. Table 3-1 includes the significance thresholds for socioeconomic resources including environmental justice.

In order to analyze the effects of the alternatives on socioeconomic resources in the ROI, an economic forecasting model that evaluates the significance of the impact of the alternatives on the ROI was used (USACE 2012). The model results associated with construction spending in the ROI were assessed for both direct effects, such as construction employment and salaries, and induced effects, such as the effect of construction workers' salaries and associated spending on the ROI's economy.

Changes in local economic activity associated with the project are computed as the product of initial changes in sales volume and a local impact multiplier. In total, the model examines changes in economic indicators including sales volume, income, employment, and population in the ROI, estimating the direct and induced effects of the action. Appendix D, *Economic Impact Forecast System*, discusses this methodology in more detail and presents the model input and output tables for this analysis. The direct and induced effects of each alternative are dependent on whether funds are spent within or outside the ROI. This analysis assumed that all funding is primarily consumed within the ROI and forecasted impacts are shown as if all funding is primarily consumed within the ROI. This method of economic impact analysis represents a conservative estimate of the economic impacts. It is likely that funding under each

alternative would be used to purchase goods from outside the ROI, which would result in fewer impacts to the local ROI than those described here.

The thresholds of significance for the economic variables are determined by the model and are based on actual historical deviations from the historical trends for extreme events. To determine the historical range of economic variation, the model calculates a rational threshold value (RTV) profile for the ROI. This analytical process uses historical data for the ROI and plots the average growth rate for the sales volume, income, employment, and population patterns as a trend over a 30-year period. This model then can identify and evaluate the historical annual extremes of these values over this 30-year period as a deviation from the average growth trend. These deviations are called historical extremes and the largest deviations during this 30-year period are the thresholds of significance (i.e., the RTVs) for social and economic change. If the estimated effect of an action falls above the positive RTV or below the negative RTV, the effect is considered to be significant.

Total construction dollars were input into the model for the year 2012; however, in reality, the construction expenditures for some alternatives, noted in the following, would occur over a longer construction period. Therefore, the model outputs show the impact of the construction spending associated with the Proposed Action if it were started and completed in 1 year. To better characterize the more gradual economic impacts, where applicable, the impacts are also discussed as if they were dispersed over the expected time span of the construction period for each alternative.

Local spending as a result of any of the action alternatives would support the employment of the construction workforce and Fort Bliss employees that already live in the ROI. Increases in the salaries and income of this workforce may provide slightly higher household spending in the ROI. The construction workforce and new operations period employees of Fort Bliss who currently live outside the ROI and move to the ROI as a result of any of the action alternatives would provide new economic stimulus to the ROI, such as increasing household spending (induced effects), which would increase downstream jobs and income in the ROI. Construction workers who may relocate temporarily also provide economic stimulus to the ROI's economy as they spend a portion of their income on food, beverages, and possibly lodging in the ROI.

All the action alternatives identified in the following sections may provide a positive socioeconomic benefit to the local community as a result of the local community's positive reception to new waste and water use reduction measures and through increased supplies of renewable energy. Additionally, the implementation of these technologies may support a local "future technology" field. Creating local energy producing projects, like the ones proposed under these alternatives, may assist in keeping a high end educated workforce and/or engineers in the region. However, the degree of impact that these projects

would have on local employment and research surrounding the renewable energy and waste and water reduction fields may depend on the action alternatives finally selected. For instance, it is likely that the action alternatives would have a greater impact on local employment and research opportunities in the region if all the alternatives are carried out as opposed to only one or two alternatives.

3.12.2.1 Alternative 1 – No Action

The No Action Alternative is not expected to create impacts or changes to the current socioeconomic characteristics at or surrounding Fort Bliss. Fort Bliss' population and employment would not be impacted, and no new construction would occur as a result of any of the action alternatives. Furthermore, benefits to economic development, employment, and income associated with the construction activity would not occur. Additionally, up to 128 support jobs would not be created on the installation.

Under Alternative 1, Fort Bliss would likely be subject to increasing costs of centralized utility-provided energy. Utility rates for electric utility providers and EPWU would not be impacted by the alternatives. No impacts to housing, utilities, or government and emergency services are expected to occur under this alternative. No environmental justice impacts or impacts to children are expected to occur under this alternative.

3.12.2.2 Alternative 2 – Conservation Policies and Procedures

Some energy conservation and energy efficiency measures, such as increased energy awareness programs, would have little or no socioeconomic effect. Other energy efficiency measures, such as replacement of conventional lighting with energy-efficient lighting; installation of more energy-efficient HVAC systems; improved building envelope features such as added installation or more energy-efficient windows, or installation of small-scale, renewable energy features, for example, the installation of solar panels on existing buildings, may temporarily increase off-installation economic levels if off-installation workers were needed to implement the measures or if equipment and supplies were purchased from off-installation vendors.

The reduced use of off-installation energy supplies, from improved energy conservation, efficiencies, or from the development of new on-installation renewable energy sources, could have a beneficial or adverse effect on the socioeconomics of the surrounding community. Socioeconomic benefits would occur as both direct effects from the wages and salaries, procurement of goods and services, and collection of state sales and income taxes and indirect effects from new jobs, income, expenditures, and tax revenues subsequently created as the direct effects circulate through the economy. Adverse effects to the local economy as a result of a reduction in electric power purchases could impact local utility rates and revenue collected by local municipalities and states in the form of taxes on the power sold.

Some water conservation and water efficiency measures, such as increased water awareness programs, would have little or no socioeconomic effect. Other water efficiency measures, such as increased water awareness programs, replacement of conventional plumbing fixtures with water-efficient plumbing fixtures, or implementing small-scale water capture projects, such as installing rain barrels or constructing small collection ponds, may temporarily increase off-installation economic levels if off-installation workers were needed to implement the measures or if equipment and supplies were purchased from off-installation vendors.

Potential beneficial socioeconomic effects could also be realized, including economic growth and a positive reception to the repurposing, recycling, and recovery of existing water supplies. The reduced use of off-installation water supplies (from improved water conservation, efficiencies, or from the development of new on-installation alternate water sources) may have positive effects on socioeconomics of the surrounding community as a higher percentage of the available water supply is available for off-installation use or adverse effects on water rates as Fort Bliss reduces its purchases of water from EPWU, which may impact water rates.

Some waste avoidance measures, such as improved procurement practices, should have little socioeconomic effect since the Army would continue to purchase materials and supplies. If purchasing practices shifted to more sustainable products, such as non-toxic cleaning supplies and higher recycled content paper, the same volume and general types of products would still be purchased. However, a shift to fewer disposable products in favor of reusable items could reduce the overall volume of goods/products purchased, which may not have a direct effect on the local economy, for example, if the goods/products were manufactured elsewhere, but could have a slight effect on the overall U.S. economy. Increased reuse or recycling efforts could result in additional employment, either for on-installation workers or in the surrounding community, at local recycling facilities (U.S. Army 2012a). Overall, Alternative 2 would result in beneficial impacts as described and any adverse impacts would be considered less than significant.

3.12.2.3 Alternative 3 – Water Reclamation Pipeline

The construction sector is considerable in the ROI with employment of approximately 33,417 jobs, comprising 7 percent of total employment in 2010. With the recent economic downturn, the ROI lost 205 construction jobs between 2007 and 2010, a 1 percent decrease over this period (U.S. Department of Commerce 2012a, b). The Economic Impact Forecast System estimates that approximately 62 workers would be required during the construction period for Alternative 3. With the current economic conditions, it is likely that the construction workforce would be supplied from within the ROI. Therefore, none of the construction workers for the construction of the water reclamation pipeline are assumed to move into the

ROI. However, some specialized construction workers may relocate temporarily to the ROI, which would have beneficial effects on lodging and the food and beverage sectors, although these effects are expected to be relatively small.

A recently completed 16-inch reclaimed water line in El Paso involved the installation of approximately 4,500 linear feet of new pipeline for a final cost of $630,000 (Cieslik 2012), or approximately $740,000 per mile. Because the entire length of the new water reclamation pipe on Fort Bliss is estimated to be 23.7 miles, construction of the entire project is forecast to cost around $17,538,000.

Economic Impact Forecast System – The following model results are estimated based on all impacts occurring within a 1 year period. In reality, the construction project would likely occur over a 1- to 2-year duration. As a result, the following impacts are likely higher than what is anticipated to occur during the construction period. Construction spending associated with this alternative would generate sales of approximately $41,214,300in 2012, which represents a less than 1 percent deviation of sales volume change over time in the ROI. Direct and induced income is estimated to be $7,427,659, which is a less than 1 percent deviation from the average rate of income change over time in the ROI. The project would support approximately 209 jobs, which is a less than 1 percent deviation from the average rate of employment change over time in the ROI. These 209 jobs include 62 construction jobs, as previously mentioned, and other jobs that are directly supported by the purchase of goods and materials for this project. Additionally, this number includes the secondary and induced employment associated with projected expenditures. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historical extreme deviations. Therefore, the anticipated economic changes in these indicators are expected to have a less than significant impact on the ROI's economy. As discussed previously, population growth in the ROI is expected to increase. However, it is likely that all construction workers under this alternative would come from within the ROI. Therefore, the anticipated economic impacts resulting from this alternative are expected to have less than significant impacts on the ROI's economy.

Housing – Some small impact to housing may occur as a result of temporary construction workers relocating to the ROI. However, given that the ROI had approximately 7,300 housing units available for rent in 2010, it is likely that this alternative would have a negligible impact on the local housing supply.

Government and Emergency Services – The University Medical Center of El Paso Hospital, given its proximity to the alternative's location, would likely treat most injuries of construction personnel if they occur. Impacts to local law enforcement and emergency services are expected to be negligible as a result of this alternative. Additionally, while some construction workers may temporarily relocate to the area as

a result of this construction, it is not expected that they would relocate with their families. Therefore, impacts to educational services are anticipated to be negligible.

Utilities – This project is not anticipated to have an impact on the rates of water supplied by EPWU. Currently, water rates for potable tap water start at $1.99 per kgal of water consumed. Water rates for potable tap water increase depending on the volume of water consumed. However, rates for reclaimed water are $1.28 per kgal of water consumed and rates do not increase depending on the volume of water consumed (EPWU 2012a). The recycled use of off-installation water supplies would have a negligible economic impact because water purchased through the purple pipe would still be purchased from EPWU. Additionally, the availability of freshwater supplies for the local community would likely increase as Fort Bliss reduces its demand for potable water from EPWU. This alternative would not likely impact water rates because Fort Bliss would still purchase this same portion of its water from EPWU; however, this portion of water would be supplied from the purple pipe instead of potable water line.

Environmental Justice and Protection of Children – The analysis has not identified any significant environmental or human health impacts that may directly or indirectly affect people or their activities. Census tracts with impoverished populations and proportionally high minority populations were identified above for the area that this alternative may impact. Under this alternative, Fort Bliss proposes to construct a reclaimed water pipeline within a census tract (tract 101.03 in El Paso County) identified as having at least 20 percent of its population living below poverty; however, this census tract would not be affected by disproportionately high and adverse impacts from the Proposed Action.

TCEQ has established general requirements for the use of reclaimed water. This includes stipulations requiring that vegetative cover be maintained and application times for reclaimed water avoid timeframes when wet vegetation would be contacted by people. Fort Bliss would ensure that the application of reclaimed water would avoid timeframes during which human exposure would be likely. In addition, potential mitigation would include appropriate signage identifying areas where reclaimed water is applied. Additionally, this alternative would not have any disproportionately high or adverse impacts to children. Therefore, no impacts to environmental justice populations or children are expected to occur under this alternative.

3.12.2.4 Alternative 4 – Waste-to-Energy Plant

As identified in Chapter 2, Alternative 4 has two proposed locations: 4A and 4B. The WTE plant features under Alternative 4B would be the same as for Alternative 4A (e.g., footprint and # of stacks). However, conceptual truck and transmission line routes have not been identified for Alternative 4B. Impacts to socioeconomic VECs and sub-VECs would be the same under Alternatives 4A and 4B with the exception

of potential environmental justice impacts and impacts to children. Therefore, no difference in impacts is noted below between Alternatives 4A and 4B with the exception of the environmental justice and protection of children section, which is divided into descriptions of impacts resulting from each of these alternatives.

As discussed under Alternative 3, the total number of those employed in the construction industry in the ROI is considerable. The construction period for this alternative is estimated to be approximately 2 years. During this period, it is estimated that approximately 715 workers annually would be required to construct the WTE plant. Approximately 700 construction workers would be required to construct the WTE plant and 15 for construction of transmission lines on an annual basis for the 2-year construction period. Given that employment in the construction industry in the ROI decreased by 205 jobs between 2007 and 2010 and the total occupational employment level of this industry is projected to increase by 2018, it is likely that the ROI would be able to provide most of the construction force necessary to construct the facilities under this alternative. Additionally, some of the construction workforce and some specialized construction workers may relocate temporarily to the ROI, which would have beneficial effects on lodging and the food and beverage sectors, although these effects are expected to be relatively small.

Transmission lines and connecting substations would be required to connect this alternative to the electrical grid on Fort Bliss. Although economic impacts to the ROI as a result of the construction of transmission lines to connect this alternative to the electric grid have not been calculated under this alternative, it is anticipated that construction of these lines would provide positive socioeconomic benefits to the local and regional economy. The benefits would be from direct effects from the wages and salaries, procurement of goods and services, and collection of state sales and income taxes, and from indirect effects of new jobs, income, expenditures, and tax revenues subsequently created as the direct effects circulate through the economy.

As a result of the development of the WTE plant, it is anticipated that an additional 100 people would be employed at this facility as operations period staff and the addition of these staff would occur after completion of the construction period. It is anticipated that these staff would have an average salary of $58,725 during their employment (Davis 2012). Anticipated impacts associated with the construction portion of this alternative are presented separately from impacts associated with changes in staff for operations of the facility. Some in-migration to the ROI as a result of construction activities or the increase in support staff is expected to occur under this alternative.

Economic Impact Forecast System – The total estimated cost of this project is approximately $350 million. The following model results are estimated based on all impacts occurring within a 1-year period.

In reality, the construction project would likely occur during a 2-year period. As a result, the following impacts are likely higher than what is anticipated to occur during the construction period. Construction spending associated with this alternative would generate sales of approximately $822,500,000 in 2012, which represents a 3.5 percent positive deviation of sales volume change over time in the ROI. Direct and induced income is estimated to be $148,231,300, which is an approximately one percent positive deviation from the average rate of income change over time in the ROI. This project would support approximately 4,165 jobs, which represents an approximately one percent positive deviation from the average rate of employment change over time in the ROI. These 4,165 jobs include 715 construction jobs, as previously mentioned, and other jobs that are directly supported by the purchase of goods and materials for this alternative. Additionally, this number includes the secondary and induced employment associated with projected expenditures. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historical extreme deviations. Therefore, the anticipated economic changes in these indicators are expected to have a less than significant impact on the ROI's economy.

Salary payments and benefits to the new 100 employees during the operations period under this alternative are estimated to be $58,725 on average annually. This increase in support staff would support sales of approximately $15,816,990 in 2012, which is a negligible deviation in 2012, based on the average rate of sales volume change over time in the ROI. Direct and induced income at the place of work associated with this new employment is estimated to be approximately $7,872,136, which is a negligible deviation from the average rate of income change over time in the ROI. These 100 new jobs would directly support an additional 124 jobs and provide induced support for another 56 jobs, a total supported employment of 180 jobs. This is also a negligible deviation from the average rate of employment change over time in the ROI. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historic extreme deviations. Therefore, the anticipated economic impacts resulting from this alternative are expected to have less than significant effects on the ROI's economy.

Housing – Construction would likely occur in phases during the 2-year period. Some phases of construction would necessitate having more workers onsite during these periods of time compared to other periods. It is estimated that a portion of the workforce required for this project would migrate into the ROI from elsewhere in the local region or the United States, depending on the technical skills required. Because approximately 7,300 housing units were available for rent in 2010, it is expected that the ROI would be able to supply the housing necessary for temporary workers migrating to the ROI under this alternative. Additionally, many hotels in the local area also would be able to house construction

workers on a temporary basis. A majority of the 100 new operations period employees resulting from this construction project are expected to come from within the ROI. Some of these employees may migrate into the ROI as a result of this alternative. Their impact to local housing is expected to be less than significant.

Government and Emergency Services – Impacts to emergency services under this alternative would be the same as to those described under Alternative 3. However, given the larger number of temporary construction workers associated with this alternative, it is expected that the demand placed on public services would be greater than that described under Alternative 3; however, this demand is expected to be less than significant as few, if any, of these construction workers are anticipated to relocate with their families and no new housing for these workers is anticipated to be constructed as a result of their temporary relocation. Additionally, while temporary workers are expected to migrate to the ROI during the construction period, it is not expected that many would bring their families. Therefore, little to no impact to local educational services is expected under this alternative. New operations period employees that migrate into the ROI as a result of this alternative may relocate with their families. Some of these families may have school-age children. Because of the relatively small size of the operations force (at 100 workers) and the small percentage of that force that is expected to migrate into the ROI, it is expected that less than significant impacts would occur to the local educational system.

Utilities – Fort Bliss currently consumes approximately 3 percent of EPEC's annual sales; therefore, as Fort Bliss reduces its electrical demand from EPEC, local utility rates may be both positively and negatively impacted (Favela 2012). Currently, Fort Bliss receives a 20 percent deduction from the base portion of its tariffed rate for electric service. EPEC is allowed, by the Texas Public Utilities Commission, to recoup the funding lost in this deduction by spreading the amount of that deduction across the rest of their rate base in Texas in the form of a reimbursement fee and the amount of this fee that ratepayers are charged could be impacted by the full or partial removal of Fort Bliss from the electric grid. At this point in time, it is anticipated that electricity rates may be slightly impacted by the partial or full removal of Fort Bliss' power demand from the local electric grid depending on the arrangements made between Fort Bliss and EPEC. However, specific impacts to electricity rates associated with the removal of this demand for electricity are not known at this time. Additionally, a wide variety of external influencers, including the price of fuel for producing energy and the need for EPEC to purchase some of their power from other electrical utility providers, constantly impact electricity rates for the community. Therefore, it is not clear at this time the extent to which the removal of a customer such as Fort Bliss from the electrical grid would have an impact on electricity rates compared to other external influencers of electric utility rates.

Environmental Justice and the Protection of Children –

Alternative 4A – The construction and operation of a WTE plant may adversely impact communities in proximity to the WTE plant and proposed conceptual WTE truck routes. Census tract 103.39 resides to the east and south of the proposed location for this alternative. This tract has been identified as having minority and poverty populations in 2010.

Significant but mitigable impacts to air quality are anticipated from the operation of the WTE Plant; however, these impacts are not anticipated to disproportionately impact the low income or minority communities. It is anticipated that impacts to surrounding communities from odor and dust releases would be minimized by use of an indoor tipping area at the WTE plant and maintaining a negative pressure inside the building to pull air from the refuse pit into the combustion chamber.

The conceptual WTE truck route between the WTE plant and Montana Avenue runs through census tract 103.39. Residents in proximity to the WTE Plant and conceptual truck route could be impacted by increased truck traffic. During the construction phase, significant but mitigable traffic impacts are anticipated at the intersection of Montana Avenue and Loop 375 south as described in Section 3.13, *Transportation and Traffic*. During WTE plant operations, routes leading onto the installation would have increased waste truck traffic. This increased traffic is anticipated to have a less than significant adverse impact on the local communities residing along or in proximity to the proposed truck route. BMPs would be used to offset the potential for impacts to these communities from the movement of these waste trucks. The proposed route for WTE trucks between the waste transfer station and Fort Bliss would take trucks through several low income and minority census tracts. However, these trucks would be travelling on an already heavily travelled thoroughfare that presently carries waste trucks. As the proposed route for WTE trucks is used by many citizens throughout El Paso and BMP's would be used to offset potential impacts from these trucks, the anticipated traffic impacts would not disproportionately impact low income or minority communities. If the Army chooses to pursue construction and operation of a WTE facility, an assessment of supplemental NEPA requirements will be conducted upon receipt of a final design proposal. The appropriate level of additional project-specific NEPA analysis, including evaluation of final WTE truck routes, would then be completed prior to construction of the project.

Potential utility rate impacts were discussed previously in this section. Any utility rate impacts under this alternative would impact all ratepayers equally, and while the increased cost of utility rates would have a greater impact on low income communities because the increased utility rate would represent a larger percentage of their income than those with a higher level of income, the increased costs would not be disproportionately high for these communities.

One daycare resides along Montana Avenue and is located between approximately 1.8 miles east of the proposed truck route entrance to the WTE plant on Montana Avenue. Additionally, El Dorado High School is located approximately 1 mile south of Montana Avenue where Justice Road meets Montana Avenue. Hershel Antwine Elementary is located approximately 3 miles from Montana Avenue where WTE trucks are proposed to move from Montana Avenue onto Fort Bliss. Under Alternative 4A, some adverse impacts to children in the neighborhoods to the south and east of the proposed location may occur, such as releases of odor and dust during construction and operation. However, these impacts would not have a disproportionately high and adverse impact on children because adverse impacts, such as odor and dust releases, are anticipated to be mitigated by using the BMPs described previously.

A potential adverse impact to the above-referenced communities could occur due to a change in aesthetics resulting from a change in these communities' view as a result of the construction of the WTE plant and the WTE plant's exhaust stack. It is anticipated that the facility would be designed in such a way as to have a low visual impact on the surrounding community. As mentioned previously, if the Army chooses to pursue construction and operation of a WTE facility, an assessment of supplemental NEPA requirements will be conducted upon receipt of a final design proposal. The appropriate level of additional project-specific NEPA analysis, including evaluation of aesthetic impacts due to WTE stack design, would then be completed prior to construction of the project.

Alternative 4B – The construction and operation of a WTE plant may impact communities in proximity to the WTE plant and proposed truck routes for WTE trucks. Census tracts 102.07, 2.04, and 2.06 in the state of Texas reside to the west of the proposed location of this alternative, along the west side of Railroad Drive, and have been identified as having minority populations in 2010. Census tracts 2.08, 2.07, and 3.02 in the state of Texas reside to the west of the proposed location of this alternative, along the west side of Railroad Drive, and have been identified as having both minority and poverty populations in 2010. Because the assumptions used for Alternative 4A (such as negative air pressure in the indoor tipping area) remain the same for Alternative 4B, impacts to surrounding communities from odor and dust releases would be minimized. Because the truck route for this alternative has not yet been identified, the appropriate level of additional project-specific NEPA analysis on the truck route would be completed prior to construction of the project.

Several daycares and schools reside within the census tracts located to the west of the proposed location of Alternative 4B. Because the truck route for this alternative has not yet been identified, impacts from WTE truck traffic to these schools and the children who attend them is unknown at this time. Some impacts to children, as a result of releases of odor and dust during the construction and operation of this

alternative, may occur because children reside in the neighborhoods to the west of the proposed location for this alternative. However, these impacts are not anticipated to have a disproportionately adverse impact on children because the adverse impacts, such as odor and dust releases, resulting from this alternative are anticipated to be mitigated by using BMPs described previously.

A potential adverse impact to the above-referenced communities could occur due to a change in aesthetics resulting from a change in these communities' view as a result of the construction of the WTE plant and the WTE plant's exhaust stack. It is anticipated that the facility would be designed in such a way as to have a low visual impact on the surrounding community. The appropriate level of additional project-specific NEPA analysis on the visual impact of the WTE stacks would be completed prior to construction of the project.

3.12.2.5 Alternative 5 – Geothermal Energy Facility

As discussed under Alternative 3, the construction sector in the ROI is considerable. The construction period for this alternative is estimated to be approximately 1.5 years. During this period, it is estimated that approximately 35 full-time equivalent workers would be required to construct the geothermal energy facility; however, this number may fluctuate during the construction period depending on the phase of construction. Additionally, the actual number of construction and operation employees would be dependent on the size of the facility constructed (Hillishiem 2013). Given that employment in the construction industry has decreased by 205 jobs between 2007 and 2010, it is likely that the local construction workforce would be able to supply the jobs for this project. However, some specialized construction workers may temporarily relocate to the ROI, which would have beneficial effects on lodging and the food and beverage sectors, although these effects are expected to be relatively small.

After the geothermal energy facility has been constructed, it is anticipated that up to six people would be employed to operate it. It is anticipated that these staff would have an average annual salary of $58,725 during their employment. Additionally, it is anticipated that an additional three to five persons would be employed once during the year for a four to six week period to perform annual maintenance. The impact of these additional maintenance workers is not quantified in this analysis, but it is anticipated that they would further contribute positive socioeconomic impacts to the local economy as a result of their short-term employment.

Anticipated impacts associated with the construction portion of this alternative are presented separately from impacts associated with changes in staff for operations of the facility.

No permanent in-migration to the ROI as a result of construction activities or increase in support staff is expected to occur under this alternative. Transmission lines would be required to connect this alternative

to the electrical grid. Impacts to the local economy as a result of the construction of these transmission lines would be similar to those described under Alternative 4.

Economic Impact Forecast System – The estimated costs for this project range between $15 million and $30 million, depending on the final design of the facility. This analysis uses the high end of this range to determine the socioeconomic impacts of this project (Dahle 2012). The following model results are estimated based on all impacts occurring within a 1-year period. Construction spending associated with this alternative would generate sales of approximately $70,499,990 in 2012, which represents a negligible deviation of sales volume change over time in the ROI. Direct and induced income is estimated to be $12,705,540, which is a negligible deviation from the average rate of income change over time in the ROI. Spending associated with this project could support approximately 357 jobs, which is a negligible deviation from the average rate of employment change over time in the ROI. Note that these 357 jobs include the 35 construction jobs previously mentioned and other jobs that are directly supported by the purchase of goods and materials for this alternative. Additionally, this number also captures the secondary and induced employment associated with the projected expenditures. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historical extreme deviations. Therefore, the anticipated economic impacts resulting from this alternative are expected to have less than significant effects on the ROI's economy. Construction costs associated with the CST array were not available at the time of this analysis, and, therefore, the costs presented only include those costs associated with the construction of the geothermal energy facility.

Salary payments and benefits to the new six employees during the operations period under this alternative are estimated to be $58,725 annually, on average. This increase in support staff would support sales of approximately $949,020 in 2012, which is a negligible deviation in 2012, based on the average rate of sales volume change over time in the ROI. Direct and induced income at the place of work associated with this new employment is estimated to be approximately $472,328, which is a negligible deviation from the average rate of income change over time in the ROI. These six new jobs would directly support an additional seven jobs and provide induced support for another three jobs, which is a total supported employment of 11 jobs. This is also a negligible deviation from the average rate of employment change over time in the ROI. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historic extreme deviations. Therefore, the anticipated economic impacts resulting from this alternative are expected to have less than significant effects on the ROI's economy.

Housing – It is possible that some specialized construction workers may have to temporarily relocate to the ROI during the construction period. Impacts to housing would be similar to those described under

Alternative 3. Because no new, permanent operations period employees are anticipated to be added as a result of this alternative, the local housing supply is not anticipated to be impacted.

Government Services – Impacts to governmental and emergency services would be the same as those described under Alternative 3.

Utilities – Impacts to utilities are the same as those described under Alternative 4. However, local landfill and waste management operations would not be impacted under this alternative.

Environmental Justice and Protection of Children – The analysis has not identified any significant environmental or human health impacts that may directly or indirectly affect people or their activities. Census tracts with impoverished populations and proportionally high minority populations were identified previously for the area that this alternative may impact. While under this alternative, Fort Bliss proposes to construct a geothermal energy facility within a census tract (tract 9.02 in Otero County) identified as having a proportionally high minority population and at least 40 percent of its population living below the poverty, this tract would not be affected by disproportionately high and adverse impacts from the alternative. Additionally, this geothermal energy facility would be located entirely within Fort Bliss and would not be located within proximity to any residential communities. Therefore, no environmental justice impacts are expected to occur as a result of this alternative.

No impacts to children are expected to occur under this alternative because no sensitive populations of children were identified to reside at any facilities in proximity to the proposed location for this alternative.

3.12.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

As discussed under Alternative 3, the construction sector in the ROI is considerable. The construction period for this alternative is estimated to between approximately 1 to 2 years. During this period, it is estimated that approximately 400 full-time equivalent workers would be required annually to construct the CSP array. Given that the number of construction jobs in the ROI has decreased by 205 jobs between 2007 and 2010, and the total occupational employment level of this industry is projected to increase by 2018, it is likely that most of the construction workforce for this alternative would be able to supply the jobs for this project. The construction workforce supply would be similar, though less than, that described under Alternative 4.

As a result of the development of the CSP array, it is anticipated that an additional 28 people would be employed at this facility because operations period staff and the addition of these staff would occur after completion of the construction period. It is anticipated that these staff would have an average salary of $60,275 during their employment (U.S. Department of Labor 2012b). Anticipated impacts associated with

the construction portion under this alternative are presented separately from impacts associated with an increase in staff for operations of the facility. Some in-migration to the ROI as a result of construction activities or the increase in support staff is expected to occur under this alternative. It is possible that some specialized construction workers may have to temporarily relocate to the ROI to support the more technical aspects of the construction project. Transmission lines would be required to connect this alternative to the electrical grid. Impacts to the local economy as a result of the construction of these transmission lines would be similar to those described under Alternative 4.

Economic Impact Forecast System – The total estimated cost of this project is approximately $217 million (Dahle 2012). The following model results are estimated based on all impacts occurring within a 1-year period. In reality, the construction project would likely occur over a 1- to 2-year duration. As a result, the following impacts are likely higher than what is anticipated to occur during the construction period. Construction spending associated with this alternative would generate sales of approximately $509,950,000 in 2012, which represents an approximately 2 percent positive deviation of sales volume change over time in the ROI. Direct and induced income is estimated to be $91,903,410, which is a less than 1 percent positive deviation from the average rate of income change over time in the ROI. This project would support approximately 2,582 jobs, which is a less than 1 percent positive deviation from the average rate of employment change over time in the ROI. Note that these 2,582 jobs include the 400 construction jobs previously mentioned and other jobs that are directly supported by the purchase of goods and materials for this alternative. Additionally, this number also captures the secondary and induced employment associated with the projected expenditures. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historical extreme deviations. Therefore, the anticipated economic impacts resulting under alternative are expected to have less than significant effects on the ROI's economy.

Salary payments to the 28 new employees during the operations period of this alternative are estimated to be $60,275 on average annually (Dahle 2012, U.S. Department of Labor 2012b). This increase in support staff would support sales of approximately $4,545,634 in 2012, which is a negligible deviation in 2012 based on the average rate of sales volume change over time in the ROI. Direct and induced income at the place of work associated with this new employment is estimated to be approximately $2,262,367, which is a negligible deviation from the average rate of income change over time in the ROI. These 28 new jobs would directly support an additional 35 jobs and provide induced support for another 16 jobs, which is a total supported employment of 51 jobs. This is also a negligible deviation from the average rate of employment change over time in the ROI. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historical extreme deviations.

Therefore, the anticipated economic impacts resulting from this alternative are expected to have less than significant effects on the ROI's economy.

Additional positive economic impacts to the community would result from the construction of transmission lines and substations associated with connecting this alternative to the local power grid. However, no costs for the construction of these transmission lines and substations are available at the time of this EIS.

Housing – Impacts to housing would be similar to those described under Alternative 4.

Government and Emergency Services – Impacts to government and emergency services would be similar to those described under Alternative 4.

Utilities – Impacts to utilities would be similar to those described under Alternative 4.

Environmental Justice and Protection of Children – The analysis has not identified any significant environmental or human health impacts that may directly or indirectly affect people or their activities. Alternative 6 would be constructed in a census tract (tract 101.01 in El Paso County) with a proportionally high minority population compared to the state of Texas. However, this census tract resides entirely within Fort Bliss. Under this alternative, Fort Bliss would locate facilities within 1 mile of proportionally high minority populations and poverty populations in census tract 103.39 in El Paso County. However, this census tract would not be impacted by disproportionately high and adverse impacts from the alternative. Additionally, construction trucks and equipment would likely be moved into the development site via Montana Avenue. One daycare resides along Montana Avenue and is located approximately 1.8 miles east of the proposed truck route entrance to the WTE plant on Montana Avenue. Additionally, El Dorado High School is located approximately 1 mile south of Montana Avenue where Justice Road meets Montana Avenue. Hershel Antwine Elementary is located approximately 3 miles from Montana Avenue where construction trucks are anticipated to move from Montana Avenue onto Fort Bliss. Some impacts to children, such as releases of dust during the construction of this alternative, may occur under this alternative because children reside in the neighborhoods to the south and east of the proposed location for this alternative. However, as these impacts would not have a disproportionately high and adverse impact on children and as the adverse impacts, such as dust releases, resulting from this alternative are anticipated to be mitigated using BMPs such as dust and erosion controls measure, no environmental justice impacts or impact to children are expected to occur as a result of this alternative.

3.12.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. Impacts from additional renewable energy development would be site specific; therefore, if these renewable energy projects are both similar in design and size to and occur within the same area as those alternatives identified previously, then it is likely that impacts would be similar to those previously described. However, impacts would remain site specific and new impacts could result in the future that would not occur today as a result of population shifts or changes in the local economy. Therefore, additional assessment at the time of these developments in the future would be necessary to determine their site-specific environmental impacts. Finally, additional renewable energy development projects would seek to minimize negative socioeconomic and environmental justice impacts during their construction and operation.

Impacts to housing, government and emergency services, utilities, and environmental justice communities would depend on the level size of future energy development projects. Site-specific impact assessments would need to be undertaken in the future to determine the level of impact these renewable energy development projects might have. If transmission lines are required to connect any of these renewable energy developments to the electrical grid, then the impacts would be similar to those described under Alternative 4.

3.12.2.8 Alternatives Combined

The following analysis discusses the combined impacts of Alternatives 2, 3, 4, 5, 6, and 7.

As shown under Alternative 3, the construction sector in the ROI is considerable. The construction period for all of the alternatives combined is estimated to be approximately 2 years. During this period, it is estimated that approximately 1,212 workers would be required annually to construct all of the alternatives, and this estimate does not include all of the construction workers that would be required to construct transmission lines and substations to tie the various alternatives into the electrical grid because the costs associated with constructing these electrical tie-ins is not known for all of the alternatives. Given that employment in the construction industry decreased by 205 jobs between 2007 and 2010, and that the total occupational employment level of this industry is projected to increase by 2018, it is likely that the local construction workforce would be able to supply most of the workforce for this project.

As a result of the development of all of the alternatives, it is anticipated that an operation period staff of 134 would be added to the installation as a result of the operations of the WTE plant (Alternative 4),

Geothermal Energy Facility (Alternative 5), and the CSP array (Alternative 6). These staff would have salaries of approximately $58,725.00, $58,725.00, and $60,274.76, respectively. This salary would be $59,049, on average, among these 134 employees. No other alternatives are anticipated to have an operations period staff. Anticipated impacts associated with the construction portion of these alternatives are presented separately from impacts associated with changes in staff for operations of these facilities. No permanent in-migration to the ROI as a result of construction activities is expected to occur under these alternatives. It is possible that some specialized construction workers may have to temporarily relocate to the ROI to support the more technical aspects of the construction project. Some permanent in-migration into the ROI as a result of operations period activities may occur. Transmission lines would be required to connect these alternatives to the electrical grid. Impacts to the local economy would be similar to those described under Alternative 4.

Economic Impact Forecast System – The total estimated construction cost of all of the alternatives combined is approximately $614,538,000. The following model results are estimated based on all impacts occurring within a 1-year period. In reality, these construction projects would likely occur during 2 years. As a result, the following impacts would likely be higher than what is anticipated to occur during the construction period. Construction spending associated with all the alternatives combined would generate sales of approximately $1,444,164,000 in 2012, which represents an approximately 6 percent positive deviation of sales volume change over time in the ROI. Direct and induced income is estimated to be $260,267,900, which is an approximately 2 percent positive deviation from the average rate of income change over time in the ROI. The Proposed Action would support approximately 7,313 jobs, which is an approximately 2 percent positive deviation from the average rate of employment change over time in the ROI. Note that these 7,313 jobs include the 1,212 construction jobs previously mentioned and other jobs that are directly supported by the purchase of goods and materials for this alternative. Additionally, this number also captures the secondary and induced employment associated with the projected expenditures. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historical extreme deviations. Therefore, the anticipated economic impacts resulting under alternative are expected to have less than significant effects on the ROI's economy.

Salary payments to the 134 new employees during the operations period of all of the alternatives combined are estimated to be $59,049 on average, annually (Dahle 2012, U.S. Department of Labor 2012b). This increase in support staff would support sales of approximately $21,311,710 in 2012, which is a negligible deviation in 2012 based on the average rate of sales volume change over time in the ROI. Direct and induced income at the place of work associated with this new employment is estimated to be

approximately $ 10,606,860, which is a negligible deviation from the average rate of income change over time in the ROI. These 134 new jobs would directly support an additional 166 jobs and provide induced support for another 76 jobs, which is a total supported employment of 242 jobs. This is a negligible deviation from the average rate of employment change over time in the ROI. None of the forecasted sales, income, or employment estimates has a deviation from the average rate of change greater than their respective historical extreme deviations. Therefore, the anticipated economic impacts resulting from this alternative are expected to have less than significant effects on the ROI's economy.

Additional positive economic impacts to the community would result from the construction of transmission lines and substations associated with connecting these alternatives to the local power grid. However, no costs for the construction of these transmission lines and substations are available at the time of this EIS.

Housing –Construction of all the alternatives combined would occur in phases over a 2-year construction period. Some phases of construction would necessitate having more workers onsite during these periods of time than during other periods. It is estimated that a portion of the workforce required for these projects would migrate into the ROI from elsewhere in the local region or the United States, depending on the technical skills required. Because approximately 7,300 housing units were available for rent in 2010, it is expected that the ROI would be able to supply the housing necessary for temporary workers migrating to the ROI as a result of these combined alternatives. Additionally, many hotels in the local area would also be able to house construction workers on a temporary basis. A majority of the 128 new operations period employees resulting from these alternatives are expected to come from within the ROI. The impact to the local housing as a result of the increase in operations period employment is therefore expected to be less than significant.

Government and Emergency Services – The construction and operations period demand and impacts placed on government and emergency services are expected to be less than significant. Impacts would be similar to those described under Alternative 4.

Utilities – Impacts to utilities are anticipated to be less than significant. Impacts under all of the alternatives combined would be similar to those impacts described under both Alternative 3 and Alternative 4.

Environmental Justice and Protection of Children – Impacts to environmental justice populations would be similar to those described under Alternatives 4A and 4B. No other environmental justice impacts or impacts to children are expected to occur as a result of the other alternatives.

3.13 Water Resources

3.13.1 Affected Environment

Water resources are sources of water available for use by humans, flora, or fauna, including surface water, groundwater, nearshore waters, wetlands, and floodplains. Surface water resources, including, but not limited to, stormwater, lakes, streams, rivers, and wetlands, are important for economic, ecological, recreational, and human health reasons. Groundwater is classified as any source of water beneath the ground surface and may be used for potable water, agricultural irrigation, and industrial applications.

Both water quantity and water quality are important in this EIS. Water quantity deals with the amount of water needed for the installation and its uses, particularly in relationship to available water supply. Water quality describes the chemical and physical composition of water as affected by both natural processes and human activities.

The main surface water feature in the vicinity of Fort Bliss is the Rio Grande, located to the west of the installation. Fort Bliss and El Paso are located approximately halfway down the length of the Rio Grande, which is used as a source for drinking water, industrial water, and irrigation along its length. Locally, local municipalities, industries, and agricultural users, as well as hydropower users (although power supplied to Fort Bliss is currently from natural gas-fired plants) make use of the river to partially fulfill water needs (The Watercourse 2010; Chacon 2012). Fort Bliss lies within an arid region, and other surface waters within the region are scarce and some are only intermittent or seasonal in nature. The installation is located atop four watershed basins that do not currently contain any significant areas of surface water but provide recharge to the aquifers below. These basins are the Salt Basin in the eastern part of the installation, the Tularosa Basin in the northwestern part of the installation, the Upper Hueco Bolson to the southeast, and the Mesilla Bolson, which skirts the western edge of the installation. The actions considered in this EIS would take place in the Tularosa Basin (geothermal energy) and the Upper Hueco Bolson.

No natural, perennial lakes currently exist in the area; however, shallow depressions known as playa lakes are common features and are important habitats for migrating waterfowl and resident wildlife species. Human-made lakes and reservoirs are present, though predominantly in the mountains outside of the boundaries of Fort Bliss. Surface water resources on McGregor Range and the STA include 1,291 dry washes with distinct stream beds and stream banks covering 2,475 miles. In addition, there are 13 natural dry lakes with distinct ordinary high water marks, totaling 134 acres, and 110 artificial bodies of water such as sewage treatment ponds, stormwater retention basins, and stock tanks, totaling 691 acres (Fort Bliss 2001).

Groundwater is obtained from both fluvial and lacustrine deposits, although fluvial aquifers are the primary source for the area. Groundwater at Fort Bliss comes from two major aquifer systems—the Hueco Bolson and Mesilla Bolson, which are separated by the Franklin Mountains, and roughly correspond with the basins of the same name discussed previously. A bolson is a semiarid, flat-floored desert valley or depression, usually centered on a playa or salt pan and entirely surrounded by hills or mountains. Thirty-nine deep wells from the Hueco Bolson Aquifer provide most of the water used at Fort Bliss (Fort Bliss 2001). The Hueco Bolson is located in the southern half of the Tularosa Basin paralleling the eastern base of the Franklin Mountains. Groundwater recharge is provided by runoff of precipitation percolating through alluvial deposits at nearby mountain bases. The freshwater aquifers in the Hueco Bolson are of very high quality and require only chlorination (Fort Bliss 2001). The Mesilla Bolson lies on the west side of the Franklin Mountains, extending along the Rio Grande Valley through New Mexico and Mexico. The geology in the Mesilla Bolson is similar to that of the Hueco Bolson, with basin fills that are contemporaneous formations of Recent and Sante Fe geologic periods. The Texas portion of the Mesilla Bolson Aquifer has significantly less available water than the Texas portion of the Hueco Bolson aquifer (Jenicek et al. 2009). Fort Bliss uses only limited water resources from Mesilla Bolson (Fort Bliss 2001).

3.13.1.1 Existing Water Use and Demand at Fort Bliss

Because of the climate, water is a scarce commodity at the installation, and water conservation plans are in place (U.S. Army 2010b). Military water use is only about 3 percent as large as the municipal use in the El Paso-Ciudad Juarez area (U.S. Army 2010b). El Paso obtained an average of 24 percent of its water supply from the Rio Grande as of 2002, and the remainder from the two aquifers. Substantial growth is occurring in the area with the factories on the Mexican side of the border, and these factories and general urban growth in the area are increasing demand for water. El Paso is expected to grow from 700,000 in 2009 to more than 1.5 million by 2050, and Ciudad Juarez from 1.4 million in 2009 to more than 3.5 million in 2050 (Jenicek et al. 2009). There are places where both aquifers are overdrawn (The Watercourse 2001). It has been estimated that Fort Bliss' main water supply, the Hueco Bolson Aquifer, is capable of providing an adequate water supply for 70 years, but that the aquifer is a non-renewable resource given current withdrawal rates (Jenicek et al. 2009).

Upstream demands on the Rio Grande and on other waters in New Mexico also affect availability of water at Fort Bliss, with growing populations in Albuquerque and other New Mexico towns, and increased interest in drawing from the Rio Grande (Jenicek et al. 2009). Regionally, WWTPs treat and recharge water back to the aquifer. In a regional context, these efforts currently contribute to Net Zero attainment.

A draft water balance study for Fort Bliss (PNNL 2012) lists the major water use categories for the installation as golf course irrigation (23 percent), family housing irrigation (21 percent), and on-installation irrigation (17 percent), with use being highest in the summer. Plumbing for family housing (14 percent) and barracks (7 percent) are the next most significant water use categories. It is also estimated that approximately 10 percent of total water used is lost in the distribution system. The majority of these uses are concentrated on East and West Bliss in the southwest corner on the installation. Annual water use on the installation between 2006 and 2011 ranged between 1,260 million gallons per year (2008) to 2,200 million gallons per year (2011). The increase is consistent with the population increase resulting from the relocation of the 1st Armored Division to Fort Bliss. With additional new functions projected at Fort Bliss, water use at the installation is expected to increase from 8.1 million gallons per day in 2010 to 9.4 million gallons per day in 2040; water use at Fort Bliss was 4.8 million gallons per day in 2000 (Jenicek et al. 2009).

The majority of electrical power supplied to Fort Bliss is generated by local natural gas-fired plants (Chacon 2012). Water demand for such plants in gallons per kilowatt hour (G/kWh) of lifetime energy output ranges between 0.38 and 0.98 G/kWh (Clark et al. 2011). The source for the water at these plants is not specified.

East and West Bliss and other portions of Fort Bliss are covered in EPWU's Master Stormwater Plan, and the installation has developed its own drainage studies for East and West Bliss, including Biggs AAF. All drainage design activity on the installation in New Mexico must at a minimum meet the design criteria of EISA Section 438 of retention of the 95th percentile rainfall event.

3.13.2 Environmental Consequences

Table 3-1 includes the significance thresholds for impacts to water resources.

3.13.2.1 Alternative 1 – No Action

Under the No Action Alternative, Fort Bliss would not implement any new energy or water conservation or production measures. There would be no new construction or increase in the amount of impermeable surfaces on the installation; therefore, no impacts to surface water or groundwater would occur from erosion or stormwater runoff.

However, baseline water consumption for Fort Bliss is projected to continue to increase, more than doubling from usage in 2000 from 4.6 million gallons per day to approximately 9.4 million gallons per day (Jenicek et al. 2009). With no new reduction or conservation measures in place to help offset the projected increase in baseline consumption, and given regional growth and water demand, Fort Bliss would be subject to fluctuations in water availability, affecting water security and independence. As noted

in the Affected Environment discussion, it is estimated that Fort Bliss' main water supply, the Hueco Bolson Aquifer, is capable of providing an adequate water supply for 70 years, but that the aquifer is a non-renewable resource given current withdrawal rates (Jenicek et al. 2009), which would continue under the No Action Alternative.

3.13.2.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement aggressive conservation policies, procedures, and BMPs to maximize resource re-use, limit waste generation, increase resource re-purposing, and increase water and energy use efficiencies in new and existing facilities. Fort Bliss also would improve the water distribution system and install smart grids to improve monitoring, and install new water meters to establish baseline metrics. Incentives for conservation and disincentives to discourage waste and overuse would be put in place to encourage Soldier, civilian, and contractor behavior in support of Net Zero goals on the installation. Construction activities would result in less than 5 acres of ground disturbance; therefore, there would be negligible impacts to water quality associated with construction activities.

The conservation policies and procedures that Fort Bliss would implement would increase the overall efficiency in water use and reduce the supply demand for potable and irrigation water, resulting in beneficial per capita impacts to surface water (i.e., Rio Grande River) and groundwater supply sources. In addition, these measures would decrease energy use per capita on the installation, which would have an indirect beneficial impact to Fort Bliss-related water consumption for energy production. Overall, water demand would continue to rise; however, because the population at Fort Bliss is projected to increase with the realignment and new training activities, the pace with which water demand would increase would not be as rapid as under the No Action Alternative.

Improving and repairing water distribution systems to reduce evaporative loss would increase the efficiency of water use on the installation and result in less overall water needed to supply the water needs for Fort Bliss. This improvement could provide benefits because water loss through the distribution system is currently the fifth largest "use" of water at Fort Bliss.

Installing water metering for installation housing, implementing and enforcing water conservation policies, installing xeriscaping and low-water demand landscaping all would increase the efficiency of water use on the installation, thereby lowering the water supply demand, resulting in beneficial impacts to the surface water and groundwater supply sources. Installing lower water using systems/technology would also reduce water supply demands and help Fort Bliss move toward meeting its installation goals for water use.

3.13.2.3 Alternative 3 – Water Reclamation Pipeline

Fort Bliss would pursue the construction and use of a water reclamation pipeline (referred to as the purple pipe) to provide Fort Bliss with reclaimed water for secondary water uses on the installation. Construction and use of a water reclamation pipeline from the City of El Paso's WWTP to provide Fort Bliss with reclaimed water for installation secondary uses, such as irrigation, would have both short-term and long-term impacts. The Army's Net Zero water target is a 50 percent reduction in water use by 2020, roughly doubling the current federal goals of 26 percent reduction for 2020.

Short-term impacts would result from the construction activities along the length of the proposed pipeline. Installation of the reclaimed water system, which would be installed with trenching, would require an estimated 23.7 miles (125,244 linear feet) of pipe, generally within already developed areas. Construction activities would result in short-term localized increases in erosion and runoff. Clearing and grading would expose soils to erosion, and compaction of near-surface soils by heavy equipment could result in increased runoff and sedimentation. Accidental release of POLs from construction equipment could impact both surface and groundwater quality. However, employing engineering controls; using BMPs, including sediment and erosion control practices in keeping with Texas sediment and erosion control requirements; and following industry standards would minimize potential adverse effects, resulting in less than significant impacts to surface and groundwater from construction activities.

In the long term, the reclaimed water pipeline would have beneficial impacts to surface and groundwater sources by reducing demand for potable water through the reuse of wastewater for secondary uses on the installation. The reclaimed water would be used primarily for landscape and golf course irrigation. At Fort Bliss, the reclaimed water would be used for irrigation on East and West Bliss and on the golf course. Use of the reclaimed water would reduce demand for primary removal of water from the aquifers, and the reduction could be substantial. As noted in the Affected Environment section, golf course, family housing, and on-installation irrigation constitutes 61 percent of water use on Fort Bliss, and most of these uses occur in the vicinity of the proposed reclaimed water system. EPWU estimates that every gallon of reclaimed water used to irrigate crops and landscapes or for construction or manufacturing is 1 gallon of potable water that is saved and does not have to be pumped from aquifers or treated from the Rio Grande River (EPWU 2012b). Fort Bliss estimates that 375 million gallons per year of reclaimed water would be used, which would therefore reduce the amount of water withdrawn from the aquifer (Cabe 2012).

Minimal impacts would be associated with water quality in receiving waters from the use of the reclaimed water. TCEQ requires that reclaimed water not be applied in a manner that would allow excess water to flow onto streets and eventually in stormwater systems. EPWU treats the water slated for reclamation in two plants to either potable quality or Type 1 quality. Type 1 water is near-potable and has been treated to

remove pathogens, such as bacteria and other contaminants, so that it is suitable for uses where the public might come into contact with the water (Texas Natural Resources Conservation Commission 1997) and would therefore cause little or no adverse impacts to water quality or other issues, such as human health.

3.13.2.4 Alternative 4 – Waste-to-Energy Plant

Construction would include those activities for the construction of the WTE plant, access roads, and 13 to 14 miles of transmission lines. The WTE plant footprint is approximately 40 acres. The exact magnitude of direct impacts from construction activities would depend on the location of the WTE plant in relationship to the surface water features on Fort Bliss. Impacts to water resources would be similar for Alternatives 4A and 4B. The new WTE plant would increase the amount of impermeable surface by approximately 40 acres. Approximately 6 new miles of road would be constructed, further increasing the impermeable surface. Finally, 13 to 14 miles of new transmission line would be constructed. New impermeable surface from the transmission lines would be limited to the footers for the towers, and some new points of access for maintenance. Long-term impacts related to stormwater runoff would depend on the location and capacity of the stormwater system in the vicinity of the new construction and any new stormwater measures that would be constructed, but stormwater management facilities would be required. These impacts are anticipated to be less than significant.

Water would be used for boilers and plant cooling at the WTE plant. The heat from the incinerated waste would be used to flash the water to steam that would then power the turbines to produce electricity. Pollutants can build up in the water used in both the plant boiler and cooling systems (USEPA 2010, Office of Texas Comptroller 2012b). The steam and cooling systems would be largely self-contained, however, and the water is reused in the plants. Discharged water would be warmer than surface waters and would contain some pollutants, potentially harming aquatic life and reducing water quality. TCEQ regulates and permits these discharges (Office of Texas Comptroller 2012b). Surface water discharge would be subject to National Pollutant Discharge Elimination System permit requirements that would include temperature restrictions to prevent thermal water pollution. Water reinjected into the aquifers also requires permits under the Underground Injection Control program to ensure that the water quality of the aquifer would be protected as a drinking water source, and water would need to be treated prior to injection (USEPA 2010). It is more likely in the case of the Fort Bliss plant that water discharged from the WTE plant would be reinjected into the groundwater because no surface waters are located near the proposed footprint. The project would also be subject to Section 438 of EISA, which requires any development or redevelopment projects involving federal facilities with footprints larger than 5,000 square feet to use strategies to maintain or restore the predevelopment hydrology to the maximum extent technically feasible, meaning that stormwater management measures would be necessary.

The WTE plant would also require drilling a small well and either the construction of a reverse osmosis facility or piping water from the desalinization plant to provide the site with clean water for power generation. The plant would require a large amount of water for cooling needs, introducing a new water supply demand and potentially adversely impacting the installation's reduced water use goals. Impacts to groundwater could result from new well construction and groundwater withdrawals. Operation of the WTE plant would require an estimated 17 million to 19 million gallons of water per year (0.07 gallons/kWh of water,[12] assuming the system is online 85 percent of the time and dry-cooling (Davis 2013). For comparison, water consumption for operations of a natural gas power plant was estimated at 26.8 million to 205.5 million gallons of water per year (0.09 to 0.69 gallon/kWh) for a conventional plant and 5.9 million to 148.9 million gallons of water per year (0.02 to 0.5 gallon/kWh) for a combined cycle plant (Clark et al. 2011).[13] It was assumed that water used for the WTE plant under Alternative 4A would be treated brackish water, whereas under Alternative 4B, there is a higher potential for the use of potable water, which would be expected to result in a greater impact.

The establishment of the WTE plant and the accompanying increase in water use under Alternative 4A, primarily for cooling, would represent a less than significant impact to water demand. Impacts to water resources under Alternative 4B would have the potential to be significant if the water supply for the WTE plant were to entirely come from potable water. If the Army chooses to pursue construction and operation of a WTE facility, an assessment of supplemental NEPA requirements will be conducted upon receipt of a final design proposal. The appropriate level of additional project-specific NEPA, including evaluation of identified water supply, would then be completed prior to construction of the project.

3.13.2.5 Alternative 5 – Geothermal Energy Facility

Under Alternative 5, Fort Bliss would develop a geothermal energy facility (currently considering a maximum 20-MW plant) at the Davis Dome site and would construct less than 2 miles of electrical transmission line to supply energy to the nearby McGregor Base Camp Complex. In developing geothermal energy and hot water resources under Alternative 5, impacts to surface and groundwater sources from construction activities would be similar to those described for the construction of the 40-acre WTE plant and transmission line construction under Alternative 4, although the geothermal site would be half the size and less than 2 miles of transmission lines would be constructed. These impacts

[12] One kilowatt-hour of electricity is equivalent to the electricity consumed by a 50-watt light bulb left on for 20 hours.

[13] Clark et al. (2011) presented results in gallons/kWh. These results were converted to gallons per year assuming a 40-MW facility and an 85 percent capacity factor.

include increased potential for stormwater runoff and erosion that could adversely affect water quality in surface waters, although there are no surface waters in this area. The potential for pollution would be minimized through the use of sediment and erosion control management practices consistent with the Fort Bliss Construction SWPPP, and are anticipated to be less than significant. This facility would be large enough that it would be subject to Section 438 of EISA.

Long-term water quality impacts could occur to groundwater resources. Geothermal energy has the potential to impact groundwater levels and thus can impact local water supplies. Under Alternative 5, geothermal waters would be withdrawn, flashed to steam, and run through turbines to generate electricity, then reinjected into the geothermal well.

Geothermal water is hot and often salty and mineral rich because it is withdrawn from deep underground reservoirs. Steam from this water is used to turn turbines and generate electricity. The remaining water, along with the condensed steam, is then injected back into the geothermal reservoir to be reheated. The plant at Fort Bliss could be a binary, air-cooled closed system. Binary power plants have very low water demand. Geothermal water would be isolated during production, injected back into the geothermal reservoir, and separated from groundwater by thickly encased pipes, making the risk of water pollution much lower than with other types of electrical generation (Kagel et al. 2007).

Although the geothermal energy trade association claims there is no record of water quality issues associated with geothermal energy, because wells are much deeper than the drinking water aquifers (Kagel et al. 2007), there is a potential for geothermal brines, the wastewater from the geothermal plant, to impact groundwater. The most notable impacts on water resources from geothermal energy are associated with the management and disposal of wastewaters associated with geothermal energy generation (i.e., geothermal brines) (Heath 2002).

Geothermal chloride brines with sodium and calcium can contain different metals, including lead, iron, zinc, and other metals, that can contaminate groundwater. Contamination of shallower groundwater aquifers can also be caused by drilling fluids if a well casing fails. However, potential impacts can be mitigated through effluent treatment and reinjection into deep (as opposed to shallow) wells and through careful monitoring of the well casing (Heath 2002); therefore, impacts are anticipated to be less than significant.

The potential adverse impacts on both water quality and water demand from the possible CST facility under Alternative 5 would be similar to those described under Alternative 6, but scaled appropriately. Short-term impacts associated with erosion and runoff during construction would occur, and new impermeable surfaces would require stormwater management facilities because the project would be

subject to Section 438 of the EISA. Approximately 2,280 gallons per MW per year would be required to clean the arrays, and a well would be required.

Different geothermal technologies are available, and they have varying water demand. Fort Bliss is considering a binary air-cooled plant, which would reduce the water demand significantly compared to the other types of geothermal technologies. Binary plants are closed systems and have very little water demand. For operations of a 20-MW facility, water use would be estimated at approximately 744,000 to 1.5 million gallons per year (0.005 to 0.01 gallon/kWh)(Clark et al. 2011). For comparison, a 20-MW natural gas plant operating 85 percent of the time would be estimated to use between 13.4 million and 102.7 million gallons per year (0.09 and 0.69 gallon/kWh) for plant operation (Clark et al. 2011)[14]. However, the comparison ultimately depends on the type of geothermal technology selected.

Long-term benefits may arise from Alternative 5 if the water supply demand for the geothermal and CST facilities is less than that required to produce the equivalent electricity from existing power plants.

3.13.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Alternative 6 would involve the development of up to 300 acres for CSP technology with a dry-cooled steam turbine. Impacts to surface water and groundwater sources from construction activities under Alternative 6 would be similar to those described under Alternative 4, but they also would be dependent on the siting of the facilities in relationship to surface water features on Fort Bliss. Impacts would result from the construction of the CSP facility and from the construction of the transmission line on the installation; however, these impacts are anticipated to be less than significant impacts resulting from newly created impermeable surfaces.

The CSP array would require clean water to clean the mirrors every 2 to 4 weeks. The water demand would be approximately 29.7 million gallons of water per year (assuming a 50 MW array operating 85 percent of the time requiring 0.08 gallon/kWh for water makeup and cycling) (DOE 2001). Long-term benefits may arise from Alternative 6 if the water supply demand for the CSP facilities would be less than what it is to produce the equivalent electricity from existing power plants.

3.13.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria

[14] Clark et al. (2011) presented results in gallons/kWh for specific technologies. These results were converted to gallons per year assuming a 20-MW facility and an 85 percent capacity factor.

presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental Screening Criteria*. These sites would need to meet screening criteria and also would include construction of 15-kW to 20-MW natural gas-fired turbines, although they would only be used to supplement the other energy sources when they fluctuate. Impacts under Alternative 7 for the different energy technologies would be similar to those described under Alternatives 5 and 6. Wind turbines have little or no water demand related to plant operations. Therefore, long-term benefits to water resources would occur by reducing the amount of electricity used on Fort Bliss and the surrounding community that is produced by power plants that require water supply.

Additional adverse impacts would arise from the construction and operation of a natural gas-fired power plant, not only from the construction of the facility but also from the water supply demand for the facility for cooling purposes. Long-term benefits may arise under Alternative 7 if the water supply demand for the facilities would be less than what it is to produce the equivalent electricity from existing power plants.

3.13.2.8 Alternatives Combined

This scenario would combine the aggressive conservation policies, implement the water reclamation system, and implement the many renewable energy options, including the WTE plant, CSP arrays, and a small geothermal facility for the McGregor Base Camp Complex, in addition to taking advantage of opportunities for additional development of renewable energy technologies across the installation. Implementation of the conservation policies and reclaimed water system would result in benefits to water supply by reducing demand, as would implementation of wind energy and the WTE plant. The CSP arrays and geothermal technologies would also likely result in benefits compared to water demand by the natural-gas fired plants currently serving Fort Bliss, but the geothermal power would be comparable or slightly higher in water demand per unit of energy.

Short-term impacts on water quality associated with erosion and runoff would result from construction activities. The short-term impacts would be mitigated by sediment and erosion control practices. Long-term water quality impacts associated with increased stormwater runoff resulting from new impermeable surfaces would be subject to stormwater management practices.

Other water quality impacts would be related to discharge of any water from the plants that is not reused; most of these technologies utilize steam to run the turbines, and waste water from such processes is warm and can pick up pollutants in the steam process.

3.14 Transportation and Traffic

3.14.1 Affected Environment

3.14.1.1 Transportation System

The affected environment would include the ground transportation systems within the region of Fort Bliss. The ROI for the ground transportation systems within East and West Bliss is El Paso County, Texas. The ROI for the ground transportation systems within the FBTC consists of the STA, Doña Ana Range–NTA, and McGregor Range.

Several highways provide regional access to El Paso and Fort Bliss (Figure 3-8). The major east-west access is provided by Interstate 10, which runs through downtown El Paso and passes just south of East and West Bliss. Interstate 10 is the most heavily traveled roadway in El Paso and connects the region to western and central Texas to the east, and southern New Mexico and Arizona to the west. The segment on Interstate 10 between U.S. 54 and Loop 375 ranks number 68 in the 2011 Most Congested Roadways in Texas. Interstate 25 is the major northern access route to the El Paso region and is available by following Interstate 10 approximately 44 miles northwest to Las Cruces, New Mexico. U.S. 54 (locally referred to as the Patriot Freeway), a major non-Interstate freeway, also provides northern access to Alamogordo, New Mexico. Another key inter-regional roadway is Montana Avenue (U.S. 62/180), which is located immediately south of Fort Bliss and provides access to locations east of El Paso.

Loop 375, also an important regional traffic corridor, connects the northeast and eastern portions of the city and helps to reduce traffic congestion along U.S. 54. Loop 375 crosses the Fort Bliss installation between Montana Avenue and U.S. 54. Under and overpasses have been constructed to allow military vehicles and equipment to pass under the roadway, preventing through-traffic interference with military operations. West of U.S. 54, Loop 375 becomes Woodrow Bean Trans Mountain Drive, which connects to Interstate 10 northwest of El Paso and has the advantage of few cross streets, allowing traffic to be carried at high speeds. Spur 601 has been constructed to provide a 7.4-mile mobility connection between U.S. 54 on the west and Loop 375 on the east. The alignment follows the existing Fred Wilson Avenue from U.S. 54 to the Airport Road/Sergeant Major Boulevard intersection, progresses eastward through an undeveloped area north of and along Founders/Walter Jones Boulevards, traverses the property lines between El Paso International Airport, Biggs AAF and Fort Bliss Military Reservation and terminates at Loop 375.

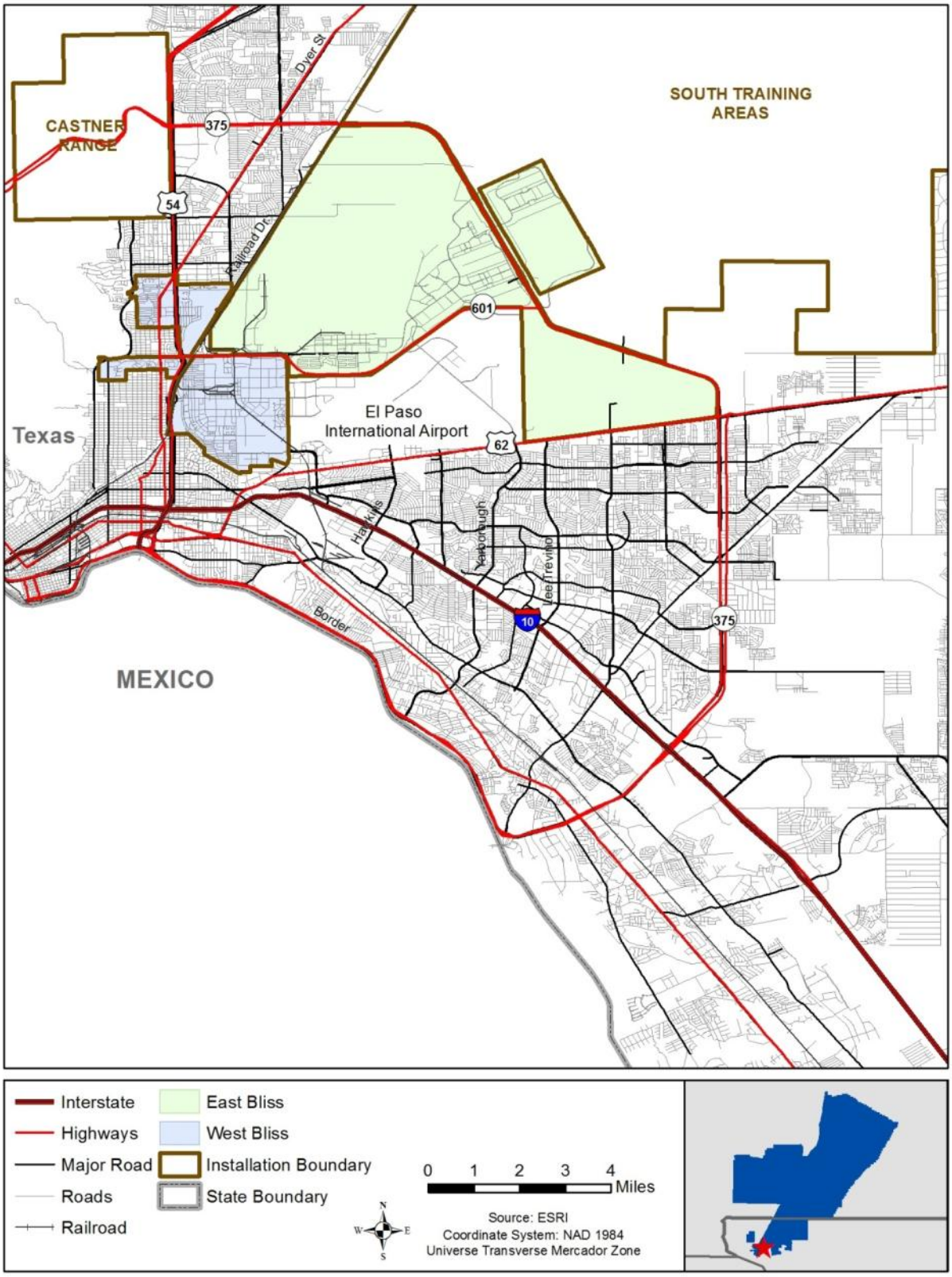


Figure 3-8. Regional Roadway Network

East and West Bliss are surrounded by major arterial city streets. The north boundary is Fred Wilson Avenue and the east boundary is Airport Road. U.S. 54 forms the west boundary and Montana Avenue serves as the south boundary. Other major roadways in the area of the installation are Railroad Drive and Dyer Street.

Access to East and West Bliss is provided by 17 Access Control Points. Nine of the gates provide access to West Bliss: Cassidy Gate, Chaffee Gate, Jeb Stuart Gate, Marshall Gate, Pershing Gate, Remagen Gate, Robert E. Lee Gate, Sheridan Gate, and Jeb Stuart South. Five gates provide access to East Bliss: Biggs Gate, Global Reach Gate, North Sargent Major Boulevard Gate, General Harmon Gate (Constitution), and Old Ironsides Gate. Two gates provide access to WBAMC: Fred Wilson Gate and Alabama Gate. Two gates also provide access to the IBCT complex: IBCT South and NE IBCT. Depending on installation-construction activities or operational needs, some of these gates are closed from time to time. At this time, entry onto the installation requires photo identification. The general public may use the Fort Bliss movie theater and shopping district. At elevated threat levels day passes may be issued at Robert E. Lee and Cassidy Gates (open 24/7). Other gates such as Pershing and Chafee are only open certain hours. Gate hours and access procedures are subject to change at any time. All cars are subject to random searches.

U.S. 54 runs along the northwest boundary of the STA, and the southernmost boundary is U.S. 62/180 (Montana Avenue). Loop 375 is the only major north-south roadway travel within the western portion of STA. None of the remaining areas of STA are near any major roadways.

Doña Ana Range is located west of U.S. 54 and is provided access from Fort Bliss by Martin Luther King Highway (Ranch Road 3255) in Texas, and War Highway (NM 213) in New Mexico, which runs along the Franklin and Organ Mountains on the eastern boundary of the range. War Highway (NM 213) is closed occasionally for safety reasons during certain military operations. U.S. 54 connects El Paso, Texas, with Alamogordo, New Mexico, and is on the western border of the McGregor Range. New Mexico Highway 506, an east-west arterial, crosses the northern portion of McGregor. It provides access to McGregor Range from the west via U.S. 54 and travels east, intersecting County Road FO52 and exiting the range to the northeast. New Mexico Highway 506 is a semi-improved road (i.e. portions have been paved) maintained by Otero County and provides access to several communities in the area. BLM maintains the road network on grazing units 1 through 15. The Army maintains the remainder of the road network on the McGregor Range. These intra-range roads primarily consist of dirt roads that provide access to different parts of the range.

Military convoy traffic between West Bliss and the FBTC on U.S. 54 is limited to wheeled vehicles. Tracked vehicles are generally transported to and from the FBTC by Heavy Equipment Tactical Trucks or transit through the training areas on tank trails.

3.14.1.2 Annual Average Daily Traffic Volumes

Annual Average Daily Traffic (AADT) volumes are available from the El Paso DOT website. The most recent AADT volumes on Montana Avenue and its cross streets are provided in Table 3-36.

Table 3-36. Annual Average Daily Traffic Volumes on Montana Avenue and Loop 375, and Cross Streets

Intersection	Montana Ave	Cross Streets	Month-Year
Montana Avenue			
Montana Avenue and Piedras Street	12,283	12,408	Oct-11
Montana Avenue and Raynor Street	13,127	3,034	Oct-11
Montana Avenue and Raynolds Street	19,757	5,671	Nov-10
Montana Avenue and Airport Road	6,318	35,285	Nov-11
Montana Avenue and Airway Boulevard	29,582	37,679	Nov-11
Montana Avenue and Rutherglen Street	50,771	1,322	Feb-11
Montana Avenue and Wedgewood Drive	48,427	4,096	Feb-11
Montana Avenue and Yarbrough Drive	54,441	20,011	Feb-11
Montana Avenue and Saul Kleinfeld Drive	36,215	5,112	Feb-11
Montana Avenue and Tierra Este Road[a]	22,090	2,443	Feb-06
Montana Avenue and Turf Road	29,027	667	Dec-10
Montana Avenue and Rich Beem Boulevard	24,102	5,597	Sep-10
Loop 375			
Loop 375 North and Spur 601	2,206	1,000	Jun-09
Loop 375 South and Spur 601	975	6,076	Jun-09

Source: El Paso DOT (2012)

Note: DOT = Department of Transportation

[a] This intersection is the truck route under Alternative 4.

Average daily traffic volumes for each access control point on both East and West Bliss are also available for January 2011from the Fort Bliss Department of Emergency Services and summarized in Table 3-37.

Table 3-37. 2011 Average Daily Traffic Volumes by Access Control Point

West Bliss			East Bliss	
Access control point location	Daily		Access control point location	Daily
Cassidy	8,735		Biggs Main	5,601
Sheridan	3,335		Global Reach	6,417
Pershing	1,629		Constitution	5,339
Robert E Lee	4,623		IBCT South	1,237
Jeb Stuart	937		NE IBCT	1,284
Remagen	2,714		1 AD North Construction	2,345
Chaffee	2,628		Hann Road Bridge	6,042
WBAMC (Alabama)	1,642		Carrington Road Bridge	N/A
WBAMC (Wilson)	3,870			
Total	30,113		Total	28,265

Source: Jacobs/Huitt-Zollars (2011)

Notes: IBCT = Infantry Brigade Combat Team, WBAM = William Beaumont Army Medical Center

3.14.1.3 Intersection Capacity Analysis

A total of six intersections (four on Montana Avenue and two on Spur 601) were selected for traffic analysis based upon their proximity to the proposed WTE plant under Alternative 4, roadway traffic volumes, and potential effect of development-generated traffic on each location. The key analysis locations within the project study area are as follows:

- Montana Avenue and Yarbrough/Global Reach Drives - signalized
- Montana Avenue and Loop 375 South - signalized
- Montana Avenue and Loop 375 North - signalized
- Montana Avenue and Conceptual Truck Route (Future Condition) – unsignalized
- Spur 601 and Loop 375 South – signalized
- Spur 601 and Loop 375 North - signalized

To estimate how well the existing infrastructure accommodates the current and future traffic demand, a traffic analysis was conducted. The capacity analysis methodology is based on the concepts and procedures in the Highway Capacity Manual (TRB, 2000). The Synchro software (Version 6) was used to model the intersections within the study area. The weekday peak hour data were analyzed to determine existing level of service (LOS) at intersections under various traffic flow conditions.

The primary performance indicator for intersections is level of service (LOS). LOS is a qualitative measure that describes operational conditions and provides an index to the quality of traffic flow. LOS is defined in letter designations from A (no congestion on the road) to F (roadways that are overcapacity). LOS A represents the best operating condition, LOS C describes a stable flow condition, and LOS F represents the worst operating condition and is generally considered "unacceptable" to most drivers. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, the LOS of a facility may vary greatly, depending on the time of day, day of week, or period of year. LOS for signalized and unsignalized intersections is defined in terms of average control delay, which is a measure of driver discomfort, frustration, fuel consumption, and lost travel time (see Table 3-38). The average control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

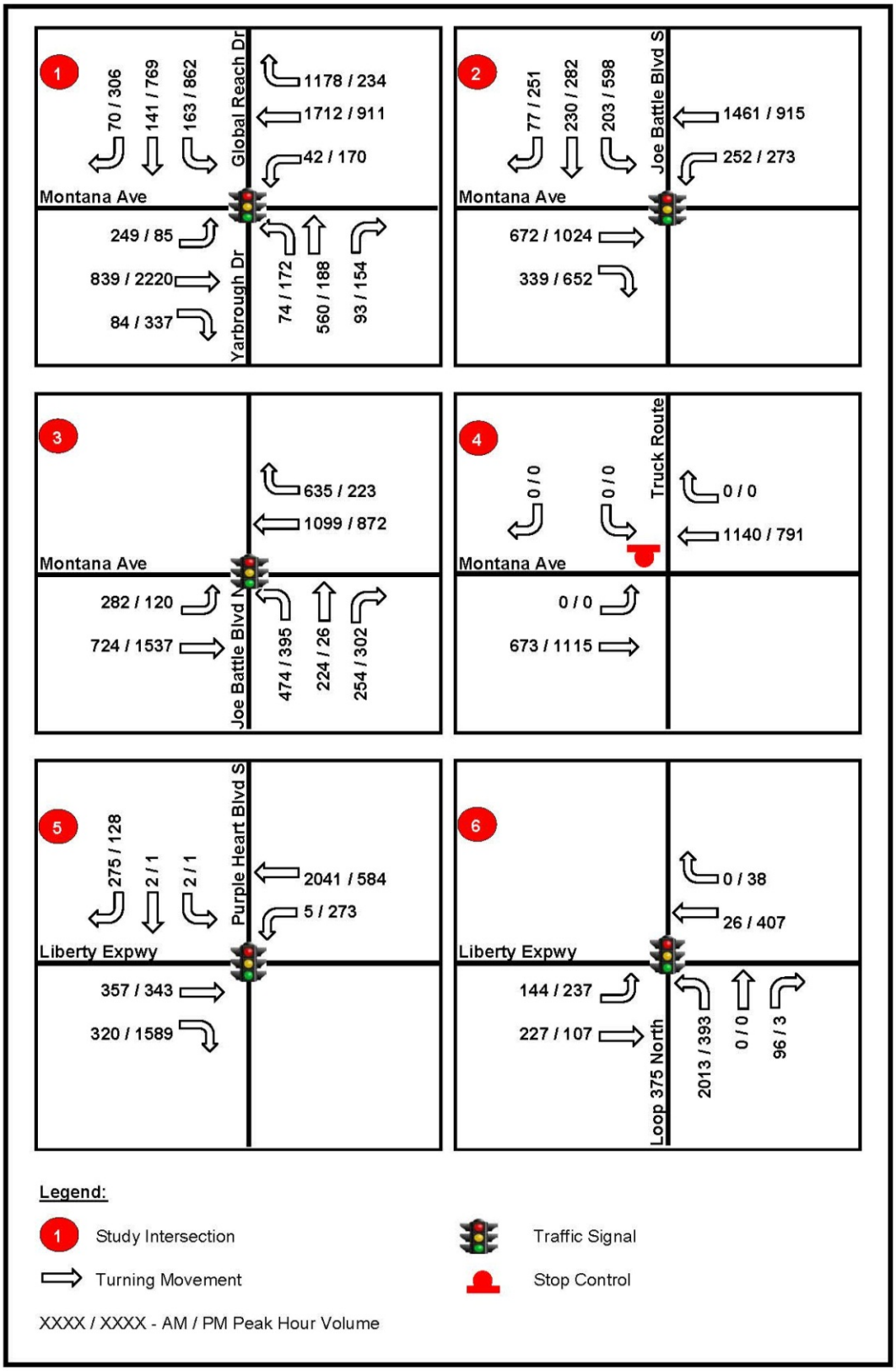
Table 3-38. Intersection Level of Service Criteria

Level of Service	Average Control Delay (seconds/vehicle)	
	Unsignalized Intersection	Signalized Intersection
A	0 to 10	≤10
B	>10 to 15	>10 to 20
C	>15 to 25	>20 to 35
D	>25 to 35	>35 to 55
E	>35 to 50	>55 to 80
F	>50	>80

Source: TRB(2000)

The existing traffic volumes at the five signalized intersections are based on traffic volume counts collected as part of the Traffic Impact Analysis (ICRC 2013). Since the Montana Avenue and Conceptual Truck Route intersection was not analyzed as part of the TIA Traffic Study, traffic volumes for this intersection were estimated using intersection turning movement volumes at the Montana Avenue and Joe Battle Boulevard intersections and existing AADT volumes from the El Paso DOT. The 2012 traffic volumes at the six analyzed intersections are provided in Figure 3-9.

Detailed capacity analyses were then conducted for the three signalized intersections in the study area using Synchro 7 traffic analysis software. The existing LOS for each intersection is provided in Table 3-39. Based upon these results, all intersections operate at LOS D or better during both the AM and PM peak hours except two intersections. The Montana Avenue and Yarbrough/Global Reach Drives intersection operates at LOS F during both the AM and PM peak hours. The Spur 601 and Loop 375 North intersection operates at LOS F during the AM peak hour.



Source: The Louis Berger Group, Inc. (2012)

Figure 3-9. Traffic Volumes at Key Intersections—Existing Condition

Table 3-39. LOS for Key Intersections—Existing Conditions

Intersection	AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS
Montana Avenue and Yarbrough/Global Reach Drives	94.0	F	107.4	F
Montana Avenue and Loop 375 South	15.0	B	36.4	D
Montana Avenue and Loop 375 North	18.8	B	16.5	B
Montana Avenue and Conceptual Truck Route (unsignalized)	NA	NA	NA	NA
Spur 601 and Loop 375 South	26.9	C	8.5	A
Spur 601 and Loop 375 North	110.3	F	12.6	B

Source: TIA Traffic Study (2012)

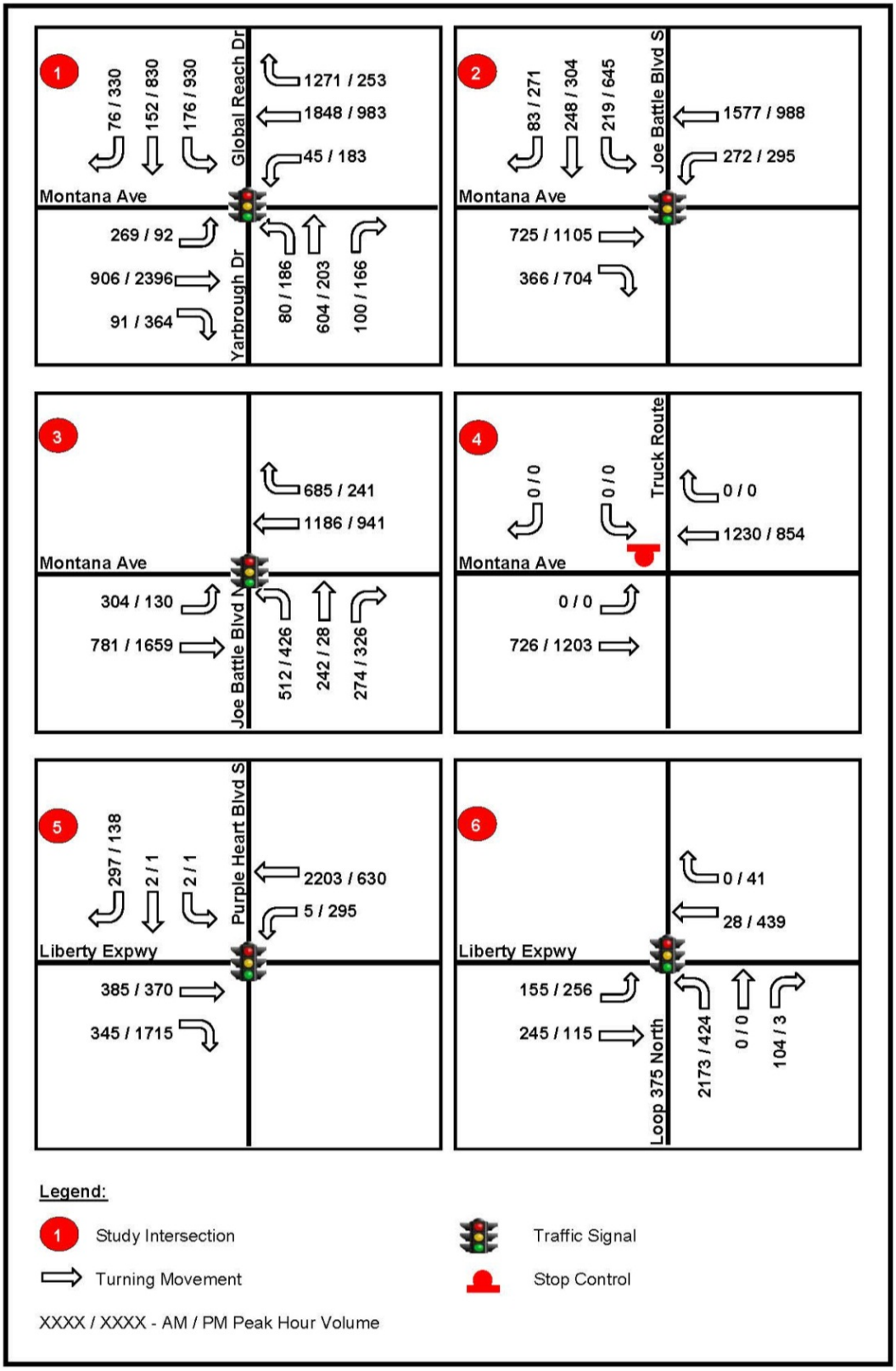
3.14.2 Environmental Consequences

Table 3-1 includes significance thresholds for transportation and traffic impacts.

3.14.2.1 Alternative 1 – No Action

Impacts of the No Action Alternative are based on regional background traffic growth. Future scenarios needed to address city's own growth and the increase in transportation needs, as a result of the proposed developments. Based on the TIA Traffic Study, the compounded annual growth rate for 2010–2020 for El Paso County is 1.11 percent for employment and 1.28 percent for population. For a conservative analysis, 1.28 percent was utilized for the traffic background growth for this study. The projected traffic volumes under the No Action Alternative are provided in Figure 3-10. Infrastructure projected by the City was included in the 2018 condition: 1) street widening of Montana Avenue by adding one lane in each direction and 2) George Dieter and Loop 375 overpass, 3) extension of Lee Trevino, 4) extension of Liberty Expressway (built).

The No Action Alternative was used as the baseline condition to make comparison of impacts between the proposed alternatives. As shown in Table 3-40, all analyzed intersections would operate at acceptable LOS during both the AM and PM peak hours except three intersections. The Montana Avenue and Yarbrough/Global Reach Drives intersection would continue to operate at LOS F during both the AM and PM peak hours. The Spur 601 and Loop 375 North intersection also would continue to operate at LOS F during the AM peak hour. The Spur 601 and Loop 375 South intersection would change from LOS D under the Existing Condition to LOS E under the No Action Alternative.



Source: The Louis Berger Group, Inc. (2012)

Figure 3-10. Traffic Volumes at Key Intersections—No Action Alternative

Table 3-40. LOS for Key Intersections—No Action Alternative

Intersection	AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS
Montana Avenue and Yarbrough/Global Reach Drives	115.7	F	135.3	F
Montana Avenue and Loop 375 South	16.2	B	50.3	D
Montana Avenue and Loop 375 North	20.5	C	18.7	B
Montana Avenue and Conceptual Truck Route (unsignalized)	NA	NA	NA	NA
Spur 601 and Loop 375 South	8.3	A	8.5	A
Spur 601 and Loop 375 North	148.9	F	13.0	B

Source: The Louis Berger Group, Inc.(2012)

Under the No Action Alternative, Fort Bliss would not pursue additional Net Zero initiatives to accelerate reduction of energy, water, and waste consumption beyond those policies and procedures that are currently in place. Therefore, no transportation impacts are anticipated under the No Action Alternative.

3.14.2.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would continue to implement policies, procedures and BMPs to maximize resource re-use, limit waste generation, increase resource re-purposing, and increase water and energy use efficiencies in new and existing facilities. No impacts to intersections and roadway operations would occur as a result of implementation of Alternative 2.

3.14.2.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, Fort Bliss would pursue the construction and use of a water reclamation pipeline to provide Fort Bliss with reclaimed water for installation secondary uses. The purple pipe would connect to a conduit pipe from the City of El Paso's WWTP near the Pershing Gate and water would be distributed.

Traffic generated by the estimated 20 construction staff would not alter traffic conditions on Fort Bliss and public roadways. Temporary closure of the Pershing Gate and along the pipeline alignment would be required during the constructions of the pipeline. Pershing Gate is currently open limited hours, therefore closure of this gate during construction would not have a significant impact on gate operations of the installation. Temporary closures along the pipeline alignment would occur on a small section of the internal roadways within the installation including Sheridan Road, Pershing Road, Pleasonton Road, JEB Stuart Road, Cassidy Road, and Hann Road. Road closures or detours would create short-term traffic delays on East and West Bliss. Thus, less than significant temporary adverse impacts would be anticipated and would end with the construction phase at each site.

Under Alternative 3, no new employees or staff would be added on East and West Bliss as a result of the purple pipe. Therefore, no impacts to intersections and roadway operations would occur.

3.14.2.4 Alternative 4 – Waste-to-Energy Plant

Alternative 4A – STA Site

Under Alternative 4A, Fort Bliss would pursue the construction and operation of a WTE plant to reduce landfill waste and provide the installation with a consistent source of alternative power. The WTE plant would be sited in the southern portion of the installation in the STA. It is estimated that a total of 100 full-time operations employees would be working at the WTE plant, most of which would be from the local community. The WTE plant would receive Fort Bliss' waste streams and waste from the city of El Paso. Approximately 1,100 tons of MSW would be transported from the curbside to the WTE plant each day by a maximum of 100 truck deliveries. Ash from the WTE plant would be delivered to the greater El Paso landfill in Clint, Texas, by approximately 30 truck deliveries each day. Additional roads and truck holding areas would be developed to accommodate the increased truck traffic at the south end of Fort Bliss leading to the STA from Montana Avenue.

Construction Traffic

Construction under Alternative 4A is expected to result in surface disruption and substantial construction worker and truck traffic for approximately 2 years. The daily construction-related truck traffic is currently unknown. A total of 715 construction workers (1,430 daily vehicle trips) is estimated for the construction of the WTE plant and associated infrastructure. The shifts for the 715 construction workers are unknown. However, it is anticipated that a certain amount of extended hours, nighttime work, and weekend construction would likely be required. Thus, the 715 construction workers would be spread into the typical day shift (7:00 a.m. to 3:30 p.m.), nighttime shift (3:30 p.m. to 11:00 p.m.), and weekend shift (7:00 a.m. to 3:00 p.m.). It is assumed that construction worker vehicles would arrive at the site before each shift and depart after the shift. The morning peak of the construction worker traffic would occur before 7:00 a.m., which is before the peak hour of the adjacent streets. It is expected that the traffic impact during the morning peak hour during the construction period would be less than significant and short term.

Under Alternative 4A, the peak of the construction worker trips would occur in the afternoon between 3:00 p.m. and 4:00 p.m. when workers from the day shift would leave the site and workers for the night shift would enter the site. Since the median on Montana Avenue at the proposed conceptual trash route would remain closed as the existing condition, construction workers could only leave the site to Montana Avenue via the dirt road on the proposed conceptual trash route. It is anticipated that construction workers

would enter and leave the site from Montana Avenue at Flager Street, which is less than 2,000 feet east of the proposed conceptual trash route. Access to the site could also be via the Spur 601 and Loop 375 (North and South) intersections.

The capacity analysis results for the construction condition under Alternative 4A during the PM peak hour are presented in Table 3-41. The Montana Avenue and Yarbrough/Global Reach Drives intersection would continue to operate at LOS F with an increase of 1.4 seconds of delay during the PM peak hour. The slight increase in delay would have less than significant impact at this intersection as a result of the construction of Alternative 4A. However, the Montana Avenue and Loop 375 south intersection would have significant traffic impacts during the construction of Alternative 4A. This intersection would change from LOS D with 50.3 seconds of delay to LOS E with 58.9 seconds of delay.

For the construction condition under Alternative 4A, the traffic impact during the morning peak hour would be less than significant and short term, and the traffic impact during the PM peak hour would be significant but mitigable and short term.

Table 3-41. LOS for Key Intersections—Construction Conditions for PM Peak Hour

Intersection	No Action Alternative		Alternative 4A Construction Condition	
	Delay	LOS	Delay	LOS
PM Peak Hour				
Montana Avenue and Yarbrough/Global Reach Drives	135.3	F	136.7	F
Montana Avenue and Loop 375 south	50.3	D	58.9	E
Montana Avenue and Loop 375 north	18.7	B	27.0	C
Montana Avenue and conceptual truck route (dirt road and unsignalized)	NA	NA	20.7	C
Spur 601 and Loop 375 south	8.5	A	9.4	A
Spur 601 and Loop 375 north	13.0	B	14.2	B

Source: The Louis Berger Group, Inc. (2012)

Trip Generation Projections

Projections of the peak-hour trips generated by the proposed facilities are typically performed based on the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 8th Edition. However, the WTE land use category proposed under Alternative 4 is not included in the ITE Trip Generation Manual. Therefore, the following trip generation assumptions were used to estimate the peak hour trips generated by the new employee and delivery truck trips to the WTE plant.

For the employee trips, ITE Land Use Code 710 (General Office Building) was used to estimate projections for the 100 new employees at the WTE plant. The ITE trip generation projections were

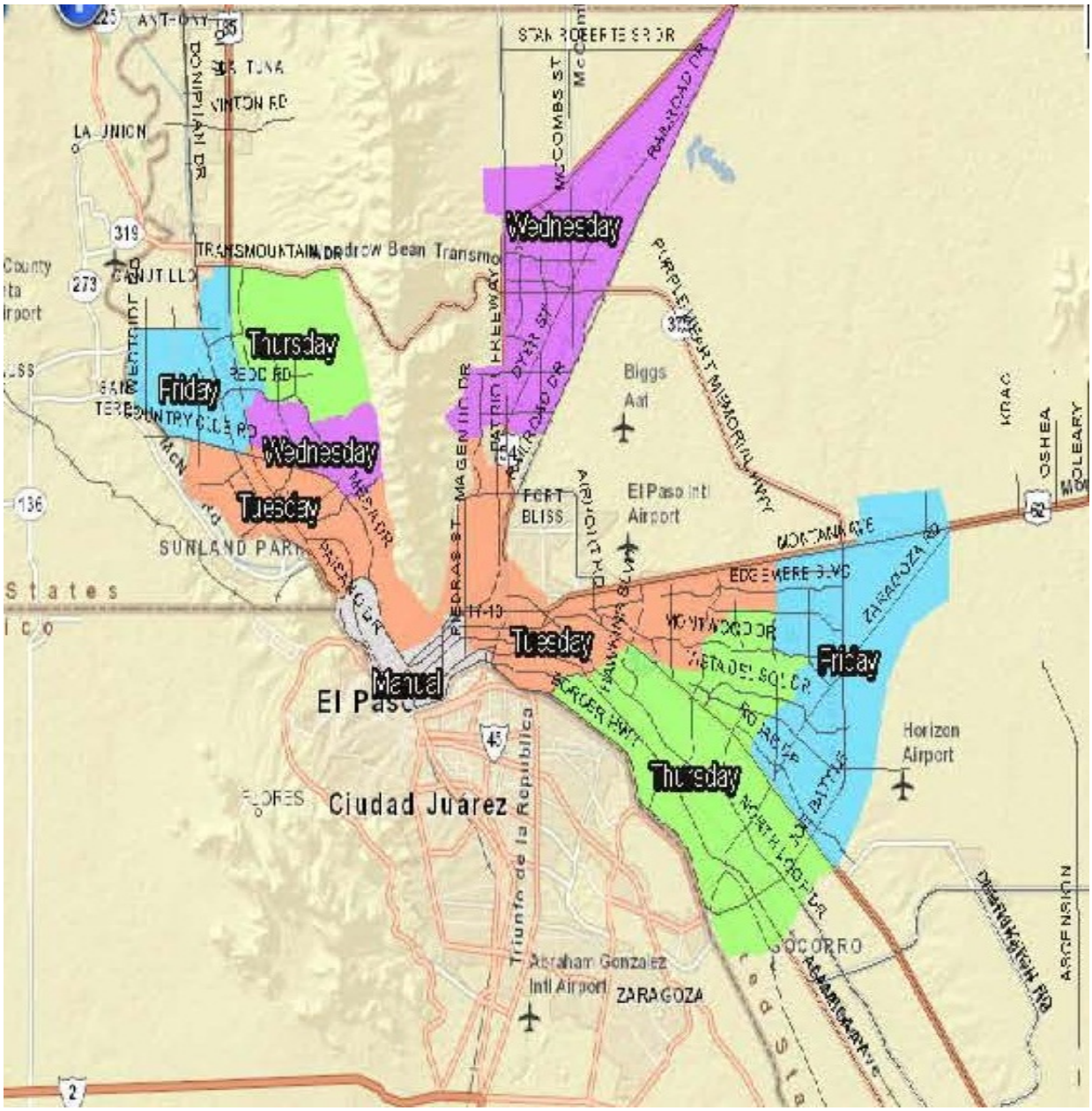
developed for the typical weekday AM and PM peak hours. Since the ITE Manual does not provide trip projections for the midday peak hour, midday trip estimates were assumed to be 60 percent of the AM total trips with a 50/50 distribution. Using the trip generation procedure outlined by the ITE, the net increase in employee vehicles during the peak hours projected for the WTE are summarized in Table 3-42. Alternative 4 would generate 48, 28, and 46 employee vehicle trips during the AM, midday, and PM peak hours respectively.

Table 3-42. Net Increase in Vehicle Trips (Passenger Car Equivalent) – AM, Midday, and PM Peak Hours

Type of Trips	Land Use	Daily Passenger Car Equivalents	AM Peak Hour			Midday Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
100 new employees	General office building[a]	332	42	6	48	14	14	28	8	38	46
300 truck deliveries	NA	1,200	28	28	56	28	28	56	0	0	0
Total		**1,532**	**70**	**34**	**104**	**42**	**42**	**84**	**8**	**38**	**46**

[a] Institute of Transportation Engineers' Land Use Code 710 (General Office Building)

For a conservative analysis, a total of 130 daily truck deliveries (130 trucks in and 130 trucks out) were used to project truck trips entering and exiting the WTE plant. 100 of these daily truck deliveries would pick up curbside trash and deliver to WTE plant and return back to the curbside or the garage/facility where they are parked. The remaining 30 daily truck deliveries would transport ash between the WTE plant and the Greater El Paso Landfill in Clint. Currently, residential garbage and recycling waste is collected once per week on Tuesday through Friday and the collection schedule by communities or areas are presented in Figure 3-11. The solid waste collections begin at 5:00 a.m. in the morning and deliver to the existing Greater El Paso Landfill (Clint, Texas) located approximately 26 miles southeast of downtown El Paso. The Greater El Paso Landfill opens from Monday to Saturday from 7:00 a.m. to 4:00 p.m. (the landfill has to close by 4:00 p.m. by state law). Under Alternative 4, the collection of solid waste would be delivered to the WTE facility and ash would be transported to the existing landfill. It is expected the solid waste collection schedule would remain the same or similar to the existing condition. Therefore, it is assumed that the 130 daily truck deliveries would be evenly spread throughout over a 9-hour work day.



Source: City of El Paso (2012)

Figure 3-11. City of El Paso Trash/Recyclables Collection Schedule

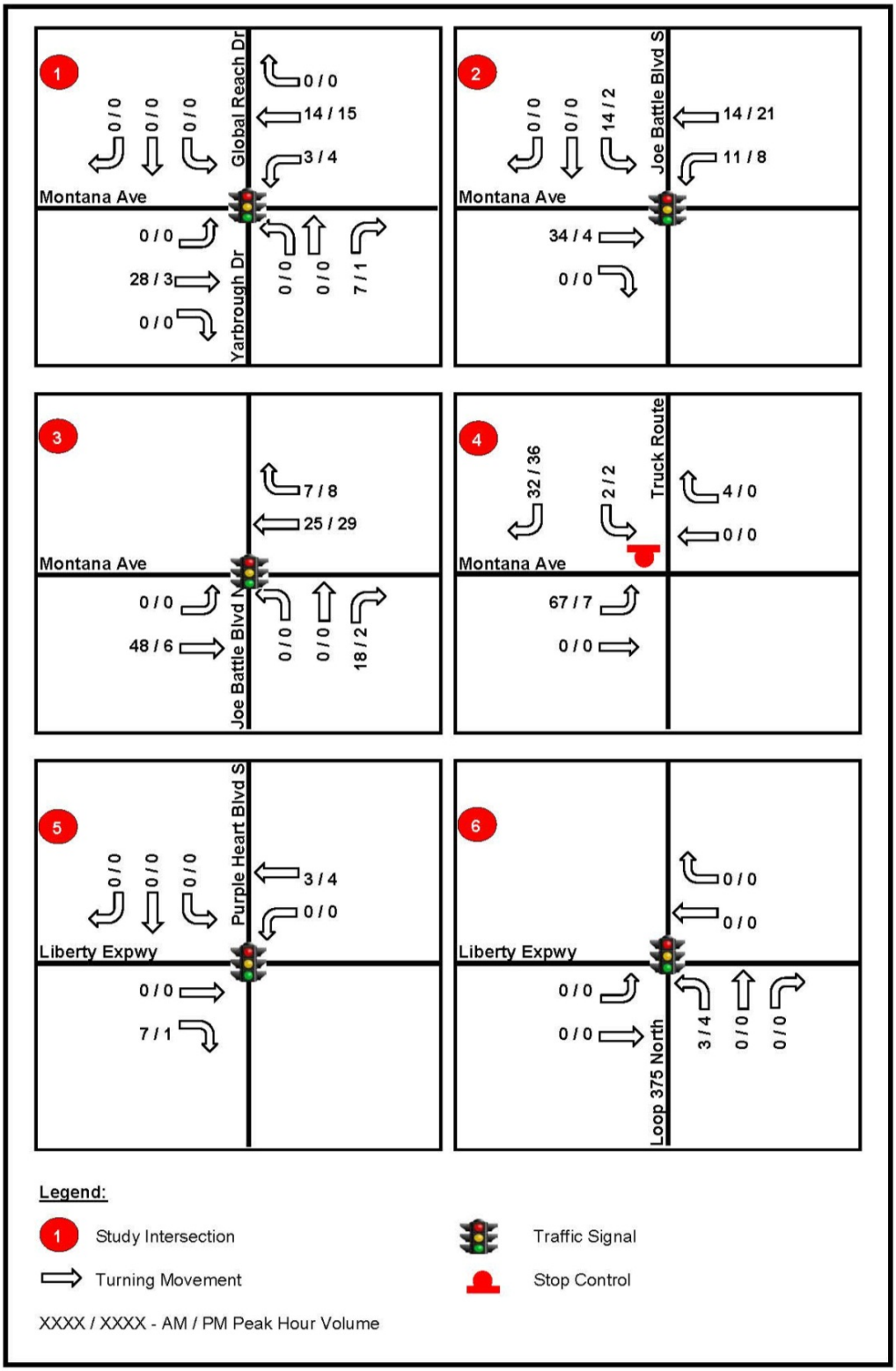
Therefore, a total of 28 truck trips (14 entering and 14 exiting) would be required each hour over a 9-hour work day. Since the impact of trucks on traffic operations is different than that of passenger cars, it is a common practice to convert the number of trucks to passenger car equivalent (PCE). Using a PCE factor of 2 for each truck, the estimated number of truck trips generated by the WTE plant is 56 PCE during each hour of work day with 28 PCE entering and 28 PCE exiting the site (Table 3-42). Since the solid waste collection would end before 4:00 p.m., these truck trips were not added to the PM peak hour of the adjacent streets.

As presented in Table 3-42, the combined employee and delivery truck trips for the WTE under Alternative 4 would generate 104, 84, and 46 PCEs during the AM, midday, and PM peak hours respectively.

Trip Distribution

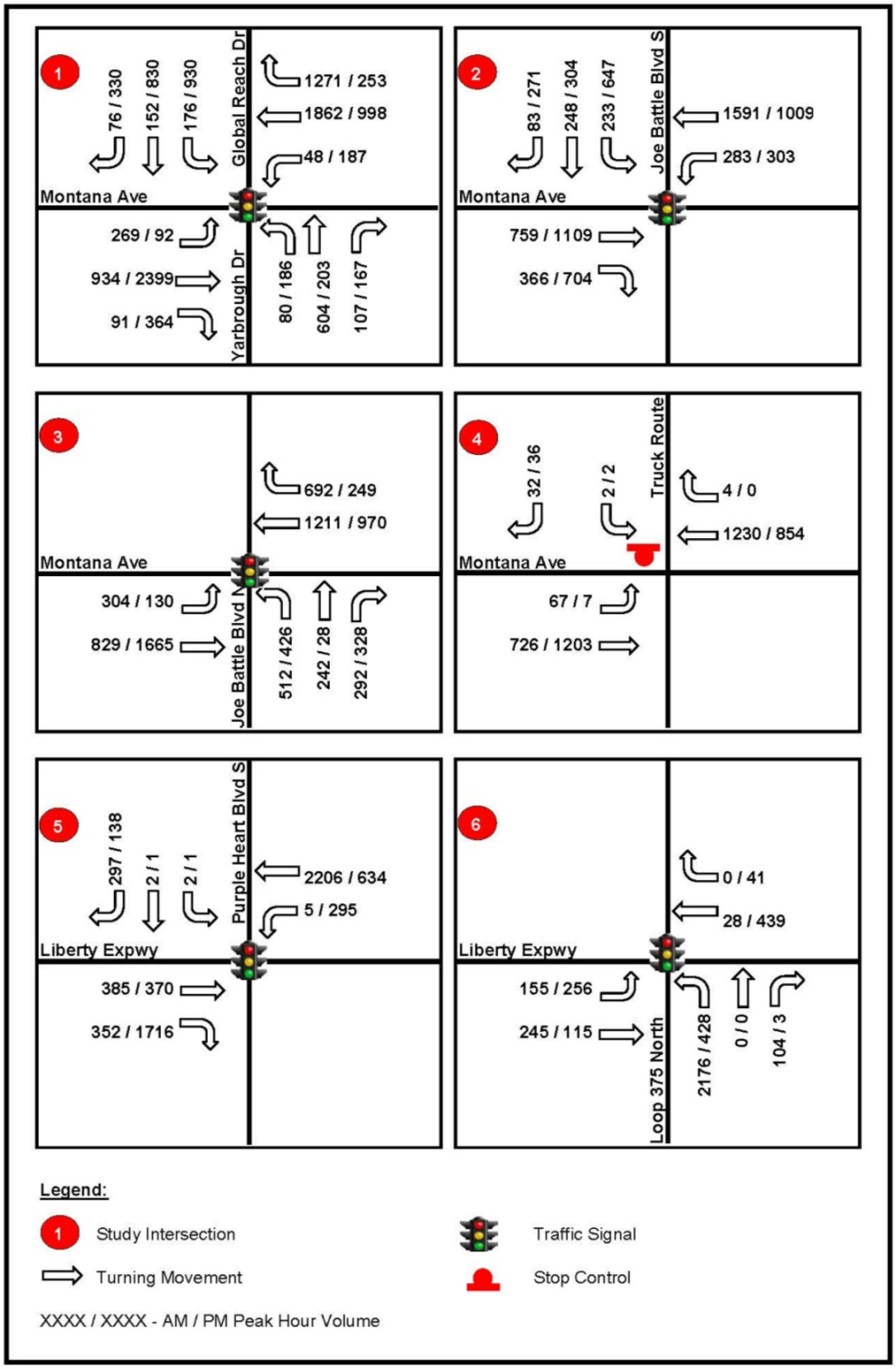
The distribution of the site generated traffic entering and exiting the site was developed based on the locations of regional and principal roadways and the proposed conceptual trash truck route. The conceptual trash truck route would be on an existing dirt road west of Flagger Street leading to the STA from Montana Avenue. For a conservative analysis, it is assumed that this route would also be the main access for other vehicles to access to the WTE. Thus, all employee, visitor, and truck traffic generated by the WTE would be assigned to use this route.

As shown on Figure 3-11, truck routes transferring solid waste from the city to the WTE would be different on each day. For analysis purpose, a typical weekday truck route is assumed based on the collection schedule. It is expected that the majority of truck trips originate from the city of El Paso via Montana Avenue from the west, Loop 375 from the north and south, and only a small portion of the trips would be from the west via Montana Avenue. Truck trips transporting ash between the WTE plant and the landfill would all travel via Loop 375 from/to the south to I-10, then the Greater El Paso Landfill at Clint. The projected net increase in traffic (PCEs) for the six analyzed intersections under Alternative 4 is provided in Figure 3-12. These trips were added to the No Action Alternative to develop traffic volumes under Alternative 4A and presented in Figure 3-13.



Source: The Louis Berger Group, Inc. (2012)

Figure 3-12. Trip Generation and Assignments—Alternative 4A



Source: The Louis Berger Group, Inc. (2012)

Figure 3-13. Traffic Volumes at Key Intersections—Alternative 4A

Traffic Analysis

Detailed capacity analysis was conducted for the six key intersections along Montana Avenue, Loop 375, and Spur 601. As shown in Table 3-43, all five existing signalized intersections analyzed would continue to operate at the same LOS as the No Action Alternative with negligible increase in delays under Alternative 4. Therefore, negligible traffic impacts are expected at these signalized intersections as a result of increase in truck traffic under Alternative 4A. The intersection at Montana Avenue and the conceptual trash truck route is a three-legged unsignalized intersection with westbound right turn into the conceptual truck route and southbound right turn out to westbound Montana Avenue. The median on Montana Avenue restricted movements to/from eastbound Montana Avenue. To accommodate the increase in truck activities under Alternative 4A, the median at this intersection should be removed to allow access to/from eastbound Montana Avenue. It is anticipated that traffic demand on the conceptual trash truck route at this intersection does not meet the signal warrant criteria to install traffic signal at this intersection. As shown in Table 3-10, the new unsignalized intersection at Montana Avenue and the conceptual trash truck route would operate at acceptable LOS C during both AM and PM peak hours.

In summary, the proposed WTE facilities for Alternative 4A would have minor traffic impacts to Fort Bliss and public roadways under the operational condition.

Table 3-43. LOS for Key Intersections—Alternative 4A

Intersection	No Action Alternative		Alternative 4	
	Delay	LOS	Delay	LOS
AM Peak Hour				
Montana Avenue and Yarbrough/Global Reach Drives	115.7	F	115.0	F
Montana Avenue and Loop 375 south	16.2	B	16.6	B
Montana Avenue and Loop 375 north	20.5	C	20.8	C
Montana Avenue and conceptual truck route (unsignalized)	NA	NA	24.6	C
Spur 601 and Loop 375 south	35.9	D	35.9	D
Spur 601 and Loop 375 north	148.9	F	149.5	F
PM Peak Hour				
Montana Avenue and Yarbrough/Global Reach Drives	135.3	F	135.9	F
Montana Avenue and Loop 375 south	50.3	D	51.1	D
Montana Avenue and Loop 375 north	18.7	B	19.1	B
Montana Avenue and conceptual truck route (unsignalized)	NA	NA	17.7	C
Spur 601 and Loop 375 south	8.5	A	8.5	A
Spur 601 and Loop 375 north	13.0	B	13.0	B

Source: The Louis Berger Group, Inc. (2012)

Alternative 4B – Railroad Drive Site

Although the WTE plant facility and operations assumptions would be the same under Alternative 4B, traffic impacts resulting from employee and truck traffic have not been assessed at this time as truck routes under Alterative 4B have not been identified. Most of the site traffic would likely need to use the two intersections at Loop 375 and Railroad Drive. Although impacts are anticipated to be similar to Alternative 4A, future NEPA analysis may be required once truck routes are identified.

3.14.2.5 Alternative 5 – Geothermal Energy Facility

Alternative 5 would construct and operate a geothermal facility within some portion of two 20-acre footprints at the Davis Dome site. The proposed construction at the Davis Dome site would generate additional traffic from worker vehicles and equipment. Temporary traffic delays may occur. However, there would be minimal changes to traffic patterns or flows on public roads. Construction traffic impacts to public roadways would be temporary and are expected to be less than significant and short term. Because no new employee would be added to the Geothermal Energy facility, no impacts to traffic on Fort Bliss and public roadways are expected.

3.14.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Under Alternative 6, Fort Bliss would develop the CSP array using dry cooling in the STA. Transmission would be constructed and tied in with the substation in the IBCT Complex about 7 miles to the west of the proposed development site. Transmission lines would follow existing easements and the installation boundary to the substation at the IBCT Complex adjacent to the STA.

Additional construction-related traffic delays and volume changes would occur as a result of the construction of the CSP and transmission line within the STA. Construction traffic impacts to public roadways would be short term and are expected to be less than significant.

The proposed dry-cooled CSP site would add 28 new employees (56 daily trips) to the site within the installation. These additional 56 daily employee trips and other vehicle trips on public road Loop 375 would likely represent a minor increase in the regional population. Therefore, impacts to traffic on Fort Bliss and public roadways are expected to be long term and less than significant.

3.14.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Under Alternative 7, additional biomass, geothermal, wind, or solar resources may be developed in compatible footprints across the installation as long as they meet the alternatives screening criteria presented in Section 2.2 and environmental criteria presented in Appendix B, *Alternative 7 Environmental*

Screening Criteria. Impacts to traffic on Fort Bliss and public roadways under this alternative are expected to be less than significant based on the impacts described under Alternatives 5 and 6.

3.14.2.8 Alternatives Combined

All alternatives would result in less than significant traffic impacts with the exception of Alternative 4A. Alternative 4A would result in short-term, significant traffic impacts during construction, and long-term, less than significant impacts under the operation condition. Impacts to traffic on Fort Bliss and public roadways under the combined alternatives are expected to be similar to Alternative 4.

3.15 Irreversible and Irretrievable Commitments of Resources

An irreversible/irretrievable commitment of resources results from a decision to use or modify resources when they are renewable only over a long period, such as soil productivity, or when they are nonrenewable resources, such as cultural resources. The single most irreversible and irretrievable commitment of resources associated with the Proposed Action is the loss of vegetation/habitat for the actions associated with the construction of new renewable energy facilities and associated infrastructure. It is considered an irreversible commitment because, for the foreseeable future, these areas would be converted to renewable energy facilities and re-establishing the vegetation types is not reasonable for quite some time. Some vegetation would be permanently lost due to construction; in addition, there is a potential for the displacement of wildlife or sensitive species and their habitat. Although these actual resources would be lost, through the design and other mitigation, much of the impacts would be minimized.

The materials and energy required for the construction, operation, and maintenance of the projects under the Proposed Action, particularly the renewable energy facilities and operations, also represent irretrievable commitments of resources. The total amount of construction materials required for this action is relatively insignificant when compared to the resources available in the region. The energy required for construction consists of the fuels necessary to operate heavy construction equipment and trucks. Although energy conservation is a vital and critical issue, the energy resource commitment to the Proposed Action is not anticipated to be excessive in terms of region-wide usage. Materials and energy are not in short supply and their use would not have an adverse effect upon continued availability of these resources. Construction, operation, and maintenance would also require a substantial expenditure of federal funds that would not be directly retrievable.

3.16 Relationship between Short-term Use of the Environment and Long-term Productivity

Alternative 1, No Action, would have no impact on the short-term use of the environment because no Net Zero initiatives would be implemented. El Paso and Fort Bliss currently withdraw water from the Hueco Bolson in quantities that exceed the aquifer's ability to recharge. This drawdown would continue under the No Action alternative; therefore, it would likely result in the reduction of long-term productivity of the aquifer.

Under Alternative 2, Fort Bliss would implement conservation policies and procedures and BMPs to reduce the consumption of energy and water resources and maximize re-use and reduction of waste at Fort Bliss. These activities would not result in any perceptible short-term uses of the environment. However, they would enhance the long-term productivity of the aquifer and the environment by minimizing electricity and water use and waste generation at Fort Bliss.

Implementation of Alternative 3 would not result in any short-term use of the environment because land disturbance would be temporary during construction and would occur within previously developed areas on East and West Bliss. However, the reuse of reclaimed water for irrigation of landscapes and other secondary uses at Fort Bliss would result in an improvement to the long-term productivity of the aquifer do to the reduced need to withdraw water for installation use.

The use of land on Fort Bliss for construction of renewable energy facilities as described under the Proposed Action and under Alternatives 4 through 7 would result in a long-term reduction in the productivity of that land for others uses (e.g., wildlife habitat). However, the actions proposed under these alternatives would result in the transition from an existing energy generation source using non-renewable fossil fuels to renewable energy sources. As a result, the long-term productivity of the environment would be enhanced due to a net reduction in the consumption of fossil fuels for use in energy generation.

3.17 Unavoidable Adverse Impacts

The environmental analysis of the alternatives includes the avoidance, minimization, or other mitigation of potential adverse effects on natural, cultural, and environmental resources; however, all adverse impacts may not be completely avoided and/or mitigated. Some adverse effects would be temporary in nature, for example, the temporary less than significant effects to air quality due to emissions from construction equipment; temporary habitat, vegetation, and soil disruption and removal from construction

staging and activities; and temporary less than significant noise, traffic, and water resources impacts associated with construction activities. Other adverse effects could be long term in nature, for example, the permanent removal of vegetation, soils, and wildlife or sensitive species habitat due to land-clearing activities for construction of renewable energy facilities and the alteration of land uses as described for Alternatives 3 through 7. Other long-term, unavoidable impacts include impacts to air quality from operations emissions of Alternatives 4 through 7 with significant impacts from the operations of the WTE plant, and noise and traffic associated with Alternative 4 operations.

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4.0 CUMULATIVE IMPACTS

In addition to identifying the direct and indirect environmental impacts of their actions, the CEQ's NEPA regulations require federal agencies to address cumulative impacts related to their proposals. A cumulative impact is defined in the CEQ regulations (40 CFR §1508.7) as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." This section describes the process used to identify potential cumulative impacts related to the Proposed Action at Fort Bliss and discusses those impacts for each of the resources addressed in Chapter 3.

4.1 Process for Identification of Cumulative Impacts

The CEQ has published guidance for assessing cumulative impacts in *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997b). In summary, the process outlined by CEQ includes identifying significant cumulative effects issues, establishing the relevant geographic and temporal (time frame) extent of the cumulative effects analysis, identifying other actions affecting the resources of concern, establishing the cause-and-effect relationship between the Proposed Action and the cumulative impacts, determining the magnitude and significance of the cumulative effects, and identifying ways in which the agency's proposal might be modified to avoid, minimize, or mitigate significant cumulative impacts.

Issues to be addressed in this cumulative impacts analysis were determined based on the identification of resources that would be affected by the alternatives under evaluation. These resources, discussed in Chapter 3, were identified based on information received during public scoping or through the analysis of direct and indirect effects that have the potential to combine with other past, present, or reasonably foreseeable future actions to produce a larger impact. If the analysis demonstrated there would be no direct or indirect impact to a resource, it was not included in the cumulative impacts analysis because the Proposed Action would not add to the cumulative impact.

An ROI was defined for each resource in Chapter 3. These ROIs represent the geographic areas within which all notable impacts from the Proposed Action and alternatives are expected to occur. The geographic extent of the cumulative impacts analysis generally coincides with the ROI of each resource and is described by resource in Section 4.3. In addition, significance thresholds defined for each resource in Chapter 3 also apply to the assessment of cumulative impacts.

CEQ regulations specify that cumulative impacts analyses encompass past, present, and reasonably foreseeable future actions. As a practical matter, the impacts of past actions are already reflected in the conditions that currently exist, as described in the affected environment in Chapter 3. Where appropriate and feasible, those sections note past activities that may have cumulatively contributed to the current condition of the environment. Past, present, and reasonably foreseeable future actions considered in the analysis are identified in Section 4.2. In general, this EIS considered present and reasonably foreseeable future actions as those that are under construction, are the subject of a plan or proposal, or have identified funding. Actions beyond that become increasingly speculative and difficult to assess.

4.2 Identified Past, Present, and Reasonably Foreseeable Future Actions

Military activity, as well as other government and non-government industrial, business, and institutional activities, historically have affected Fort Bliss and its surrounding area. The latter influences have included foundries, diverse manufacturing, mixed agricultural practices, mining operations, government facilities, financial institutions, educational institutions, health services, and other, smaller entrepreneurial sources of growth. Many of these activities have been shaped by the geographic position of El Paso as an international border crossing and its “sister city” of Ciudad Juárez and as a historical transportation hub. Future impacts will mostly occur through the continued growth of these diverse components of the El Paso community, exacerbated and accelerated by the continued growth and expanded influence of the much larger Ciudad Juárez.

The following past, present, and reasonably foreseeable future actions were considered as part of this cumulative impacts analysis.

4.2.1 Past Actions

Specific past actions considered include:

2005 Base Realignment and Closure – Through the Base Realignment and Closure of 2005 (BRAC), the Secretary of Defense recommended that Fort Bliss be realigned by relocating the 1st Armored Division from Germany and Korea to Fort Bliss. In addition, it was recommended to realign Fort Sill by relocating an artillery (fires) brigade to Fort Bliss and realign Fort Hood, Texas, by relocating maneuver battalions, a support battalion, and aviation units to Fort Bliss. Some of these actions are ongoing.

Fort Bliss Mission and Master Plan, Supplemental EIS – In April 2007, a ROD was signed for the Fort Bliss Mission and Master Plan Supplemental Programmatic EIS. The Fort Bliss Mission and Master Plan Supplemental EIS evaluated alternatives to:

- Modify current land use on Fort Bliss to more fully realize the installation's capability and flexibility to support Army training and testing requirements; the evolving force structure; potential future missions; and joint, interagency, intergovernmental, and multinational agencies, without compromising the commitment to stewardship of natural and cultural resources
- Construct additional facilities and infrastructure in the Main Cantonment Area(referred to herein as East and West Bliss) necessary to support BRAC and Integrated Global Presence Basing Strategy stationing decisions
- Develop live-fire, qualification, and testing ranges required to support the requirements of units stationed at Fort Bliss
- Develop range camps, auxiliary facilities, and other improvements

The selected alternative included the following attributes:

- Increase in military personnel, total personnel (civilians and military), and military dependents to 40,300, 57,800, and 66,500 respectively
- Increase in primary additional equipment to 6,260 wheeled vehicles, 2,360 tracked vehicles, and 220 helicopters
- Develop an additional 4,900 acres in the Main Cantonment Area (East and West Bliss)
- Construct 25.8 million square feet of additional buildings in the Main Cantonment Area (East and West Bliss)
- Disturb 4,300 acres to complete construction in the Main Cantonment Area (East and West Bliss)
- Create 1,600 acres of additional impermeable surface in the Main Cantonment Area (East and West Bliss)
- Create 352,000 acres of additional off-road vehicle maneuver area for a total of 687,000 acres

Grow the Army Stationing and Training – As part of the Grow the Army stationing and training (Grow the Army) actions, Fort Bliss received one additional IBCT and then converted a Brigade Combat Team to a Stryker Brigade Combat Team.

Kay Bailey Hutchinson Desalination Plant – In 2007, EPWU finished construction on the Kay Bailey Hutchinson Desalination Plant, located off Montana Avenue near the STA of Fort Bliss. The plant is the world's largest inland desalination plant with a capacity of treating 27.5 million gallons per day.

4.2.2 Present and Reasonably Foreseeable Future Actions

The following actions are ongoing or are considered reasonably foreseeable future actions.

Public/Private Venture off Montana Avenue – The El Paso City Council has approved plans for private developers to develop 200 acres of land off-post near Montana Avenue and east of Loop 375 in East El Paso just south of Fort Bliss as a smart growth community. This development will include residences, entertainment venues, and increased mass transit and will have the potential to increase traffic along Montana Avenue.

Balfour Beatty Communities Solar Power Project – Balfour Beatty administers privatized residential housing developments at Fort Bliss. Balfour Beatty has been working with Fort Bliss to lease rooftop space for 13.2 MW of solar PV units for individual homes to provide energy to the individual homes in which the solar power is placed.

Modification of Special Use Airspace at Fort Bliss, Texas and New Mexico – Fort Bliss has finalized an environmental assessment (EA) for the proposition to modify SUA over the STA and some adjacent lands to separate military and civilian aircraft operating in those areas. Specifically, the proposal would modify the designation of SUA in the STA and Training Areas 8 and 9 in the McGregor Range from the surface to a ceiling of 1,200 feet AGL, including a triangular area over private land extending east of the STA and south of the Terrain Flying Area, and correct restricted airspace coordinates currently in effect for R-5103A airspace to extend that airspace south to the Texas/New Mexico state line and the edge of Fort Bliss property.

Expansion of U.S. Air Force Student Training – The U.S. Air Force 204th Security Forces Squadron (Desert Defenders) proposes to increase the throughput of student Airmen at Fort Bliss, training up to 850 students on the ground at one time and also increase the training vehicle fleet by 50 percent. Although pre-deployment training can be conducted on other U.S. Air Force properties, due to the required student throughput, the use of existing Army training areas, ranges, and building assets provides the U.S. Air Force with the flexibility to complete training required by Central Command. Fort Bliss training areas and ranges are suitable for all training requirements set by Central Command.

Construction and Use of Advanced Operations Bases at McGregor Range Camp, Contingency Operating Location Westbrook, and Doña Ana Range Camp – The U.S. Army Special Forces Command's Special Operations Force Pre-Mission Training Cell is planning to improve pre-mission training capabilities in the Tularosa Basin portion of McGregor Range and the Doña Ana-NTA on Fort Bliss. Advanced Operations Bases (AOBs) will be constructed at McGregor Range Camp, Contingency Operating Location Westbrook, and Doña Ana Range Camp to billet approximately 130 Soldiers each.

The AOBs will serve as training centers for Special Operations Force teams preparing for deployment to current operational theaters. Each AOB will have dimensions of approximately 800 feet by 400 feet, covered with a layer of base course or gravel. Activities will include 12 acres of ground disturbance in previously undisturbed areas.

Texas Department of Transportation Route Location Study – The Texas DOT, in cooperation with the New Mexico DOT, conducted a route location study for a limited access highway to connect Loop 375 in northeast El Paso near Railroad Drive with Interstate 10 in Anthony, New Mexico. The project examined the feasibility of establishing an alternative route to the congested Interstate 10 corridor through El Paso for through truck and other traffic. Congestion on Interstate 10 is a function of the unique political and mountainous physical geography of the El Paso area that effectively channels all interstate traffic through the center of El Paso on Interstate 10. An alternative cross-mountain route entails steep grades that preclude its use on a regular basis by truck and through traffic. As a result, there is frequent severe congestion on Interstate 10 with no possibility for alternative routing of through truck and auto traffic and hazardous cargoes. Currently, the project is still in the planning/study phase with an exact construction date unknown. The possible construction of the roadway, however, has the possibility of altering the route of trucks carrying hazardous materials.

Army 2020 Force Structure Realignment – On 5 January 2012, the President and DoD officials presented a strategic guidance document called *Sustaining U.S. leadership: Priorities for 21st Century Defense*. (21st Century Strategic Guidance). As part of this presentation, DoD officials stated that the Army end-strength would decline to 490,000. The Army's Chief of Staff stated: "We will reduce our active force end strength from 570,000 to 490,000, which will include a reduction of at least eight brigade combat teams." The Army's Proposed Action is to conduct force reductions and realign existing forces in accordance with Congressional authorizations to a size and configuration that is capable of meeting national security and defense objectives, implements QDR recommendations, sustains unit equipment and training readiness, and preserves a high quality of life for Soldiers and their families. Army 2020 force structure realignment would allow for the adjustment of the composition of its forces to meet force requirements in high-demand military occupational specialty areas while rebalancing the number and types of units in lower priority military occupational skill areas. The implementation of Army force structure realignment will allow the Army to reduce its operational costs, while allowing the Army to field a smaller force that still can meet the mission requirements of the current and future global security environment. As part of the Army 2020 force structure realignment, military (Soldier and civilian) manning levels may change at Fort Bliss in the range of anywhere from -8,000 to + 3,000 (the range being considered to support Army 2020 at all major bases). Primary potential impacts identified in the

21st Century Strategic Guidance were to traffic/transportation and socioeconomics with impacts to traffic/transportation deemed mitigable. On 18 January 2013, the Army published a Final Programmatic EA and Draft FNSI evaluating the impacts of potential force realignment at Fort Bliss and other potentially affected Army installations.

Environmental Assessment for Solar Photovoltaic Facilities on the Training Ranges, Fort Bliss, Texas and New Mexico – 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. It is estimated that the Proposed Action would generate 73,000 MWh per year, which would supply approximately 15 percent of the total energy consumed by Fort Bliss on an annual basis. Several renewable power source alternatives were considered during the initial planning. Three types of solar energy technologies were identified: PV, 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. Currently, a 20-MW solar PV facility is being planned in the STA adjacent to the East Bliss IBCT and a 1-MW facility at McGregor Range Camp.

Environmental Assessment for the Sale, Development, and Exchange of Army Owned Land, Fort Bliss, Texas – Fort Bliss is pursuing the sale of Army-owned land to pay for additional military housing on Fort Bliss. Included in this action is a land sale of approximately 1,653 acres in the same area and sale of approximately 94 acres at Lower Beaumont. A 683-acre parcel will also be conveyed to Texas General Land Office in exchange for 2,880 acres in the STA, adjacent to Training Area 2E.

El Paso Electric Company's Power Plant near Montana Avenue – EPEC has announced plans to construct a 150-acre power plant located just south of Fort Bliss near Montana Avenue, just east of Zaragoza Avenue. The power plant is expected to contain two generators, using the most economically viable and cleanest fossil fuels available and will provide 176 MW of peaking capacity combined (the amount needed to provide energy to 80,000 homes). EPEC is in the process of filing for the necessary regulatory approvals with the Public Utility Commission of Texas, the New Mexico Public Regulation Commission, TCEQ and USEPA. Once the permits are approved, construction at the site will occur during 2013–2014; the first unit is scheduled to become operational in 2014.

El Paso Electric Company's Pursuit of Additional Generating Capacity – Through 2020, EPEC plans to bring 1 gigawatt of new natural gas-fired power into the El Paso area electrical grid. While bringing this new capacity online, EPEC plans to decommission outdated production capacity elsewhere.

Environmental Assessment for a U.S. Immigration and Customs Enforcement El Paso City Administrative Facility, Fort Bliss, Texas – Fort Bliss is pursuing the issuance of a renewable permit (i.e.,

a long-term lease to the U.S. Immigration and Customs Enforcement (U.S. ICE) for U.S. ICE to construct, operate, and maintain one or more buildings, which would total approximately 90,000 square feet on an approximately 19-acre site within the STA of Fort Bliss on Montana Avenue, west side of the Armed Forces Reserve Center. The proposed facility would house approximately 500 employees and offer approximately 550 parking spaces for visitors, employees, and government vehicles.

4.3 Cumulative Impacts by Resource

This section describes potential cumulative impacts related to the actions occurring and proposed at Fort Bliss by resource. For each resource, the following subsections first identify the geographic boundary considered for the cumulative impacts analysis and describe the nature and magnitude of the cumulative impacts for each alternative evaluated, to the extent feasible considering uncertainties inherent in the analysis. In general, this EIS assumes a 20-year horizon for estimating future impacts; actions beyond that time frame become increasingly more speculative and difficult to assess. Impacts are characterized using the same definitions used for direct and indirect impacts (Section 3.1).

4.3.1 Air Quality

The study area considered in the cumulative analysis for the criteria pollutants includes areas in and near Fort Bliss. It is noteworthy that individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Because the potential effects of proposed GHG emissions on climate change are by nature global, the study area for this aspect is not defined. Because GHG emissions and climate change are by nature global and cumulative impacts, they are addressed in this analysis.

The important air quality cumulative impact issues considered in this analysis were:

- Potential for increased emissions of criteria pollutants by Fort Bliss activities, in combination with increased emissions due to population growth that could result in non-attainment of NAAQS for carbon monoxide, ozone, or expansion of the nonattainment area for PM_{10}
- Impact of increase in ground disturbance and exposure from construction activities, off-road vehicle traffic, landfill operations, and other activities that affect vegetative cover and soils on fugitive dust generation and particulate matter emissions
- Cumulative effects of increased human-caused dust generation in combination with natural wind-blown dust events on ambient air quality in El Paso and Doña Ana counties.

While individual sources of GHG emissions are not large enough to have an appreciable effect on climate change, all of these sources incrementally increase concentrations. Consequently, cumulative impacts of GHG emissions occur when proposed GHG emissions combine with other GHG emissions from other

natural and human-made activities on a global scale. Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions stemming from the Proposed Action. Formulating such thresholds is problematic because it is difficult to determine what level of proposed emissions would substantially contribute to global climate change.

In addition to assessing the GHG emissions impacts that would result from implementation of the alternatives and the potential impact on climate change, the effect of climate change on the Proposed Action and the adaptation strategies that would be developed in response also are assessed. The effects of climate change are a global issue for the DoD. As is clearly outlined in the *Quadrennial Defense Review Report* of February 2010 (DoD 2010), the DoD will need to adjust to the impacts of climate change on facilities and military capabilities. The DoD already provides environmental stewardship at hundreds of DoD installations throughout the U.S. and around the world, working diligently to meet resource efficiency and sustainability goals set by relevant laws and executive orders. Although the U.S. has significant capacity to adapt to climate change, it will pose challenges for civil society and DoD alike. DoD operational readiness hinges on continued access to land, air, and sea training and test space. Consequently, DoD must complete a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required (DoD 2010).

The *Quadrennial Defense Review Report* goes on to illustrate that DoD will work to foster efforts to assess, adapt to, and mitigate the impacts of climate change. Domestically, DoD will leverage the Strategic Environmental Research and Development Program, a joint effort among DoD, the Department of Energy, and the USEPA, to develop climate change assessment tools.

The U.S. Global Climate Research Program report, *Global Climate Change Impacts in the U.S.*, reviewed the unique impacts of climate change on the U.S. (Karl et al. 2009). The Southwest region of the United States has already experienced a 1.5°F rise in average temperature since 1979, and temperatures are projected to rise approximately 4 to 10 degrees above the historical baseline by the end of the century, averaged over the Southwest region. Water supplies are projected to become increasingly scarce, and droughts and wildfires are projected to increase, although local changes in temperatures and precipitation, as well as fire fuel availability, all play a role in the degree of projected change.

As climate science advances, the Army will regularly re-evaluate climate change risks and opportunities to develop policies and plans to manage effects on its operating environment, missions, and facilities. The following sections describe the anticipated cumulative impacts associated with each alternative.

4.3.1.1 Alternative 1 – No Action

The No Action Alternative would have no direct or indirect impacts to air quality; therefore, no cumulative impacts would occur. No beneficial impacts to air quality or GHG reductions would occur under this alternative. The forecast baseline population growth, in combination with proposed Fort Bliss-induced population changes, is projected to result in a 28 percent increase in the population of El Paso County by 2035 (El Paso MPO 2010). This population increase could ultimately result in exceedances of the NAAQS, especially of carbon monoxide and PM_{10} (for which the city of El Paso is in moderate non-attainment). PM_{10} levels in El Paso and Doña Ana counties are further aggravated by windblown dust, especially during dust storms. Additional ground disturbance due to construction associated with other actions both on and off Fort Bliss, in combination with other fugitive dust sources in the region, would contribute to increases in PM_{10} emissions in the ROI.

4.3.1.2 Alternative 2 – Conservation Policies and Procedures

Alternative 2 would result in beneficial impacts to air quality through reduced air emissions, including GHG emissions associated with Fort Bliss operations in both the short and long term. Other actions described in Section 4.2 could contribute short-term construction-related air emissions within the ROI. These construction projects include local projects planned by private developers, Texas DOT, U.S. ICE, EPEC, and Fort Bliss. In addition, new operation-related emissions would occur from projects, such as the proposed EPEC power plant, and increased mobile source emissions due to increase training activities at Fort Bliss. Potential population growth discussed for Alterative 1 also would contribute to future increases in emissions from increased mobile sources and energy demand for the population. Although these other actions would have potential for significant cumulative impacts, Alternative 2 would not contribute to these adverse impacts. Other actions, such as Fort Bliss solar energy development and the Balfour Beatty solar panel installation project, would also contribute to lower air emissions and GHG emissions from the use of renewable energy sources. As previously stated, Alternative 2 is anticipated to contribute beneficial impacts from reduced energy consumption through implementation of conservation policies and procedures and would therefore help minimize short- and long-term cumulative impacts to air quality.

4.3.1.3 Alternative 3 – Water Reclamation Pipeline

Implementation of conservation policies and procedures under Alternative 3 would result in beneficial impacts to air quality through reduced air emissions, including GHG emissions associated with Fort Bliss operations in both the short and long term. Construction impacts to air quality resulting from the purple pipe would be less than significant. Other past, present, or reasonably foreseeable actions as described under Alternatives 1 and 2 have the potential to increase construction-related emissions over the short

term. Long-term increases in emissions could occur from other actions, such as the proposed EPEC power plant, EPEC's pursuit of additional generating capacity through natural gas, and increased training levels at Fort Bliss. These actions including population growth-related increases would have the potential for significant cumulative air quality impacts if they result in exceedances of the NAAQS within the ROI. However, air quality impacts resulting from Alternative 3 would be small and less than significant in the short term as well as beneficial in the long term due to reduced emissions from the implementation of conservation policies and procedures. Therefore, Alternative 3 would contribute minimally to short-term cumulative impacts and would contribute beneficial impacts in the long term, potentially minimizing cumulative impacts to air quality.

4.3.1.4 Alternative 4 – Waste-to-Energy Plant

Alternative 4 would contribute short-term less than significant impacts from construction of the WTE plant and associated infrastructure and long-term significant but mitigable impacts from operations emissions generated by the WTE plant. Beneficial indirect impacts are anticipated from the replacement of fossil fuel-based energy sources with a renewable energy source. The WTE plant, while a major stationary source with potential to emit substantial amounts of air pollutants, would require permitting under the PSD and Title V federal programs. These programs require analysis to assess both short- and long-range transport of pollutants of concern to ensure that impacts are known and can be addressed through implementation of state-of-the-art control technologies and operational limits.

More extensive information on plant design and operation, as well as analysis of emissions transport, would need to be known to determine if air pollutant emissions from WTE plant operations would significantly affect visibility in Class I areas, such as Guadalupe National Park. Cumulatively, increased emissions in the ROI, including the WTE plant, can be expected to contribute to increasing haze in those areas.

The WTE plant would potentially produce 253,357 metric tons of CO_2. Using MSW as feedstock for the WTE plant rather than landfilling would have indirect impacts on GHGs. According to the City of El Paso's *Carbon Footprint Report*, nearly 95 percent of the GHGs for the city stem from the two primary landfills. Diversion of the MSW to the WTE is a more efficient way to reduce GHG emissions because waste is combusted shortly after its generation, producing CO_2; whereas landfilling results in the long-term biodegradation of the MSW, which produces methane, a more damaging GHG that has an atmospheric lifetime 21 times that of CO_2.

Emissions of GHGs from implementing Alternative 4 alone would not cause appreciable global warming that would lead to climate changes. However, these emissions would incrementally increase the

atmosphere's concentration of GHGs, and, in combination with past and reasonably foreseeable future emissions from all other sources, contribute to the adverse effects of climate change. At present, no methodology exists that would enable estimating the specific impacts (if any) that this increment of climate change would produce locally or globally.

The significant but mitigable impacts associated with Alternative 4 when combined with the potentially significant impacts of other actions within the ROI, as discussed previously for Alternatives 1 through 3, would result in significant cumulative impacts to air quality. However, the potential identification of additional mitigation measures through the PSD and Title V permitting process may minimize the adverse impacts. Beneficial impacts associated with Alternative 4, such as the implementation of conservation policies and procedures and the transition to a renewable energy source at Fort Bliss, would contribute to minimization of these cumulative impacts.

Projects planned near the proposed WTE plant include the U.S. ICE El Paso City administrative facility, the proposed EPEC power plant, EPEC's plans to pursue additional generating capacity, and the 200-acre public/private residential development off Montana Avenue. The construction and operation of the U.S. ICE El Paso city administrative facility would produce temporary emissions during construction that would be less than significant. The operation of the facility would require approximately 500 employees, and while there would be resulting increases in mobile source emissions, these emission are not expected to be significant.

The 200-acre public/private residential development would result in temporary emissions during construction that would be less than significant. It is unknown how many residents would be new to the region; however, if all residents were new residents, then presumably there would be increased emissions from the associated mobile sources. It is most likely that there will be a combination of existing and new residents, so some increase in mobile source emissions is expected; however, it is unlikely these emissions alone would be significant.

The proposed EPEC power plant will be a new facility consisting of two state-of-the art 88-MW natural gas-fueled combustion turbines. The technology used in the turbines would be more efficient and allow for quick starts. The new turbines will be designed to meet or exceed all local, state, and federal environmental requirements. The generators will be equipped with state-of-the-art air pollution controls to minimize any pollution to the air (EPEC 2012c).

EPEC's plan to pursue additional generating capacity of 1 gigawatt through natural gas-fired power would create temporary emissions during construction and continued emissions during operation of the facility. The additional capacity generated by this facility would allow EPEC to decommission outdated

production capacity elsewhere. While the combustion of natural gas-generated energy would still cause emissions, the operation of the natural gas-fired power facility would likely lead to beneficial impacts to air quality because the combustion of natural gas is cleaner than other fossil fuels.

The combination of the proposed EPEC power plant, U.S. ICE El Paso city administrative facility, EPEC's plans to pursue additional generating capacity, the 200-acre public/private residential development, and Alternative 4 would be considered a significant but mitigable impact because the WTE plant alone is considered a significant but mitigable impact.

4.3.1.5 Alternative 5 – Geothermal Energy Facility

Construction and operation impacts to air quality resulting from the geothermal energy facility would be less than significant. Other past, present, and reasonably foreseeable actions as described under Alternatives 1 and 2 have the potential to increase construction-related emissions over the short term. Long-term increases in emissions could occur from other actions such as the proposed EPEC power plant and increased training levels at Fort Bliss. These actions including population growth-related increases would have the potential for significant cumulative air quality impacts if they resulted in exceedances of the NAAQS within the ROI. However, air quality impacts resulting from Alternative 5 would be small and less than significant in the short term as well as beneficial in the long term from reduced emissions from implementation of conservation policies and procedures. Therefore, Alternative 5 would contribute minimally to short-term cumulative impacts and would contribute beneficial impacts in the long term, potentially minimizing cumulative impacts to air quality.

4.3.1.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Construction and operation impacts to air quality resulting from the CSP array would be less than significant. Other past, present, or reasonably foreseeable actions as described under Alternatives 1 and 2 have the potential to increase construction-related emissions over the short term. A long-term increase in emissions could occur from other actions such as the proposed EPEC power plant and increased training levels at Fort Bliss. These actions including population growth-related increases would have the potential for significant cumulative air quality impacts if they resulted in exceedances of the NAAQS within the ROI. However, air quality impacts resulting from Alternative 6 would be small and less than significant in the short term as well as beneficial in the long term from reduced emissions through the implementation of conservation policies and procedures. The use of CSP technology would ultimately replace electricity generated through fossil fuel combustion methods and would help offset any increases in emissions from other activities occurring in the region. Therefore, Alternative 6 would contribute

minimally to short-term cumulative impacts and would contribute beneficial impacts in the long term, potentially minimizing cumulative impacts to air quality.

4.3.1.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Alternative 7 proposes the construction and operation of renewable energy resources to produce electricity on Fort Bliss. The impacts of Alternative 7 are anticipated to be the same as those described for Alternatives 5 and 6. These impacts are less than significant and beneficial to air quality from the replacement of fossil-fuel energy sources with renewable energy sources. Alternative 7 would contribute minimally to the adverse cumulative impacts from other identified actions, as described previously, and would contribute beneficial impacts to air quality and GHG emissions by increasing the use of renewable energy sources on Fort Bliss.

4.3.1.8 Alternatives Combined

Section 3.2 presents projected construction emissions for facilities and infrastructure and operational emissions on Fort Bliss, including combustion emissions from heavy-duty diesel equipment and private vehicles, stationary sources, and fugitive dust from construction. While these emission sources are analyzed separately, air quality in the ROI would be affected by the cumulative total of any combination of these sources if multiple alternatives are selected for the Proposed Action, in addition to other off-installation sources.

In terms of short-term cumulative impacts, the infrastructure improvement projects associated with the Proposed Action and other regional construction projects could produce a short-term additive amount of emissions if they are concurrent. Local construction projects planned by the private developers, Texas DOT, U.S. ICE, EPEC, possible growth actions, and potential increases in range operations by the Army at Fort Bliss are relevant if they occur during the same time frame as the implementation of the Net Zero action, which is presumed to occur by 2018. These actions would produce emissions that would be additive to those of the Proposed Action. However, the proposed construction under each of the Proposed Action alternatives is expected to produce emissions well below significance thresholds; therefore, it is not anticipated that air emissions from other past, present, and reasonably foreseeable future actions, when considered incrementally with any of the alternatives would exceed any regulatory standards.

Operations emissions associated with the WTE plant are anticipated to be significant but mitigable. As a result, when added to the potentially significant impacts of other actions as discussed previously, cumulative impacts would be significant but mitigable. Implementing all alternatives would, however,

greatly increase the amount of renewable energy sources on Fort Bliss and would therefore minimize these adverse cumulative impacts.

4.3.2 Airspace

The study area considered in the cumulative analysis for airspace includes air traffic and airspace classifications in and near Fort Bliss.

4.3.2.1 Alternative 1 – No Action

Because no impacts to airspace are expected as a result of implementing Alternative 1, no cumulative impacts would occur.

4.3.2.2 Alternative 2 – Conservation Policies and Procedures

Because no impacts to airspace are expected as a result of implementing Alternative 2, no cumulative impacts would occur.

4.3.2.3 Alternative 3 – Water Reclamation Pipeline

Because no impacts to airspace are expected as a result of implementing Alternative 3, no cumulative impacts would occur.

4.3.2.4 Alternative 4 – Waste-to-Energy Plant

The past, present, and reasonably foreseeable future actions that could impact airspace include the 2005 BRAC, the Balfour Beatty solar panel installation project, the modification of SUA at Fort Bliss, and the construction, operation, and maintenance of solar renewable energy sources on Fort Bliss. Depending on the location of the solar panels for the proposed Balfour Beatty solar installation project (conducted through the Programmatic EA at Fort Bliss), solar glare from the panels has the potential to disrupt pilots taking off or landing at El Paso International Airport or Biggs AAF. It is expected that all pilots would have the necessary equipment to minimize the potential glare, resulting in less than significant impacts to the airport and airfield. The 2005 BRAC realigned aviation units to Fort Bliss, thereby increasing the amount of flight activity through Fort Bliss and adjacent airspace and increasing air traffic. However, based on the existing airspace classifications and air traffic control and also that traffic would continue to be controlled to comply with current regulations, actions would result in less than significant impacts to airspace. The modification of SUA at Fort Bliss would potentially modify SUA over the STA in Training Areas 8 and 9 and in the McGregor Range and some adjacent land to separate military and civilian aircraft operating in these areas. The alteration of airspace would provide greater protection to military and civilian air traffic and while civilian airspace is reduced, there is ample useable civilian airspace in

adjacent areas. The EA documenting this modification determined that impacts to air space would not be significant.

The less than significant impacts from the above actions when combined with the negligible impacts from implementation of Alternative 4 would result in less than significant, cumulative impacts to airspace. Alternative 4 would only slightly contribute to the cumulative impacts of the above actions.

4.3.2.5 Alternative 5 – Geothermal Energy Facility

The same past, present, and reasonably foreseeable future actions described under Alternative 4 would also occur under Alternative 5, with less than significant impacts occurring to airspace, airport, and airfield. These impacts, when combined with the less than significant impacts to the airport and airfield as a result of Alternative 5, would result in less than significant cumulative impacts to the airport and airfield, with Alternative 5 having a slight contribution. No impacts to airspace classifications would occur as a result of Alternative 5, and no cumulative impacts would occur.

4.3.2.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

The same past, present, and reasonably foreseeable future actions described under Alternative 4 would also occur under Alternative 6—less than significant impacts to airspace, airport, and airfield. These impacts, when combined with the less than significant impacts to the airport and airfield as a result of Alternative 6, would result in less than significant, cumulative impacts to the airport and airfield, with Alternative 6 having a slight contribution. No impacts to airspace classifications would occur under Alternative 6, and no cumulative impacts would occur.

4.3.2.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

The same past, present, and reasonably foreseeable future actions described under Alternatives 5 and 6 would also occur under Alternative 7—less than significant impacts to airspace, airport, and airfield. It is assumed that additional renewable energy development facilities associated with Alternative 7 would be of similar size and magnitude to those presented under Alternatives 5 and 6, and these facilities would have to adhere to all FAA regulations, resulting in less than significant impacts to the airspace, airport, and airfield. These impacts, when combined with the impacts of the cumulative projects, would result in less than significant cumulative impacts to the airport, airfield, and airspace.

4.3.2.8 Alternatives Combined

Fort Bliss would consult with and adhere to all FAA regulations in implementation of any of the proposed alternatives and therefore impacts associated with the combined alternatives to the airport and airfield would be less than significant. When combined with the past, present, and reasonably foreseeable future

actions, as described under Alternative 4, the alternatives combined would result in less than significant impacts to the airspace classifications, airport, and airfield.

4.3.3 Biological Resources

4.3.3.1 Alternative 1 – No Action

Under the No Action Alternative, there would be no impacts to vegetation, wildlife, or sensitive species; therefore, there would be no cumulative impacts ton these biological resources.

4.3.3.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, there would be negligible impacts to vegetation, wildlife, or sensitive species; therefore, there would be no cumulative impacts to these biological resources.

4.3.3.3 Alternative 3 – Water Reclamation Pipeline

Under Alternative 3, cumulative impacts to vegetation, wildlife, or sensitive species would result from projects on or within the vicinity of Fort Bliss that contribute to disturbance and removal of vegetation and habitat. More than 1,612 additional acres of vegetation would be removed on the installation as a result of present and future projects identified in Section 4.2. In addition, approximately 370 additional acres of vegetation would be removed off installation. Projects on the installation that could contribute to cumulative impacts to vegetation include construction projects identified in the Fort Bliss Mission and Master Plan (including 1,600 acres of additional impermeable surface on East and West Bliss and 352,000 acres of additional off-road vehicle maneuver areas), construction of AOBs at McGregor Range Camp (approximately 12 acres), construction of a geothermal facility in the southeast corner of Fort Bliss, and construction of solar projects. Projects off Fort Bliss include the public/private development of land near Montana Avenue (200 acres), construction and operation of the U.S. ICE El Paso city administrative facility (19 acres), and construction of the proposed EPEC power plant (150 acres). In addition, impacts could result from the potential introduction and spread of invasive species.

Cumulative impacts to wildlife and sensitive species would also include additional noise from construction and operations. Projects on and off the installation that could contribute to cumulative impacts to wildlife are the same as those projects described previously. Construction-related noise may temporarily displace wildlife or sensitive species from suitable habitat in the immediate vicinity of project areas. However, quality wildlife habitat is limited in areas where these projects would occur because of the developed nature of the areas. Additionally, wildlife species within the proximity of these projects are adapted to the existing urban/industrial environment. Cumulative impacts to wildlife would be less than significant as a result of implementation of the construction activities.

Cumulative impacts are expected to be less than significant because the majority of these areas, such as East and West Bliss, have been previously disturbed and the percent of each vegetation type that would be removed within the project areas would represent a small percentage of those vegetation types on Fort Bliss or within the vicinity of Fort Bliss. In addition, BMPs to decrease erosion and sedimentation and to control invasive species spread and introduction would be implemented.

4.3.3.4 Alternative 4 – Waste-to-Energy Plant

Cumulative impacts to vegetation, wildlife, and sensitive species would be similar to those described for Alternative 3. Alternative 4 would result in less than significant impacts. Projects planned near the proposed WTE plant include the EPEC power plant, U.S. ICE El Paso city administrative facility, and the 200-acre public/private development off Montano Avenue. Cumulative impacts would be less than significant.

4.3.3.5 Alternative 5 – Geothermal Energy Facility

Cumulative impacts to vegetation, wildlife, and sensitive species would be similar to those described for Alternatives 3 and 4. Projects planned near the proposed geothermal energy facility include the construction of AOBs at McGregor Range Camp.

4.3.3.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Cumulative impacts to vegetation, wildlife, and sensitive species would be similar to those described for Alternatives 3 and 4. Projects planned near the proposed dry-cooled CSP include the construction of AOBs at McGregor Range Camp, EPEC power plant, U.S. ICE El Paso city administrative facility, and the 200-acre public/private development off Montano Avenue.

4.3.3.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Cumulative impacts would be anticipated to be similar to Alternatives 5 and 6; however, site-specific NEPA analysis would be conducted, as appropriate, to determine the impacts. Cumulative impacts to vegetation, wildlife, and sensitive species are anticipated to be less than significant given compliance with identified screening and environmental criteria.

4.3.3.8 Alternatives Combined

As discussed previously, numerous projects are planned near the proposed alternatives. However, vegetation and habitat loss due to construction is anticipated to be less than significant because the percent of each vegetation type that would be removed within the combined project areas would still represent a small percentage of those vegetation types on Fort Bliss. Construction-related noise may

temporarily displace wildlife from operation and maintenance of the facilities, including noise and increased traffic and human presence, could displace wildlife from suitable habitat in the immediate vicinity of the project areas. Therefore, the cumulative impacts of all alternatives combined are anticipated to be less than significant.

4.3.4 Cultural Resources

Most of the alternatives proposed for the implementation of the Proposed Action at Fort Bliss when taken together with past, present, and reasonably foreseeable future actions may have cumulative adverse effects on cultural resources on the installation. Each alternative is discussed in the following sections. For the purposes of the cumulative impacts assessment, the ROI for cultural resources includes the entirety of Fort Bliss.

4.3.4.1 Alternative 1 – No Action

Because the No Action Alternative is not anticipated to impact cultural resources, there would be no cumulative impacts associated with Alternative 1.

4.3.4.2 Alternative 2 – Conservation Policies and Procedures

The implementation of conservation policies and procedures, primarily associated with replacement of building features such as windows in historic buildings, under Alternative 2 are anticipated to result in less than significant impacts to cultural resources. Other actions identified in Section 4.2 have the potential to adversely affect cultural resources within the ROI on Fort Bliss. These actions include those with associated ground disturbance, such as additional training activities and ground disturbance under the Army 2020 force structure realignment and the Fort Bliss Mission and Master Plan, range construction and operations, as well as other smaller scale construction projects, such as the U.S. ICE El Paso city administrative facility. As a result, archaeological sites may be lost over time due to not only maneuvers but also construction on previously undeveloped land within the ROI. TCPs and sacred sites may also be threatened or lost during this expansion.

At Fort Bliss, implementation of the PA and its associated procedures would ensure that a process is in place to avoid, reduce, or mitigate adverse effects on historic properties. Tribes are not party to the Fort Bliss PA. Fort Bliss is in consultation with interested tribes in preparation of an Agreement similar to the PA in addressing impacts to cultural resources of interest to the tribes. Additionally, Fort Bliss would work with trainers to open up areas with the least impacts to cultural resources but that still meet the requirements to adequately train Soldiers. The less than significant impacts resulting under Alternative 2 when combined with the potential adverse impacts associated with other past, present, and reasonably

foreseeable future actions are anticipated to result in less than significant, cumulative impacts to cultural resources.

4.3.4.3 Alternative 3 – Water Reclamation Pipeline

Alternative 3 is anticipated to result in significant but mitigable impacts to cultural resources due to irrigation of parade ground vegetation with reclaimed water. Impacts from other past, present, and reasonably foreseeable future actions are anticipated to be the same as described for Alternative 2. As a result, cumulative impacts would be significant but mitigable.

4.3.4.4 Alternative 4 – Waste-to-Energy Plant

Construction of the WTE plant and associated access roads and transmission lines when taken together with increased training and the construction of additional facilities and infrastructure may have cumulative impacts to cultural resources on Fort Bliss. Impacts to cultural resources from other past, present, and reasonably foreseeable future actions would be similar to that described under Alternative 2. Archaeological sites have and likely will be lost during past, present, and future construction activities. Ground-disturbing activities associated with installation expansion and continued facility and infrastructure developments can result in a loss of archaeological sites. An overall reduction in the number and diversity of archaeological sites has the potential of resulting in a significant cumulative impact to cultural resources. However, at Fort Bliss, the procedures outlined in the PA and ICRMP would ensure that processes are in place to avoid, reduce, or mitigate adverse effects on historic properties. It is anticipated that cumulative impacts to cultural resources under Alternative 4 would be less than significant.

4.3.4.5 Alternative 5 – Geothermal Energy Facility

Potential cumulative impacts to cultural resources from construction and operation of a geothermal energy facility at the Davis Dome site would be similar as those described for Alternative 4; however, impacts would be less than significant.

4.3.4.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Potential cumulative impacts to cultural resources from construction and operation of a dry-cooled CSP technology would be the same as described for Alternative 5.

4.3.4.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

The development of additional geothermal, wind, or solar resources taken with increased training activities and construction of facilities and infrastructure may have cumulative impacts to cultural

resources. The locations and designs of additional potential energy developments and consultation with the appropriate state SHPO, interested tribal governments, or other interested parties will determine whether the actions would result in significant effects on historic properties, TCPs, and sacred sites. Potential cumulative impacts would be assessed after such determinations are made; however, impacts are anticipated to be similar to that described for Alternatives 5 and 6 and would therefore be less than significant.

4.3.4.8 Alternatives Combined

Cumulative impacts for the alternatives combined would result from the implementation of Alternatives 2 through 7, in addition to increased training activities and construction of facilities and infrastructure. Modifications to architectural historic properties and historic districts are possible, as well as the destruction of archaeological sites. At Fort Bliss, compliance with the PA and ICRMP would ensure that processes and procedures are in place to avoid, reduce, or mitigate adverse effects on historic properties. Consultation with the New Mexico and Texas SHPOs would be necessary to determine whether the Proposed Action would result in adverse effects on significant architectural and archaeological resources. Fort Bliss would continue consultation with interested tribes to determine whether cultural resources of interest to the tribes would be impacted by the Proposed Action. As there is a potential for significant impacts under Alternative 4B, cumulative impacts for all alternatives combined would also potentially be significant.

4.3.5 Energy Demand and Generation

The study area for cumulative impacts under Energy Demand and Generation includes all projects located within Fort Bliss boundaries.

4.3.5.1 Alternative 1 – No Action

Under the No Action Alternative, Fort Bliss would not implement any actions to construct renewable energy sources or implement conservation policies and procedures. Alternative 1 would have no impacts on energy demand and generation and, therefore, would result in no cumulative impacts. It is anticipated, however, that additional growth would result from the actions described in Section 4.2. No beneficial impacts would be realized under this alternative from the transition of Fort Bliss to renewable energy sources and decreases in energy consumption. As a result, the cumulative impact projects that increase the electrical and natural gas demands would be adequately met within the existing capacity of EPEC and the El Paso Natural Gas Company. The construction of solar renewable energy sources and geothermal energy production on installation would provide a negligible amount of energy compared to the demand but would result in a beneficial cumulative impact to energy generation.

4.3.5.2 Alternative 2 – Conservation Policies and Procedures

Cumulative actions impacting energy demand and generation under Alternative 2 would be the same as those described in detail under Alternative 4. Construction and growth projects would increase the overall energy demand, contributing to adverse cumulative impacts. Alternative 2 would contribute beneficial impacts resulting from short- and long-term reductions in energy demand on Fort Bliss. EPEC and El Paso Natural Gas Company would continue to meet energy demands through their existing and planned additional capacity. Adverse cumulative impacts under Alternative 2 would be less than significant.

4.3.5.3 Alternative 3 – Water Reclamation Pipeline

Cumulative actions impacting energy demand and generation under Alternative 3 would be the same as those described for Alternative 2. Cumulative impacts would be less than significant.

4.3.5.4 Alternative 4 – Waste-to-Energy Plant

Cumulative actions that impact energy demand and generation can be split into three categories: increase energy demand, decrease energy demand, and energy generation. The cumulative actions that would increase energy demand include all projects that would increase the number of personnel on Fort Bliss or include construction of new buildings. Other actions that would increase energy demand include implementation the 2005 BRAC, 2010 Grow the Army, Fort Bliss Mission and Master Plan, the expansion of U.S. Air Force Student training, construction and operation of the ICE El Paso city administrative facility, and the use of AOBs at McGregor Range Camp. While some projects, like 2005 BRAC, are fully complete, each of these projects would increase the energy demand at Fort Bliss. The addition of 45 MW of electrical generating capacity under Alternative 4 would contribute to meeting current and future energy demand at Fort Bliss.

Additional cumulative actions would reduce the overall energy demand through energy generation or a reduction of personnel. The Army 2020 force structure realignment could potentially reduce the number of personnel on the installation, although this reduction would likely not result in a significant reduction of energy demand. Three projects on Fort Bliss include small-scale energy generation using geothermal and solar renewable technologies. The Balfour Beatty solar panel installation project and solar renewable energy projects would generate energy. The Balfour Beatty solar panel installation project would produce energy for specific buildings. Implementation of these projects would help offset the increased energy demand under the cumulative actions listed previously (increased energy demand projects) and would result in beneficial cumulative impacts and would help Fort Bliss meet Net Zero goals.

4.3.5.5 Alternative 5 – Geothermal Energy Facility

Cumulative actions impacting energy demand and generation under Alternative 5 would be the same as those described in detail under Alternative 4. Construction and growth projects would increase the overall energy demand, contributing to adverse cumulative impacts. Alternative 5 would contribute beneficial impacts resulting from short- and long-term reductions in energy demand on Fort Bliss and addition of a renewable energy source. EPEC and El Paso Natural Gas Company would continue to meet energy demands through their existing and planned additional capacity. Adverse cumulative impacts under Alternative 5 would be less than significant.

4.3.5.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Cumulative actions impacting energy demand and generation under Alternative 6 would be the same as those described in detail for Alternative 4. Construction and growth projects would increase the overall energy demand, contributing to adverse cumulative impacts. Alternative 6 would contribute beneficial impacts resulting from short- and long-term reductions in energy demand on Fort Bliss and addition of a renewable energy source. EPEC and El Paso Natural Gas Company would continue to meet energy demands through their existing and planned additional capacity. Adverse cumulative impacts under Alternative 6 would be less than significant.

4.3.5.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Cumulative actions impacting energy demand and generation under Alternative 7 would be the same as those described for Alternatives 5 and 6. Construction and growth projects would increase the overall energy demand, contributing to adverse cumulative impacts. Alternative 7 would contribute beneficial impacts resulting from long-term additions of renewable energy sources. EPEC and El Paso Natural Gas Company would continue to meet energy demands through their existing and planned additional capacity. Adverse cumulative impacts under Alternative 2 would be less than significant.

4.3.5.8 Alternatives Combined

If all alternatives were selected for implementation, Fort Bliss would have capacity to meet the existing demand with renewable energy source, however the electrical generation from Alternatives 4-6 would not be sufficient to meet projected peak loads. Cumulative projects impacting energy demand and generation under the combination of alternatives would be the same as those described for Alternative 4. Energy generating alternatives would combine to produce 95 MW of capacity on the installation. Combined with the cumulative projects that would also generate energy, cumulative impacts to energy generation would be beneficial. Conservation policies implemented under Alternative 2 would help offset the increased

energy demand under the cumulative impact construction projects. Cumulative impacts to energy demand and generation under the combination of alternatives would be beneficial and less than significant.

4.3.6 Geology and Soils

The study area considered in the cumulative analysis for geology and soils includes areas in and near Fort Bliss.

4.3.6.1 Alternative 1 – No Action

Because no impacts to geology and soils are expected as a result of Alternative 1, no cumulative impacts would occur.

4.3.6.2 Alternative 2 – Conservation Policies and Procedures

Because negligible impacts to geology and soils are expected as a result of Alternative 2, cumulative impacts would not occur.

4.3.6.3 Alternative 3 – Water Reclamation Pipeline

The past, present, and reasonably foreseeable future actions that could impact geology and soils include the 2005 BRAC, Grow the Army stationing and training, implementation of the Fort Bliss Mission and Master Plan, construction and operation of AOBs at McGregor Range Camp, the contingency operating location of Col Westbrook and Doña Ana Range Camp, construction, operation, and maintenance of solar renewable energy sources on Fort Bliss, and construction and operation of the U.S. ICE El Paso city administrative facility. The effects of construction activities, completed construction, and operations associated with the 2005 BRAC, Grow the Army stationing and training, Fort Bliss Mission and Master Plan Supplemental EIS, the AOBs, the solar renewable energy projects, and the U.S. ICE El Paso city administrative facility would require some soil disturbance, including localized erosion and compaction, and would remove the soil productivity in the footprint of the constructed and the potentially constructed structures. All previously constructed and potentially constructed structures already have or would include mitigation to reduce soil loss and erosion and would follow all storm water management protocols. While soil would be disturbed and some soil would be lost, the amount of soil that would be affected is relatively small compared to the amount of soil present at Fort Bliss, and these cumulative projects would have a less than significant impact to soils. In addition, while some geologic features may have been or would be impacted by these projects, the impacts are relatively small scale and would impact only a small portion of geologic features and would result in less than significant impacts.

The less than significant impacts of the above actions, when combined with the less than significant impacts of Alternative 3, would result in less than significant cumulative impacts to geology and soils, with Alternative 3 having a minor contribution.

4.3.6.4 Alternative 4 – Waste-to-Energy Plant

The same past, present, and reasonably foreseeable future actions described under Alternative 3 would also occur under Alternative 4, with less than significant impacts significant impacts to geology and soils. These impacts, when combined with the less than significant impacts to geology and soils as a result of Alternative 4, would result in less than significant cumulative impacts to geology and soils with Alternative 4 having a minor contribution.

4.3.6.5 Alternative 5 – Geothermal Energy Facility

The same past, present, and reasonably foreseeable future actions described under Alternative 3 would also occur under Alternative 5, with less than significant impacts significant impacts to geology and soils. These impacts, when combined with the less than significant impacts to geology and soils as a result of Alternative 5, would result in less than significant cumulative impacts to geology and soils with Alternative 5 having a minor contribution.

4.3.6.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

The same past, present, and reasonably foreseeable future actions described under Alternative 3 would also occur under Alternative 6, with less than significant impacts significant impacts to geology and soils. These impacts, when combined with the less than significant impacts to geology and soils as a result of Alternative 6, would result in less than significant cumulative impacts to geology and soils with Alternative 6 having a minor contribution.

4.3.6.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

The same past, present, and reasonably foreseeable future actions described under Alternative 3 would also occur under Alternative 7, with less than significant impacts to geology and soils. The development of additional renewable energy generation facilities are expected to be of a similar magnitude as those facilities presented under Alternatives 5 and 6; however, the exact impacts to geology and soils as a result of Alternative 7 would depend on the amount of area disturbed and the nature of the disturbance. Impacts are anticipated to be less than significant, and when combined with past, present and reasonably foreseeable actions impacting geology and soils, cumulative impacts are expected to be less than significant with Alternative 7 having a minor contribution.

4.3.6.8 Alternatives Combined

Impacts associated with the combined alternatives would likely result in significant impacts to geology and soils. When combined with the past, present, and reasonably foreseeable future actions, as described under Alternative 3, significant impacts to geology and soils would occur.

4.3.7 Hazardous Materials, Hazardous Waste, and Safety

The discussion of the cumulative effects of hazardous materials, hazardous waste, and safety addresses the properties in the ROI in which the cumulative projects are taking place. The effects of hazardous materials and hazardous waste are commonly localized and limited to the boundaries of the project ROI.

4.3.7.1 Alternative 1 – No Action

Under the No Action Alternative, the cumulative actions would be implemented and there could potentially be an increase in the amount of hazardous materials used and stored and hazardous waste generated and managed. However, existing policies, procedures, and regulatory requirements would be followed to manage these materials and ensure there are no adverse human or environmental impacts. Because Alternative 1 would result in no impacts to hazardous materials, hazardous waste, or safety; there would be no cumulative impacts.

4.3.7.2 Alternative 2 – Conservation Policies and Procedures

Policies and procedures developed and implemented under this alternative would be beneficial related to the implementation of cumulative impact projects. Cumulative projects located on Fort Bliss would be required to comply with all applicable policies and procedures regarding hazardous materials, hazardous wastes, and safety and comply with all applicable regulatory requirements. These actions are described in more detail under Alternative 4. Cumulative impacts would be less than significant.

4.3.7.3 Alternative 3 – Water Reclamation Pipeline

The increase in construction activities related to implementing cumulative projects could result in an increase in the use of hazardous materials and a potential increase in petroleum leaks or releases when combined with the purple pipe. Implementation of established policies and procedures and use of BMPs would minimize any such incidents. These actions are described in more detail under Alternative 4. Cumulative impacts would be less than significant.

4.3.7.4 Alternative 4 – Waste-to-Energy Plant

The amount of hazardous materials used and hazardous waste generated is expected to increase when combined with implementation of cumulative actions. Construction of new facilities on East and West Bliss would generate small amounts of hazardous waste and require controlled amounts of hazardous

materials. If demolition of existing structures were required, building materials such as asbestos and LBP found during previous surveys of East and West Bliss would be disposed of properly by licensed personnel. No asbestos or LBP would be used in the construction of new facilities. Controlled amounts of POLs would be required to fuel and maintain construction equipment working on East and West Bliss. The implementation of installation BMPs and continued implementation of the IHWMP would minimize POL and hazardous waste contamination during construction. Less than significant adverse impacts are expected if BMPs are implemented. Cumulative impacts are anticipated to be less than significant.

4.3.7.5 Alternative 5 – Geothermal Energy Facility

The amount of hazardous materials used and hazardous waste generated is expected to increase when combined with implementation of cumulative projects. The potential for additional leaks and spill of chemicals and petroleum products related to the construction and operation is expected to increase. The construction and operation of the new facilities would add to the current hazardous materials used and hazardous waste generation and storage. The implementation of BMPs and continued implementation of the IHWMP would minimize the impacts from hazardous material and waste generation, storage, handling, and disposal. Cumulative impacts would be less than significant.

4.3.7.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Cumulative impacts to hazardous materials, hazardous waste, and safety would be less than significant and similar to that described for Alternative 4.

4.3.7.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Cumulative impacts to hazardous materials, hazardous waste, and safety would be less than significant and similar to that described for Alternatives 4 through 6.

4.3.7.8 Alternatives Combined

The potential for hazardous materials usage and hazardous waste generation is expected to increase from the implementation of all alternatives combined in conjunction with the implementation of cumulative projects. As with other alternatives, there would be the potential for additional leaks and spill of chemicals and petroleum products related to the construction and operation. The construction and operation of the newly constructed facilities would add to the current hazardous materials used and hazardous waste generation and storage. The implementation of BMPs and continued implementation of the IHWMP would minimize the impacts from hazardous material usage and waste generation, storage, handling, and disposal. Less than significant adverse impacts are expected if BMPs are implemented and established policies and procedures are followed.

4.3.8 Land Use

The study area considered in the cumulative analysis for the land use includes land in the immediate vicinity of the proposed alternatives both in Fort Bliss and outside of the Fort Bliss boundaries as well as land use within Fort Bliss as a whole.

4.3.8.1 Alternative 1 – No Action

Because no impacts to land use are expected as a result of Alternative 1, no cumulative impacts would occur.

4.3.8.2 Alternative 2 – Conservation Policies and Procedures

The past, present, and reasonably foreseeable future actions that could impact land use include the 2005 BRAC, Grow the Army stationing and training, construction of the Kay Bailey Hutchinson desalination plant, the public/private residential development, implementation of the Fort Bliss Mission and Master Plan, construction and operation of the U.S. ICE El Paso city administrative facility, EPEC's plans to pursue additional generating capacity, the construction and operation of AOBs at McGregor Range Camp, Texas DOT Route Location Project, Fort Bliss Solar Renewable Energy projects, and the proposed EPEC power plant near Montana Avenue. The effects of construction and use associated with the above projects and plans alter land use typically from open space to a developed area. In some instances, developed land use is simply altered from a particular use to another developed use. Each of these projects has or will have to fit existing development plans and zoning and have been or will be screened for compatibility to adjacent land uses. The impacts to land use of these past, present, and reasonably foreseeable future actions would be less than significant

The less than significant impacts of the above actions, when combined with the less than significant impacts of Alternative 2, would result in less than significant cumulative impacts to land use.

4.3.8.3 Alternative 3 – Water Reclamation Pipeline

The same past, present, and reasonably foreseeable future actions described under Alternative 2 would also occur under Alternative 3. These impacts, when combined with the less than significant impacts to land use under Alternative 3, would result in less than significant cumulative impacts to land use with Alternative 3 having a minor contribution.

4.3.8.4 Alternative 4 – Waste-to-Energy Plant

The same past, present, and reasonably foreseeable future actions described under Alternative 2 would also occur under Alternative 4. These impacts, when combined with the less than significant impacts to

land use as a result of Alternative 4, would result in less than significant cumulative impacts to land use with Alternative 4 having a minor contribution.

4.3.8.5 Alternative 5 – Geothermal Energy Facility

The same past, present, and reasonably foreseeable future actions described under Alternative 2 would also occur under Alternative 5. These impacts, when combined with the less than significant impacts to land use as a result of Alternative 5, would result in less than significant cumulative impacts to land use with Alternative 5 having a minor contribution.

4.3.8.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

The same past, present, and reasonably foreseeable future actions described under Alternative 2 would also occur under Alternative 6. These impacts, when combined with the significant impacts to land use as a result of Alternative 6, would result in significant cumulative impacts to land use with Alternative 6 contributing significant impacts due to the conversion of training land to CSP facility.

4.3.8.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

The same past, present, and reasonably foreseeable future actions described under Alternative 2 would also occur under Alternative 7. The development of additional renewable energy facilities are expected to be of a similar magnitude as those presented under Alternatives 5 and 6; however, the exact impacts to land use as a result of Alternative 7 would depend on the amount of area disturbed and the nature of the disturbance. Impacts are expected to be less than significant, and when combined with past, present and reasonably foreseeable actions impacting land use, cumulative impacts are expected to be less than significant with Alternative 7 having a minor contribution.

4.3.8.8 Alternatives Combined

Impacts associated with the combined alternatives would result in significant impacts due to conversion of training land under Alternative 6. However, the amount of overall land altered would be relatively small in comparison to existing land uses and land use changes would need to adhere to all zoning codes and be compatible with existing land uses. When combined with the past, present, and reasonably foreseeable future actions described under Alternative 2 which result in significant impacts to land use.

4.3.9 Noise

Cumulative noise impacts are time, location, duration, and magnitude dependent. In order for one noise event to have a cumulative impact with another noise event, the events need to occur during the same averaging period, i.e., during the same day for Leq (24 hour) or DNL. Multiple noise events would need

to occur within earshot of a specific location in order to have a cumulative impact. The duration of an impact is important cumulatively because occasional short and very loud impulse noise may cause a startle, but this type of noise is not necessarily as intrusive as a long, drawn-out, medium-loud noise event. On the other hand, many short, loud noises can be extremely intrusive. The magnitude of the two events needs to be similar to have a cumulative impact. If one event is 10 dBA or louder than the other event, the loudest event dominates the noise environment. The geographic ROI for noise would be the same ROIs described in Section 3.10 for each alternative.

The geographic area, timing, and nature of the action for each of the projects with the potential to cause cumulative impacts listed in Sections 4.2.1 and 4.2.2 were compared to the various alternatives to determine whether there would be a cumulative impact.

4.3.9.1 Alternative 1 – No Action

Under the No Action Alternative, there would be no noise impacts; therefore, there would be no cumulative noise impacts.

4.3.9.2 Alternative 2 – Conservation Policies and Procedures

Under Alternative 2, there would be negligible noise impacts; therefore, there would be negligible cumulative noise impacts.

4.3.9.3 Alternative 3 – Water Reclamation Pipeline

Construction noise impacts would be the only noise impacts due to this alternative. Cumulatively, only those projects listed in 4.2.1 and 4.2.2 that generate noise near housing areas on East and West Bliss have the potential for cumulative noise impacts. The Balfour Beatty project to lease rooftop space for solar PV units for individual homes in the housing areas could have potential for cumulative noise impacts when combined with this alternative. It is unlikely that leasing and installation of rooftop solar units would be installed at exactly the same time as the pipeline construction. Even if they were to occur at the same residence on the same day, the cumulative impact would be for only about three hours total while the excavation occurs adjacent to the residence. Cumulative impacts to the acoustic environment would be less than significant.

4.3.9.4 Alternative 4 – Waste-to-Energy Plant

Of all of the potential cumulative impacts projects listed in Sections 4.2.1 and 4.2.2, only the Growth and Force Structure Realignment project, the proposed EPEC power plant, EPEC's plans to pursue additional generating capacity, and the construction of the U.S. ICE El Paso city administrative facility would have noise impacts that would intersect the impacts to this alternative. The Growth and Force Structure

Realignment project would raise large caliber weapons noise in the STA such that the LUPZ would be near the proposed WTE plant and the proposed EPEC power plant, EPEC's plans to pursue additional generating capacity, and the U.S. ICE El Paso city administrative facility. The large caliber noise and construction and operation noise combined with construction and/or operations for the WTE plant would result in increased noise levels. Mathematically, it is not possible to add "A-weighted" noise levels (WTE plant) to "C-weighted" noise levels (large caliber weapons). However, the noise levels due to the LUPZ would be about 57 dBC and well under the 65-dBA standard. Similarly, operations at the proposed WTE would generate noise of only 50 dBA at Homestead Meadows and the large caliber noise would dominate the noise environment. Cumulative impacts to the acoustic environment would be less than significant.

4.3.9.5 Alternative 5 – Geothermal Energy Facility

Projects with the potential to have a cumulative noise affect with this alternative would be noise impacts associated construction and use of AOBs at McGregor Range Camp. Construction impacts by both actions could have a cumulative impact at McGregor Range Camp but would be short term and would be dominated by the large caliber weapons Noise Zone II of 62 to 67 dBC. Operational noise levels due to this alternative would be in the low 50-dBA range, and once construction of the AOB is completed, the noise levels at the AOB should similar to a billeting facility, and 50 dBA would be somewhat normal. Again, the large caliber noise impacts would greatly dominate the noise environment and cumulative impacts associated with the two projects would be less than significant.

4.3.9.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

As discussed in Section 4.3.9.4, only the Growth and Force Structure Realignment project, the proposed EPEC power plant, EPEC's plans to pursue additional generating capacity, and the construction of a U.S. ICE El Paso city administrative facility would have noise impacts that would intersect the impacts to this alternative. Cumulative impacts to the residents at Homestead Meadows would be approximately the same as described for Alternative 4 with the large caliber noise dominating the noise environment.

4.3.9.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Cumulative impacts would be anticipated to be similar to Alternatives 5 and 6 and less than significant; however, site-specific NEPA analysis would be conducted, as appropriate, to analyze the impacts.

4.3.9.8 Alternatives Combined

Alternatives 4 and 6 are the only two alternatives that affect the same receptors. As discussed above, the Growth and Force Structure Realignment project, the proposed EPEC power plant, EPEC's plans to pursue additional generating capacity, and the construction of the U.S. ICE El Paso city administrative

facility would have noise impacts that would intersect the impacts to this alternative. Cumulatively, the large caliber weapons noise is expected to be the dominate noise, with the WTE and CSP as minor contributors to the noise environment. Cumulative noise levels are expected to remain below the City of El Paso noise standards, resulting in less than significant impacts.

4.3.10 Socioeconomics and Environmental Justice

Socioeconomic impacts of past, present, and reasonably foreseeable future actions, would contribute to the ROI primarily through their impacts to construction spending and population growth.

Past actions are considered in the baseline analysis of this document. Several of these past actions include the relocation of military units, divisions, and brigades to Fort Bliss and the construction of their supporting facilities. The total number of previously relocated persons is already accounted for in the analysis of the installation's current population levels in Chapter 3.

Many of the present and reasonably foreseeable future actions would cause increases in the local population, new construction-related spending, and movement of new equipment and supporting materials into the ROI. Population growth, regardless of the source, would have an impact on the local housing supply, sales, educational services, and government and emergency services. The movement of materials, such as aircraft and vehicles, is not expected to have a socioeconomic impact on the ROI. Furthermore, it is likely that purchases of supplies for these materials would come from outside the ROI. Some additional local economic impacts could occur as a result of additional transportation of goods and services to the installation to support this new equipment. Construction of new facilities at Fort Bliss would have an impact on local sales, income, and employment in the area. Finally, one reasonably foreseeable future action involves the leasing of solar panels on homes within Fort Bliss. These panels would provide all or a portion of power to the homes on which they are placed. This project could have a less than significant impact on utility rates as all or a portion of these customers' power demands are removed from the electric grid. However, this impact is expected to be negligible given the small percentage of power these panels would be removing from the grid. Additionally, EPEC is considering constructing a new power plant and is seeking additional generating capacity. It is possible that the construction of this plant and future generating capacity could impact electrical rates both positively and negatively. The associated generating capacity could have a positive impact on rates because the power plant would provide EPEC with its own source of power production and would reduce EPEC's need to purchase power from other power producers, which could subsequently reduce costs and rates. However, the construction of this plant also could increase rates because the cost of the facility places a debt on EPEC that it would then pass on to its customers.

The impacts resulting from the construction of present and reasonably foreseeable future projects would be positive, providing additional employment, income, and sales to the local economy. Additionally, impacts to income, employment, and sales would likely be phased over the construction periods for each of the present and reasonably future foreseeable actions with construction-related projects. It is therefore likely that, during any one time, impacts to income, employment, and sales would be positive but less than significant. Present and reasonably foreseeable future projects impacts on population levels would be phased over a number of years as well. It is expected that the local housing supply would be able to support this population increase.

4.3.10.1 Alternative 1 – No Action

Under the no action alternative, the baseline population growth would continue and no construction of renewable energy or waste and water reduction projects would occur. Therefore, present socioeconomic conditions are expected to remain as they exist under the baseline conditions and no cumulative effects are expected to occur.

Under this alternative, Fort Bliss would not incrementally reduce the amount of electricity it consumes from the electric grid. Therefore, the action alternatives would not have an impact on utility rates. While it is not expected that Fort Bliss' remaining on the grid would have a significant cumulative impact, it would, depending on how the electricity on the grid is produced, represent one more entity on the grid consuming non-renewable energy. Cumulatively, no beneficial impacts would be realized from increased on-installation renewable energy sources.

Under this alternative, Fort Bliss would not incrementally reduce the amount of potable water it consumes nor would it reduce the amount of waste that it sends to landfills. Therefore, the cumulative impact of the no action alternative would be to have continued reliance on potable water for irrigation, this could cause a cumulative impact to water supplies and further constrain this resource which could cause rates to continue to increase in order to curb demand to sustain the resource.

Because implementation of this alternative is not expected to have a disproportionately high and adverse human health or environmental effect on minority, low-income, or younger segments of the local population, it would not cause cumulative impacts for purposes of environmental justice when considered with any other actions in the area.

4.3.10.2 Alternative 2 – Conservation Policies and Procedures

As shown above, past actions have, and present and future actions will contribute to impacts on socioeconomic resources in the ROI. Some portions of Alternative 2, such as new energy, waste, or water conservation and sustainability awareness programs, would have little or no socioeconomic effect;

however, others, such as the installation of new energy efficient systems, would have construction costs associated with them and these could have both local and non-local socioeconomic impacts. Therefore, impacts from construction-related spending associated with the development of past, present, and reasonably foreseeable future actions, when combined with the impacts from Alternative 2, would have a positive but less than significant impact on socioeconomic resources; however, Alternative 2 would have a negligible contribution to these impacts. Impacts from population growth related to the implementation of past, present, and reasonably foreseeable future actions, when combined with the impacts from Alternative 2, would have a positive impact on socioeconomic resources; however, Alternative 2 would not contribute to this impact because no anticipated population growth is projected to occur under Alternative 2. Since implementation of this alternative is not expected to have a disproportionately high and adverse human health or environmental effect on minority, low-income, or younger segments of the local population, it would not cause cumulative impacts for purposes of environmental justice when considered with any other actions in the area.

4.3.10.3 Alternative 3 – Water Reclamation Pipeline

The effects on socioeconomic resources from past, present, and reasonably foreseeable future actions would be similar to those identified at the beginning of Section 4.3.10. Alternative 3 would have a minimal impact to socioeconomic resources in the ROI. Construction-related spending would be the primary economic impact under this alternative. Impacts from construction-related spending related to the development of past, present, and reasonably foreseeable future actions, when combined with the impacts from Alternative 3, would have a positive impact on socioeconomic resources; however, Alternative 3 would have a negligible contribution to these impacts. Since implementation of this alternative is not expected to have a disproportionately high and adverse human health or environmental effect on minority, low-income, or younger segments of the local population, it would not cause cumulative impacts for purposes of environmental justice when considered with any other actions in the area.

4.3.10.4 Alternative 4 – Waste-to-Energy Plant

The effects on socioeconomic resources from past, present, and reasonably foreseeable future actions are identified at the beginning of Section 4.3.10. Alternative 4 would have a less than significant impact on socioeconomic resources. Construction-related spending and changes to local population levels would provide the primary economic impacts to the local community under this alternative. Impacts from construction-related spending related to the development of past, present, and reasonably foreseeable future actions, when combined with the impacts from Alternative 4, would result in a beneficial impact to socioeconomic resources; Alternative 4 would have a less than significant contribution to these impacts. Cumulative impacts to local sales, income, and employment would be confined to the period of

construction under Alternative 4. Therefore, cumulative impacts resulting from construction-related spending would occur only during the period of construction under Alternative 4. Alternative 4 is anticipated to have a small, minor impact on local population levels. Impacts to population levels related to the implementation of past, present, and reasonably foreseeable future actions, when combined with the impacts from Alternative 4, would result in an positive impact on socioeconomic resources; however, Alternative 4 would have a negligible contribution to these impacts. It is assumed that BMPs would be used under this alternative during the construction and operation of the WTE and transportation of waste materials to the WTE. Therefore, implementation of this alternative is not expected to have a disproportionately high and adverse human health or environmental effect on minority, low-income, or younger segments of the local population, it would not cause cumulative impacts for purposes of environmental justice when considered with any other actions in the area.

4.3.10.5 Alternative 5 – Geothermal Energy Facility

The effects on socioeconomic resources from past, present, and reasonably foreseeable future actions are identified at the beginning of Section 4.3.2. Though the construction-related spending of this alternative would be approximately four times greater than Alternative 3, impacts to socioeconomics resources as a result of this spending would be similar to Alternative 3. Therefore, Alternative 5 would have cumulative impacts similar to those described under Alternative 3.

4.3.10.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

The effects on socioeconomic resources from past, present, and reasonably foreseeable future actions are identified at the beginning of Section 4.3.2. Alternative 6 would have a great but less than significant impact on socioeconomic resources in the ROI. This alternative would primarily have an impact on the local economy resulting from its construction-related spending. Impacts from construction-related spending related to the development of past, present, and reasonably foreseeable future actions, when combined with the impacts from Alternative 6, would result in a positive impact to socioeconomic resources; however, Alternative 6 would have a great but less-than-significant contribution to these impacts. Cumulative impacts to local sales, income, and employment would be confined to the period of construction of Alternative 6. Alternative 6 is anticipated to have a small, minor impact on local population levels. Impacts to population levels related to the implementation of past, present and reasonably foreseeable future actions, when combined with the impacts from Alternative 6, would result in a positive impact on socioeconomic resources; however, Alternative 6 would have a negligible contribution to these impacts. Since implementation of this alternative is not expected to have a disproportionately high and adverse human health or environmental effect on minority, low-income, or

younger segments of the local population, it would not cause cumulative impacts for purposes of environmental justice when considered with any other actions in the area.

4.3.10.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

The effects on socioeconomic resources from past, present, and reasonably foreseeable future actions are identified at the beginning of Section 4.3.2. Socioeconomic impacts resulting from the implementation of Alternative 7 are dependent on the renewable energy project chosen and its location. However, it is likely that additional renewable energy development under this alternative would have a positive impact on socioeconomic resources in the ROI as a result of construction-related project spending. Impacts from construction- related spending related to the development of past, present and reasonably foreseeable future actions, when combined with the impacts from Alternative 7, would result in a positive impact to socioeconomic resources; however, Alternative 7 would likely have a positive, but less than significant contribution to these impacts. Cumulative impacts to local sales, income and employment would be confined to the period of construction of Alternative 7. Renewable energy development projects that are pursued under this alternative have the potential to increase the population in the ROI as a result of creating jobs that create a demand for workers to migrate into the ROI to fill these jobs. Therefore, there is some possibility that this alternative, when combined with impacts from the implementation of past, present and reasonably foreseeable future actions would result in an increase in population levels; however, Alternative 7 would have a positive, but negligible contribution to these impacts.

Since implementation of this alternative is not expected to have a disproportionately high and adverse human health or environmental effect on minority, low-income, or younger segments of the local population, it would not cause cumulative impacts for purposes of environmental justice when considered with any other actions in the area.

4.3.10.8 Alternatives Combined

The effects on socioeconomic resources from past, present, and reasonably foreseeable future actions are identified at the beginning of Section 4.3.2. In combination, all of the alternatives combined would have a great, but less than significant impact on socioeconomic resources. These alternatives would primarily have an impact on the local economy through associated construction-related spending and impacts to the local population. Impacts from construction- related spending related to the development of past, present and reasonably foreseeable future actions, when combined with the impacts from all of the alternatives combined, would result in a positive impact to socioeconomic resources; however, the alternatives combined would have a great, but less-than-significant contribution to these impacts. Cumulative impacts to local sales, income, and employment would be confined to the period of construction of each of the

alternatives. In combination, the alternatives are anticipated to have a small, minor impact on local population levels, primarily during the period of construction. Impacts from population levels related to the implementation of past, present and reasonably foreseeable future actions, when combined with the impacts from each of the alternatives, would result in a positive impact on socioeconomic resources; however, the combination of each of the alternatives impacts to population would have a negligible contribution to these impacts. Implementation of these alternatives is not expected to have a disproportionately high and adverse human health or environmental effect on minority, low-income, or younger segments of the local population; therefore, it would not cause cumulative impacts for purposes of environmental justice when considered with any other actions in the area.

4.3.11 Water Resources

In considering the impacts of each alternative in the context of past, present and reasonably foreseeable future project, the geographic boundary is the extent of the aquifers that serve Fort Bliss and would be impacted by the alternatives and the cumulative actions. Historical drawdown of the Hueco Bolson and Mesilla Bolson aquifers has decreased amounts of available water and has increased salinity in the aquifers.

4.3.11.1 Alternative 1 – No Action Alternative

All past, present and reasonably foreseeable future actions that increase population on Fort Bliss and in neighboring El Paso would add or have already placed additional demand on these water resources from the aquifers that serve the installation, El Paso, and Ciudad Juarez. Development of new energy sources such as the new El Paso power plant, new solar facilities, and the geothermal facility for the hospital at Fort Bliss would also contribute to increased water demand in the area. Depletions of the aquifer could cause further issues with salinity, although EPWU has constructed a desalination plant that is utilizing the groundwater with higher salt content. The plant can treat 27.5 million gallons per day, increasing El Paso water production by 25 percent, and has capacity for 50 years, creating additional water resources for Fort Bliss (EPWU 2012c). Although the population and overall water demand at Fort Bliss is relatively small in comparison to the surrounding metropolitan area, by not implementing any additional water conservation measures per the No Action Alternative, water demand at Fort Bliss would continue to contribute to water supply issues in the region more rapidly than would occur with implementation of alternatives, and development and growth outside the installation would also continue to increase demand on water resources.

Water quality issues associated with past, present and reasonably foreseeable projects would be associated mostly with increased impermeable surfaces and short-term impacts from construction. The No Action Alternative would not contribute noticeable water quality impacts.

4.3.11.2 Alternative 2 – Conservation Policies and Procedures

Past, present, and reasonably foreseeable future actions with the potential to impact water supply and water quality would be the same as with Alternative 1. There would therefore be additional demand for water supply as the result of an increased population at Fort Bliss and with other projects in the area. Implementation of Alternative 2, putting aggressive water conservation policies and procedures in place and addressing water loss from existing water pipes would contribute beneficially by lessening the increase in demand for water on base and help to offset the rate of increase in demand for water supply.

Implementation of Alternative 2 would not contribute any noticeable adverse water quality impacts to past, present, or reasonably foreseeable future projects.

4.3.11.3 Alternative 3 – Water Reclamation Pipeline

Past, present, and reasonably foreseeable future actions with the potential to impact water supply and water quality would be the same as with Alternative 1. Extension of the water reclamation pipeline onto Fort Bliss would contribute long-term benefits to water demand by addressing two of the largest sources of water demand on the installation. The alternative would contribute short-term adverse impacts to water quality from construction activities that would be mitigated with the use of appropriate sediment and erosion control practices.

4.3.11.4 Alternative 4 – Waste-to-Energy Plant

Past, present, and reasonably foreseeable future actions with the potential to impact water supply and water quality would be the same as with alternative one. The WTE plant would contribute additional demand for water, although it would use less water per power unit than a comparable fossil fuel plant (assuming a dry-cooled, self-contained facility), and would also create large amounts of impermeable surface that would reduce groundwater recharge and increase volume of stormwater runoff, as well as stormwater-related pollution. Construction activities would also contribute short-term adverse impacts on water quality. T, the contribution of Alternative 4 on impacts to water quantity and quality from other past, present and reasonably foreseeable projects would be relatively small but noticeable with the use of accepted management practices to protect water resources, and the maximizing reuse of water in the cooling cycle.

4.3.11.5 Alternative 5 – Geothermal Energy Facility

Past, present, and reasonably foreseeable future actions with the potential to impact water supply and water quality would be the same as with alternative one. The geothermal facility would contribute to additional aquifer withdrawals that could be comparable to water demand for a fossil fuel plant, although most withdrawals and reinjection would be deeper than the Hueco Bolson aquifer, the water supply

source for Fort Bliss and much of the surrounding area. There is a limited risk that the act of drilling the geothermal wells could contribute water quality impacts to the Hueco Bolson, and the construction activities at the site would contribute short-term impacts to water quality and increase impermeable surface over the longer term, which would reduce groundwater recharge and increase stormwater impacts, although stormwater management practices would be put in place.

4.3.11.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Past, present, and reasonably foreseeable future actions with the potential to impact water supply and water quality would be the same as with alternative one. The development of the solar technology would contribute short-term impacts from soil disturbance during construction, and these impacts would be mitigated through the implementation of sediment and erosion control practices. There would be increased impermeable surfaces associated with the CSP fields that would reduce groundwater recharge and increase stormwater runoff and runoff of pollutants similar to other alternatives. CSP would require some water demand to clean the solar mirrors on a regular basis, although those impacts would be less noticeable than for development of other more traditional energy technologies.

4.3.11.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

Past, present, and reasonably foreseeable future actions with the potential to impact water supply and water quality would be the same as with Alternative 1. Contributions of impacts to the cumulative scenario would vary with the energy technology developed, and the number and size of the facilities. All of the new facilities would contribute short-term impacts related to stormwater runoff during construction, and these impacts would be mitigated through sediment and erosion control practices. All facilities would result in new impermeable surface that also would affect stormwater runoff volume and quality over the long term. Stormwater management practices would be required, however, and would mitigate impacts associated with both stormwater quality and quantity. There would be potential impacts to groundwater quality associated with the drilling of the geothermal wells, and increases in water demand associated with all of the energy technologies. All of these contributions would be relatively insignificant compared to the size of the base and the water demand of the surrounding area, however, and the energy technologies are mostly more water efficient than the current gas fired plant that serves Fort Bliss currently.

4.3.11.8 Alternatives Combined

Past, present, and reasonably foreseeable future actions with the potential to impact water supply and water quality would be the same as with alternative one. Development of all the alternatives would result

in contribution of several benefits to water demand by using reclaimed water, implementing aggressive conservation measures, and addressing evaporative water loss in the pipes, all of which combined would noticeably reduce demand for water from the Hueco Bolson aquifer. Implementation of non-fossil fuel based energy alternatives would also mostly compare favorably in terms of water demand when compared with natural gas facilities from which Fort Bliss gets its energy currently, although these facilities would introduce new sources of water demand. All of the new facilities and road and pipe construction would contribute short-term water quality impacts from sediment runoff during construction. The new impermeable surfaces also would contribute water quality impacts, although they would be relatively insignificant when compared to the overall size of the Fort Bliss installation. The geothermal facilities (with the potential for groundwater contamination during the drilling of the well and the possibility of pollution related to geothermal brines) and the WTE plant would contribute the most noticeable water quality impacts, although they would be limited and mitigated with proper management practices.

4.3.12 Transportation and Traffic

In considering the impacts of each alternative in the context of past, present and reasonably foreseeable future project, the geographic boundary for traffic and transportation is the immediate and nearby area of the project footprint, as well as overall traffic patterns.

4.3.12.1 Alternative 1 – No Action

Traffic impacts associated with an increase in traffic generated by construction workers and delivery trucks and road closures and/or detours during construction periods of projects identified in the cumulative impact study area would be less than significant and short term. These impacts would end with the construction phase at each project or site.

Projects identified in the cumulative impact study area and population increase in and around El Paso and smaller communities would cause increased traffic volumes on regional and local roadways. However, transportation improvement plans developed as part of these projects and the Texas DOT Route Location Project would maintain traffic conditions on these roadways under capacity with the exception of some key roadways. The LOS on some segments of U.S. 54 would decline to unacceptable level as a result of the Fort Bliss Mission and Master Plan and the increased trans-border traffic on U.S. 54. The Montana Avenue and Loop 375 and Liberty Expressway intersections would decline to unacceptable LOS as a result of the potential sale and/or exchange of land at Parcel A and B at the southeastern portion of East Bliss north of Montana Avenue and east of the El Paso International Airport. Additional roadway connections, other planned infrastructure, and alternative transportation modes (i.e., public transportation) are being planned or discussed to accommodate future traffic demand in El Paso. Therefore, the effects of

these past, present, and reasonably foreseeable future actions would be considered significant but would be mitigated to less than significant through road improvements and construction and traffic management.

This alternative would have not contribute to increases in traffic volumes or alter traffic patterns in El Paso because Fort Bliss would not implement any actions beyond those policies and procedures that are currently in place. There would be no cumulative impact because Alternative 1 would have no impact on traffic and transportation.

4.3.12.2 Alternative 2 – Conservation Policies and Procedures

The implementation of policies and procedures under this alternative would have no effect on increased traffic volumes and would not alter traffic patterns in El Paso. Therefore, there would be no cumulative impact as described under Alternative 1.

4.3.12.3 Alternative 3 – Water Reclamation Pipeline

The cumulative construction impacts associated with increased traffic generated by construction workers and delivery trucks and road closures and detours under Alternative 3 in addition to the other planned projects identified in the cumulative impact study area would be less than significant and short term. These impacts would end with the construction phase at each project or site.

Because no new employees or staff would be added to East and West Bliss as a result of implementing the purple pipe under Alternative 3, no traffic impact is expected under this alternative. Cumulative impacts from implementation of this alternative and other area transportation studies or projects would be less than significant in both the short term and long term.

4.3.12.4 Alternative 4 – Waste-to-Energy Plant

Construction activities under Alternative 4 are expected to result in surface disruption and substantial construction worker and truck traffic for approximately 2 years. The projected construction worker traffic and truck delivery traffic would have a significant impact on the traffic flow along the already congested route on Montana Avenue during the PM peak hour. Cumulative impacts from the implementation of this alternative, construction of the proposed public/private residential development north of Montana Avenue and west of Loop 375, construction of the U.S. ICE El Paso city administrative facility, and implementation of other area transportation studies or projects would be significant and short term during construction period.

The combined employee and delivery truck trips for the WTE plant under Alternative 4 would generate 104, 84, and 46 PCEs during the AM, midday, and PM peak hours, respectively. As shown in Table 4-1, the additional two travel lanes (one in each direction) proposed on Montana Avenue between Limerick

Road and Loop 375, intersection improvements at Spur 601 and Loop 375 (north and south) intersections, and other traffic mitigation measures as part of the Mitigation Option I of the public/private residential development and U.S. ICE El Paso city administrative facility project would provide sufficient capacity to accommodate the increase in future traffic demand associated with all cumulative projects under Alternative 4A at all analyzed intersections, except three. The Spur 601 and Loop 375 north intersection would continue to operate at LOS F during the AM peak hour and the Montana and Yarbrough/Global Reach Drives intersection would improve from LOS F to LOS E during the PM peak hour under the No Action Alternative. In addition, the intersection delays at these two intersections would be reduced when compared with the No Action Alternative. In addition, the City of El Paso is working with the developers of the public/private residential community off Montana Avenue to continue to enhance proposed traffic improvements in the study area.

Table 4-1. LOS for Key Intersections—Cumulative Condition under Alternative 4A

Intersection	No Action Alternative		Alternative 4		Cumulative Alternative 4	
	Delay	LOS	Delay	LOS	Delay	LOS
AM Peak Hour						
Montana Avenue and Yarbrough/Global Reach Drives	115.7	F	115.0	F	18.2	B
Montana Avenue and Loop 375 south	16.2	B	16.6	B	23.1	C
Montana Avenue and Loop 375 north	20.5	C	20.8	C	20.0	B
Montana Avenue and conceptual truck route (unsignalized)	NA	NA	24.6	C	49.1	E
Spur 601 and Loop 375 south	35.9	D	35.9	D	24.1	C
Spur 601 and Loop 375 north	148.9	F	149.5	F	80.9	F
PM Peak Hour						
Montana Avenue and Yarbrough/Global Reach Drives	135.3	F	135.9	F	79.5	E
Montana Avenue and Loop 375 south	50.3	D	51.1	D	25.2	C
Montana Avenue and Loop 375 north	18.7	B	19.1	B	16.3	B
Montana Avenue and conceptual truck route (unsignalized)	NA	NA	17.7	C	27.4	D
Spur 601 and Loop 375 south	8.5	A	8.5	A	5.3	A
Spur 601 and Loop 375 north	13.0	B	13.0	B	13.8	B

Source: The Louis Berger Group, Inc. (2012)

For the Montana Avenue and the conceptual trash route intersection, the southbound left turn would change from LOS C under Alternative 4A to LOS E with 49.1 seconds of delay due to increased traffic on Montana Avenue for all cumulative projects. However, the LOS E condition is for two vehicles making

southbound left turns from the conceptual truck routes onto eastbound Montana Avenue. In addition, the proposed wide median would provide sufficient storage length for the southbound left turn traffic to wait in the median to find a gap to turn onto eastbound Montana Avenue. Therefore, the LOS F for only two vehicles would have less than significant impact at this intersection. Thus, cumulative impacts from implementation of this alternative and other area transportation studies or projects would be significant and short term during construction and less than significant in the long term.

4.3.12.5 Alternative 5 – Geothermal Energy Facility

The cumulative construction impacts would result in increased traffic generated by construction workers and delivery trucks and road closures and detours under Alternative 5 in addition to the other planned projects identified in the cumulative impact study area and would be less than significant and short term. These impacts would end with the construction phase at each project or site.

No new employees or staff would be added for the Geothermal Energy facility under Alternative 5. Therefore, no traffic impact is expected under this alternative. Cumulative impacts from implementation of this alternative and other area transportation studies or projects would be less than significant in both short term and long term.

4.3.12.6 Alternative 6 – Dry-cooled Concentrating Solar Power Technology

Construction traffic impacts to public roadways would be less than significant and short term during the implementation of Alternative 6. The cumulative construction impacts associated with increased traffic generated by construction workers and delivery trucks under this alternative and other planned projects identified in the cumulative impact study area would be less than significant and short term. These impacts would end with the construction phase at each project or site.

The effects of the additional 56 daily employee trips and other vehicle trips on public and internal roadways within the installation would be less than significant impact. Cumulative impacts from implementation of this alternative and other area transportation studies or projects would be less than significant impacts in both the short term and long term.

4.3.12.7 Alternative 7 – Implement Additional Renewable Energy Development at Compatible Sites

The implementations of additional geothermal, wind, or solar resources under this alternative would have impacts similar to those described for Alternatives 5 and 6. Therefore, cumulative impacts from the past, present, and reasonably foreseeable projects under Alternative 7 would be similar to Alternatives 5 and 6.

Cumulative impacts from implementation of this alternative and other area transportation studies or projects would be less than significant in both the short term and long term.

4.3.12.8 Alternatives Combined

Traffic impacts projected for each of the above seven alternatives would be less significant in both the short and long term. Alternative 4 would generate the most construction workers and vehicles trips during construction and operational conditions when compared with other alternatives. Therefore, cumulative impacts for the alternatives combined are expected to be similar or slightly worse than those under Alternative 4. Cumulative impacts from implementation of this alternative and other area transportation studies or projects would be significant and short term during construction and less than significant in the long term.

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5.0 POTENTIAL MITIGATION AND MONITORING

This chapter presents a summary of potential mitigation measures that could reduce adverse environmental impacts from the alternatives analyzed in this EIS. Consideration for avoidance and minimization of impacts to resources was incorporated into the alternatives screening criteria described in Section 2.2. Mitigation and monitoring measures to be considered by the Army and other entities are described by resource in this chapter. The ROD for this EIS will identify those mitigation measures that the Army will implement.

5.1.1 Air Quality

For all of the construction activities, the primary pollutant of concern is PM, and the most significant source of PM is fugitive dust. To minimize the potential, hazard dust control provisions would be used as BMPs and would include but not be limited to the use of chemical dust suppressants when water is insufficient, use of regular water truck passes to keep the dirt roads moist, restriction of activities during wind events, and building of wind breaks and shelters for fill piles. These same practices would apply to the operation of the WTE plant.

For all of the operational activities, commuting staff are a source of air emissions. Encouraging carpooling or shuttle service to the WTE plant to shorten staff commutes would reduce air emissions from mobile sources.

Additional mitigation measures could be implemented under Alternative 4. For example, regarding the WTE plant, the use of more efficient APCD that are above and beyond existing regulatory requirements could be established. This mitigation measure would have the benefit of reducing emissions but would come at an increased cost. Selective catalytic reduction is an option for NOx control, and would increase the efficiency of control from 45 percent to 80 percent.

5.1.2 Airspace

The implementation of Alternative 4 would require consultation and coordination with the FAA for placement of the WTE plant, and solar panels, and Fort Bliss would adhere to all applicable FAA airspace regulations.

5.1.3 Biological Resources

5.1.3.1 Vegetation

To minimize potential impacts to vegetation construction, BMPs would be employed during construction activities to minimize soil movement, stabilize runoff, and generally control sedimentation. These BMPs

would include, but not be limited to: the development of a project-specific SWPPP, regular and documented site inspections, the installation of silt fencing and sediment traps, minimization of disturbed surficial area at any given moment, stabilization of cut/fill slopes, minimization of earth-moving activities during wet weather, use of temporary detention ponds, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, as appropriate.

Preventive and control measures presented in the Fort Bliss INRMP would be followed in order to reduce the possibility of exotic species invasions and further spreading of existing populations. In addition, these areas would be monitored following construction to determine whether project activities are causing an increase of exotic or undesirable plant species. If monitoring shows that invasive species are increasing, then a strategy for control would be implemented.

In areas that would be irrigated with reclaimed water, Fort Bliss would incorporate management techniques for reducing impacts to vegetation from reclaimed water, such as increasing drainage potential through soil aeration, incorporating salt tolerant species into existing and new landscapes, applying water in excess of plants' water needs to maintain salt balance in root zone, blending more saline water with less-saline water, adding soil amendments to correct sodium and alkalinity problems, and avoiding spraying reclaimed water on the foliage of plants that are salt sensitive.

5.1.3.2 Wildlife and Sensitive Species

In order to minimize potential injury and entrapment of wildlife in open trenches and ditches during construction, construction would implement the following strategies: to minimize the amount of open trenches at any given time, crews trenching and backfilling would be kept close together, trenching would occur during cooler months when possible, when possible trenches would not be left overnight or an escape ramp would be constructed every 90 meters.

During the construction of transmission lines the 2006 Suggested Practices for Avian Projection on Power Lines (APLIC 2006) would be implemented and followed. In addition, an Avian and Bat Protection Plan would be developed using the 2006 Avian Protection Plan Guidelines and the 2012 USFWS Land-Based Wind Energy Guidelines for the construction and operation of these power lines and turbines associated with Alternative 7 (APLIC and USFWS 2005). If wind energy is developed as a part of Alternative 7, impacts to birds and bats would be reduced by following the 2012 USFWS Land-Based Wind Energy Guidelines during installation and operation of wind energy facilities (USFWS 2012).

Under Alternative 7, surveys would be conducted prior to construction to determine the presence of any listed or sensitive plant or animal species determined to have potential habitat in the area of impact for

future renewable energy projects. Fort Bliss would obtain the necessary permits for all projects, when required, to be in compliance with the Bald and Golden Eagle Act.

5.1.4 Cultural Resources

Fort Bliss has a PA and ICRMP that establish processes and procedures to address adverse effects on cultural resources. The processes and procedures in the PA and ICRMP would ensure that processes and procedures are in place to avoid, reduce, or mitigate adverse effects on historic properties or cultural resources of interest to the tribes. Adherence to the applicable processes, procedures, laws, and regulations would provide adequate protection for Fort Bliss cultural resources potentially impacted by the implementation of the Proposed Action. Specific measures to avoid or mitigate adverse effects on NRHP-eligible historic properties and cultural resources of interest to the tribes would be identified through consultation with the New Mexico and Texas SHPOs, tribal governments, and other interested parties. Identified avoidance or mitigation measures would be implemented as necessary. An archaeologist would be required onsite during ground-disturbing activities in the event of accidental discovery of archaeological features, artifacts, or Native American remains. No additional mitigation measures for cultural resources have been identified at this time.

5.1.5 Energy Demand and Generation

The implementation of any of the Proposed Action alternatives would not require any mitigation measures.

5.1.6 Geology and Soils

The following management strategies and tools would be used to help minimize and mitigate adverse impacts to geology and soils resulting from implementation of the all action alternatives that propose construction. Prior to construction all necessary construction permits would be obtained, and all construction would adhere to sediment and erosion control measures at Fort Bliss. Site-specific BMPs would be developed based on the proper design, run-off calculations, slope factors, soil type, topography, and construction activities involved. Examples of BMPs that could be utilized at Fort Bliss include, but are not limited to:

- Erosion control matting
- Silt fencing
- Storm drain outlet protection
- Stone check dams

- Construction exits
- Temporary and permanent seeding

The application of any or all of these BMPs depends upon precise, specific ground conditions in the areas disturbed by construction.

5.1.7 Hazardous Materials, Hazardous Waste, and Safety

The implementation of BMPs, procedures, and implementation of the IHWMP would minimize potential impacts from hazardous materials and hazardous waste generation, storage, handling, and disposal and POL and hazardous waste contamination during construction and operation.

Site workers and installation personnel in the range areas would be trained on how to identify munitions and explosives of concern/UXO and the proper protocol to be followed if munitions and explosives of concern/UXO are found.

5.1.8 Land Use

Fort Bliss would adhere to all existing land use management requirements and ensure that the implementation of all action alternatives that propose construction would be compatible with all adjacent or nearby land uses as well as the military mission at the installation. To ensure the compatibility of the Proposed Action, coordination within Fort Bliss and with applicable parties would be required.

5.1.9 Noise

The impacts associated with the construction activities under the action alternatives would be less than significant; however, that does not mean that receptors would not hear any noise from these actions. To further reduce noise levels, several steps may be implemented, including:

- Performing construction work during business hours only
- Sequencing work to minimize the number of loud construction equipment when working near residences
- Ensuring all noise muffling equipment is installed and working properly
- Using noise protection for workers, as directed by the Hearing Protection Program (U.S. Army 1998)
- Shutting off idling equipment not in use

- Sequencing the use of the loudest pieces of heavy equipment (e.g., graders and excavators) such that only a few pieces of equipment would be used in areas nearest the residential areas at any one time
- Using sound mufflers on heavy equipment and sound enclosures walls between work areas and residential areas

5.1.10 Socioeconomics and Environmental Justice

Construction and operation of Alternative 4 could have an impact on local communities as a result of dust and odor escaping the site during the construction and operation of the WTE plant. However, BMPs would be used to mitigate these impacts. Additionally, during the operational period of Alternative 4, dust and odor emissions from the WTE plant can be minimized if the WTE plant has an indoor tipping area, and a negative pressure is maintained inside the building to pull air from the refuse pit into the combustion chamber.

Some residents residing close to the WTE truck routes may be impacted by the increased truck traffic that would occur as a result of WTE trucks traveling between Montana Avenue and the WTE plant. These trucks could release odors that would disturb the local community. BMPs would be followed by WTE hauling trucks to prevent, to the extent possible, odors from escaping these trucks.

TCEQ has established general requirements for the use of reclaimed water. These requirements include stipulations requiring that vegetative cover be maintained and application times for reclaimed water avoid timeframes when wet vegetation would be contacted by people. Fort Bliss would ensure that the application of reclaimed water would avoid time frames during which human exposure would be likely. In addition, potential mitigation would include appropriate signage identifying areas where reclaimed water is applied.

5.1.11 Water Resources

Several mitigation measures would be used to protect water resources, including water quality and water supply:

- Under all alternatives, sediment and erosion control measures would be applied during construction, in accordance with the CWA:
    - Construction contract terms and conditions would include the following BMPs: dredging, filling, or grading in or adjacent to streams and riparian areas would be scheduled to occur during low-flow periods and would be in compliance with the CWA.
    - Application of dust-suppressing materials would occur according to industry standards.

- Turbidity and siltation from project-related work would be minimized and contained to the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse weather conditions.

- Trash or debris would be collected and disposed of properly.
- Per industry standards, appropriate measures, such as secondary containment, would be installed in industrial areas where materials that could pollute surface or groundwater is stored or used, so that spills would be contained and managed easily.

5.1.12 Transportation and Traffic

Construction of Alternative 4A would have short-term significant impacts to traffic on Fort Bliss and public routes.

The Montana Avenue and Loop 375 South intersection would change from LOS D under the No Action Alternative to LOS E during the PM peak hour under the construction condition for Alternative 4A. It is anticipated that the additional two travel lanes (one in each direction) proposed on Montana Avenue between Limerick Road and Loop 375 and signal optimization at this intersection as part of the Public/Private venture off Montana Avenue would minimize traffic impact at this intersection. Therefore, no additional mitigation measure is recommended for this intersection.

Another recommendation for construction period is to reduce construction worker trips during the peak hours through shift management. Even though the exact shifts of the 715 construction workers are not available at this time, it is recommended that at least one additional shift or multiple shifts should be provided on the weekday to reduce the number of construction workers that arrive and leave the site during the peak hour.

For the operational condition, cumulative impacts from implementation of this alternative and other area transportation studies or projects would be less than significant in the long term. The additional two travel lanes (one in each direction) proposed on Montana Avenue between Limerick Road and Loop 375, intersection improvements at Spur 601 and Loop 375 (North and South) intersections, and other traffic mitigation measures as part of the Public/Private venture off Montana Avenue would provide sufficient capacity to accommodate the increase in future traffic demand associated with all cumulative projects under Alternative 4A. The Montana Avenue and the conceptual trash route intersection would be designed according to Federal Highway Administration and El Paso DOT guidelines to accommodate the increase in truck traffic as part of Alternative 4A. Therefore, no mitigation measure is required for the operational condition under Alternative 4A.

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El Paso, TX 79936

Richard Burges Branch Library
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El Paso, TX 79924

UTEP Library
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Alamogordo Public Library
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Alamogordo, NM 88310

NMSU Zuhl Library
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Thomas Branigan Memorial Library
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9.0 ACRONYMS AND ABBREVIATIONS

AAF	Army Airfield
ACHP	Advisory Council on Historic Preservation
ACM	asbestos containing material
AD	Armored Division
ADNL	day-night average sound level for A-weighted noise
AGL	above ground level
AFB	Air Force Base
amsl	above mean sea level
AOB	Advanced Operations Base
APCD	air pollution control devices
APLIC	Avian Power Line Interaction Committee
AQCR	Air Quality Control Region
Army	U.S. Department of the Army
AST	aboveground storage tanks
Balfour Beatty	Balfour Beatty Communities
BCT	Brigade Combat Team
BLM	U.S. Bureau of Land Management
BMP	best management practice
BRAC	Base Realignment and Closure
Btu	British thermal unit
°C	degrees Celsius
CAA	Clean Air Act
CDD/CDF	total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofuran
CEQ	Council on Environmental Quality

CERCLA	Comprehensive, Environmental Response, Compensation, and Liability Act
CFH	cubic feet per hour
CFR	Code of Federal Regulations
CFU	colony-forming unit
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
CRM	Cultural Resource Manager
CSP	concentrating solar power
CST	concentrating solar thermal
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DNL	day-night average sound level
DoD	Department of Defense
DOT	Department of Transportation
DPW	Directorate of Public Works
DPW-E	Directorate of Public Works-Environment Division
DRMO	Defense Reutilization and Marketing Office
EA	environmental assessment
EIFS	Economic Impact Forecast System
EIS	environmental impact statement
EISA	Energy Independence and Security Act of 2007
EOD	explosives ordnance disposal
EPAct 2005	Energy Policy Act of 2005
EPEC	El Paso Electric Company
EPWU	El Paso Water Utilities

°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FBTC	Fort Bliss Training Center
FLAG	Federal Land Manager's Air Working Group
FLM	federal land manager
FPPA	Farmland Protection Policy Act of 1981
FTX	field training exercise
FY	fiscal year
G	gallons
GHG	greenhouse gas
GIS	Geographic Information System
H_2SO_4	sulfuric acid
HAP	hazardous air pollutant
HCl	hydrochloric acid
HVAC	heating, ventilation, and air conditioning
IBCT	Infantry Brigade Combat Team
ICRMP	Integrated Cultural Resources Management Plan
IFR	instrument flight rule
IHWMP	Installation Hazardous Waste Management Plan
INRMP	Integrated Natural Resources Management Plan
IPM	integrated pest management
IPMP	Integrated Pest Management Plan
IRP	Installation Restoration Program
ISD	Independent School Districts
ITE	Institute of Transportation Engineers

kW	kilowatt
kWh	kilowatt hours
kgal	thousand gallons
LBP	lead-based paint
Leq	equivalent noise level
Lmax	maximum A-weighted sound level
LUPZ	Land Use Planning Zone
MBTA	Migratory Bird Treaty Act
mg/l	milligrams per liter
ml	milliliter
mph	miles per hour
MSAT	Mobile Source Air Toxic
MSW	municipal solid waste
MVA	megavolt ampere
MW	megawatt
MWC	municipal waste combustor
MWh	megawatt-hour
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NMDGF	New Mexico Department of Game and Fish
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOI	Notice of Intent

NOx	nitrogen oxide
NRHP	National Register of Historic Places
NTA	North Training Areas
NTU	nephelometric turbidity unit
O_3	ozone
ODUSD	Office of Deputy Under Secretary of Defense
ORC	Organic Rankine Cycle
OSHA	Occupational Health and Safety Administration
P2	Pollution Prevention
PA	Programmatic Agreement
Pb	lead
PCB	polychlorinated biphenyls
PCE	passenger car equivalent
$PM_{2.5}$	fine particulate matter, less than or equal to 2.5 microns in diameter
PM_{10}	coarse particulate matter, less than or equal to 10 microns in diameter
POL	petroleum, oils, and lubricants
Ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
psig	pounds per square inch (gauge)
PTE	potential to emit
PV	photovoltaic
Q/D	quantity over distance
QDR	Quadrennial Defense Review
R-	Restricted

RCNM	Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	region of influence
RTV	rational threshold value
SHPO	State Historic Preservation Officer
SNCR	selective non-catalytic reduction
SO_2	sulfur dioxide
STA	Southern Training Areas
STG	steam turbine generator
SUA	special use airspace
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TCP	traditional cultural property
TSDF	Treatment Storage Disposal Facility
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
USC	United States Code
USDOT	Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
U.S. ICE	U.S. Immigration and Customs Enforcement
UST	underground storage tank
UXO	unexploded ordnance

VEC	valued environmental component
VFR	visual flight rule
VOC	volatile organic compound
WBAMC	William Beaumont Army Medical Center
WTE	waste-to-energy
WWTP	waste-water treatment plant

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10.0 GLOSSARY

Air defense. All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack.

Airspace management. The coordination, integration, and regulation of the use of airspace of defined dimensions.

Alluvial fan. A pattern of sediment deposit caused by running water. Fan- or cone-shaped mass of sediment deposited at a point along a stream at which there is a sharp decrease in gradient, such as between a mountain front and a plane. Two or more adjacent alluvial fans that are growing or have grown together are **coalescing alluvial fans**.

Alluvium. Any stream-laid sediment deposit.

Ambient. Surrounding or background conditions in the absence of an identifiable source.

Ambient air. That portion of the atmosphere, outside of buildings, to which the general public has access.

Aquifer. A body of rock that contains enough saturated permeable material to transmit groundwater and to yield significant quantities of groundwater to wells and springs.

Archaeological and Historic Preservation Act. Law that declares all federal agencies managing construction programs are responsible for any damages to scientific, prehistoric, and historic resources and are authorized to fund recovery, protection, and preservation of significant archaeological data and materials (enacted 1974).

Archaeological Resource Protection Act (ARPA). Law that strengthens preservation and protection laws through civil and criminal felony-level penalties for the destruction of resources and sites (enacted 1979).

Aridisol. A soil, formed under conditions of low moisture, that has been in place long enough to have developed distinct layers.

Asbestos. Any of several minerals (e.g., chrysotile) that readily separate into long flexible fibers suitable for use as a noncombustible, non-conducting, or chemically-resistant material. Asbestos has been used in the construction of floor tile, wall panels, brake pads in vehicles, ceiling tile, pipe material, and as insulating material around pipes and buildings. Inhalation of asbestos fibers can cause lung cancer.

Attainment area. A region that meets the NAAQS for a criteria pollutant under the CAA.

Attenuation of sound. Any noise level is diminished with distance from the source in a mathematically predictable manner. Under normal conditions, distance alone reduces the noise level by 6 dB for each doubling of the distance from the source. For example, a noise source that produces an 80 dB noise level at a distance of 50 meters would produce 74 dB at 100 meters. Absorption of sound energy by the atmosphere reduces noise levels even further.

Average annual daily traffic (AADT). For a 1-year period, the total volume passing a point or segment of a highway facility in both directions divided by the number of days in the year.

Baseline. The initial environmental conditions against which the environmental consequences of various alternatives are evaluated.

Basin. A drainage or catchment area of a stream or lake.

Biodiversity. Different life forms or species within a defined area.

Bolson. An intermontane basin extending from the divide of one block-faulted mountain to the divide of the adjacent mountain, generally with no external drainage, but may be transected by regional streams.

Candidate species. Species for which the USFWS has on file sufficient information on biological vulnerability and threat(s) to support the issuance of a proposed rule to list, but issuance of the proposed rule is precluded.

Cantonment. Housing quarters for personnel.

Capacity (traffic). The maximum rate of flow at which vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions.

Census block. Cluster of blocks within the same census tract. Census blocks do not cross county or census tract boundaries and generally contain between 250 and 550 housing units.

Concentrating Solar Power. Solar panels using mirrors or lenses to concentrate a large area of sunlight, onto a small area and converting the sunlight into heat and ultimately electricity.

Concentrating Solar Thermal. Solar panels using mirrors or lenses to concentrate sunlight, into thermal energy.

Confined aquifer. An aquifer sealed above and below by impermeable material resulting in the water in the aquifer being under hydraulic pressure—also known as an artesian aquifer.

Controlled access FTX sites. FTX sites where military access is subject to increased control and restricted to activities with limited ground-disturbing effects. Examples include training involving wheeled vehicle movement off-road limited to entering and exiting the site, no site improvements, no clearing of vegetation on the site, and no digging on the site.

Coppice dunes. Coppice dunes are sand dunes characterized by a thicket of woody vegetation.

Criteria pollutants. The CAA required the EPA to set air quality standards for common and widespread pollutants after preparing criteria documents summarizing scientific knowledge on their health effects.

Cultural. The system of behavior, beliefs, institutions, and objects human beings use to relate to each other and to the environment.

Cumulative impact. Cumulative impact is the environmental impact resulting from the incremental impact from a particular activity when added to other past, present, or future activities. Cumulative impacts may be individually insignificant, but collectively, the individually insignificant activities may become significant.

Decibel, A-weighted (dBA). Adjusted unit of sound measurement that corresponds to the relative sensitivity of the human ear at specified frequency levels. This represents the loudness as perceived by humans.

Decibel (dB). A standard unit of measuring sound-pressure levels based on a reference sound pressure of 0.0002 dynes per square centimeter. This is the smallest sound a human can hear.

Direct impact. Effects resulting solely from the Proposed Action.

Diversity. A measure of the richness of species in a community relative to the number of individuals of each species.

Effluent. A gas or fluid discharge into the environment.

Endangered Species Act. An act of the U.S. Congress of 1972; 16 USC §§1531–1543. The Act requires federal agencies to ensure that their actions do not jeopardize the existence of endangered or threatened species.

Endangered species. A plant or animal species that is threatened with extinction or serious depletion in its range and is formally listed as such by the USFWS.

Entisol. A young soil with little or no development of distinct layers located in areas where the soil is either actively eroded (by wind or water) or receiving new deposits of soil maters (as occurs with alluvial fans, floodplains or windblown sand dunes).

Environmental impact statement (EIS). A detailed written statement that helps public officials make decisions that are based on understanding of environmental consequences and to take actions that protect, restore, and enhance the environment.

Equivalent noise level (L_{eq}). A single number representing the fluctuating sound level in decibels over a specified period of time; the average of a fluctuating level of sound energy.

Erosion. The set of all processes by which soil and rock are loosened and moved downhill or downwind.

Escarpment. A long, usually continuous cliff or steep slope facing in one general direction, separating two level or gently sloping surfaces, and produced by erosion or faulting.

Explosive ordnance. All munitions containing explosives, nuclear fission, or fusion materials and biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket, and small arms ammunition; all mines, torpedoes, and depth charges; pyrotechnics; clusters and dispensers; cartridge-and propellant-actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components explosive in nature.

Field training areas. Areas with appropriate terrain characteristics used for assembly, training, communication, command, and control exercises, that are designed to maintain combat readiness for military deployment and air defense operations.

Fill. A sediment deposited so as to fill or partly fill a valley or other low place.

Floodplain. The relatively flat land lying adjacent to a river channel that is covered by water when the river overflows.

Fugitive dust. Particulate matter composed of soil. Fugitive dust may include emissions from haul roads, wind erosion of exposed soil surfaces, and other activities in which soil is either removed or redistributed.

Geologic. Any natural process acting as a dynamic physical force on the earth; i.e., faulting, erosion, and mountain-building resulting in rock formations.

Greenhouse gas. A gas in an atmosphere that absorbs and emits radiation

Groundwater recharge. Water that infiltrates the land surface and is not lost to evaporation or consumed by plants can percolate downward and replenish the groundwater aquifers. This deep percolation is called recharge.

Groundwater. Subsurface water within the zone of saturation.

Habitat type. A land area capable of supporting a given plant association at climax. It represents a mature vegetation association and is usually characterized by two indicator species.

Hazardous material. Any substance or material in a quantity or form that may be harmful to humans, animals, crops, water systems, or other elements of the environment if accidentally released. Hazardous materials include explosives, gases (compressed, liquefied, or dissolved), flammable and combustible liquids, flammable solids or substances, oxidizing substances, poisonous and infectious substances, radioactive materials, and corrosives.

Hazardous waste. Wastes that are designated as hazardous by the EPA or state regulations. Hazardous waste, defined under RCRA is waste from production or operation activities that poses a potential hazard to human health or the environment when improperly treated, stored, or disposed; hazardous wastes that appear on special EPA lists or possess at least one of the four following characteristics: ignitability, corrosivity, reactivity, and toxicity.

Herbicide. A chemical used to kill or inhibit the growth of plants.

Historic properties. Included in or eligible for inclusion in the NRHP.

Hydrology. A science dealing with the properties, distribution, and circulation of water on and below the earth's surface and in the atmosphere.

Impact. The terms "impacts" and "effects" are synonymous as used in the NEPA. Impacts may be beneficial or adverse, and may apply to the natural, aesthetic, historic, cultural, and socioeconomic resources of the installation and the surrounding communities. Where applicable, impacts may be classified as direct or indirect.

Indirect impact. An indirect impact is caused by a proposed activity but is later in time or farther removed in distance, but still reasonably foreseeable. Indirect impacts may include land use changes or population density changes and the related effects these changes will have on air, water, and other natural or social systems.

Infiltration. Water that falls on the land surface that does not run off but percolates into the ground. Some of this water evaporates, some is used by plants, and some percolates downward to the groundwater.

Infrastructure. Utilities and other physical support systems needed to operate a laboratory or test facility. Included are electric distribution systems, water supply systems, sewage disposal systems, roads, and so on.

Long-term impacts. Long-term impacts are neither temporary nor reversible. They may occur either during the construction or operational phases of an activity. For example, the construction of a new building may create long-term impacts during both the construction and operational phases. Draining of a wetland for the construction of a new building will create long-term and permanent impacts on biological resources. Likewise, once operational, the new building may create additional long-term impacts such as increased population density, waste generation, etc.

Mitigation. Mitigation generally includes: avoiding the impact altogether by stopping or modifying the Proposed Action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; compensating for the impact by replacing or providing substitute resources or environments.

National Ambient Air Quality Standards (NAAQS). Section 109 of the CAA requires the EPA to set nationwide standards for widespread air pollutants. Currently, six pollutants are regulated: NO_2, SO_2, CO, PM_{10}, O_3, and Pb.

National Historic Preservation Act (NHPA). Law that states that the federal government will cooperate with other governments (including state and local), Indian tribes, and private organizations and individuals to ensure that prehistoric and historic resources are properly preserved for present and future generations (enacted 1966).

National Register of Historic Places (NRHP). Document containing those resources deemed to be important in American history, architecture, anthropology, engineering, or culture, and associated with significant past events or persons and/or representing distinctive construction or high artistic value.

Native American Graves Protection and Repatriation Act (NAGPRA). Law that states that any remains of American Indians (and associated objects) must be professionally curated and made available to any descendants for a traditional tribal burial (enacted 1990).

Native American. A generalized term referring collectively to individuals, tribes, bands, or organizations that trace their ancestry to indigenous populations of North America.

Nitrogen dioxide (NO_2). Gas formed primarily from atmospheric nitrogen and oxygen when combustion takes place at high temperature. Nitrogen dioxide emissions contribute to acid deposition and formation of atmospheric ozone (see Criteria pollutants).

Nitrogen oxide (NO_x). Gases formed primarily by fuel combustion, which contribute to the formation of acid rain. Hydrocarbons and nitrogen oxides combine in the presence of sunlight to form O_3, a major constituent of smog.

No impact. "No impact" implies that a particular activity creates neither a direct nor indirect impact, does not have long- or short-term implications, and is neither beneficial nor adverse.

Noise. Any sound that is undesirable because it interferes with speech and hearing or is intense enough to damage hearing.

Nonattainment area. An area that has been designated by the EPA or the appropriate state air quality agency as exceeding one or more national or state AAQS.

Nonpotable. Water that is unsafe or unpalatable to drink because it contains pollutants, contaminants, minerals, or infective agents.

Ordnance. Explosives, chemicals, pyrotechnic and similar stores; for example, bombs, guns, ammunition, flares, and smoke.

Ozone O_3 (ground level). A major ingredient in smog. O_3 is produced from reactions of hydrocarbons and nitrogen oxides in the presence of sunlight and heat.

Particulate. Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions.

Peak hour (traffic). The hour of highest traffic volume on a given section of roadway.

Permeability. The ability of rock, alluvium, or sediment to permit water to flow through it. Technically, it is the volume flow rate of water through a unit cross-sectional area of a porous medium under a unit hydraulic gradient.

Pesticide. Chemical used to kill or inhibit growth of undesirable species.

Playa. A dry, vegetation free, flat area at the lowest point of an undrained basin.

Polychlorinated biphenyl (PCB). A class of toxic, nonflammable, nonvolatile chlorinated oils used in transformers, capacitors, and fluorescent ballasts. PCBs are potential carcinogens and are regulated under the *Toxic Substances Control Act*.

Recharge. Percolation of rainwater and snowmelt through the soil unsaturated zone to the groundwater table.

Record of Decision (ROD). A public document that explains which alternative will be selected.

Riparian. Of or pertaining to the banks of a body of water.

Scoping. Process in the beginning stages of an EIS during which the public and federal and state agencies may voice concerns they wish the study to address.

Short-term impacts. Short-term impacts are temporary and either direct or indirect. Short-term impacts usually occur during the construction phase of the activity.

Significance. Significance requires consideration of the context and intensity of the impact or effect, under consideration. Significance can vary in relation to the context of the Proposed Action. At Fort Bliss, the significance of the Proposed Action may include consideration of the effects on a national, regional,

and local basis. Both short- and long-term effects may be relevant. Impacts may also be evaluated in terms of their intensity or severity.

Sound. (1) A physical disturbance in a medium (e.g., air) that is capable of being detected by the human ear. (2) The hearing sensation excited by a physical disturbance in a medium.

Stakeholders. Interested and/or affected people or groups.

Subsurface. A zone below the surface of the earth whose geologic features are principally layers of rock that have been tilted or faulted and are interpreted on the basis of drill hole records and geophysical (seismic or rock vibration) evidence. Generally, it is all rock and solid materials lying beneath the earth's surface.

Succession. The process of gradual replacement of one community or ecosystem by another, involving a series of changes in the plant and animal life.

Surveillance. A systematic observation of airspace or surface areas by visual, aural, electronic, photographic, or other means.

Cultural resources surveys. The archaeological exploration of areas to collect data on observed cultural materials. These surveys are conducted under various field techniques.

Tertiary. A geologic time period extending from 65 million years ago to 2 million years ago.

Threatened species. A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Traditional cultural properties (TCP). Properties, regions, or locales that are eligible for inclusion in the National Register because of association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

Training complex. Firing ranges and weapons training facilities designated for firing ammunition and explosives, heavy rockets, and guided missiles for training and target practice, and nonlive-fire sites for maneuver exercises and operations.

Trip generation. A determination of the quantity of trip ends associated with a parcel of land.

Underground storage tank (UST). Typically used to contain gasoline or other petroleum fuels; buried beneath the ground surface.

Unemployment rate. The number of civilians, as a percentage of the total civilian labor force, without jobs but actively seeking employment.

Unexploded explosive ordnance (UXO). Explosive ordnance that has been primed, fused, armed, or otherwise prepared for action and that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material, and remains unexploded either by malfunction or design or for any other cause.

Waste-to-energy. A facility that uses solid waste materials (processed or raw) that is incinerated to produce steam in order to generate electricity.

Waste-water treatment plant. A facility that receives waste waters (and sometimes runoff) from domestic and/or industrial sources, and by a combination of physical, chemical, and biological processes reduces (treats) the waste water to less harmful byproducts.

Wetlands. An area that is regularly saturated by surface water or groundwater and subsequently supports vegetation that is adopted for life in saturated soil conditions.

Woodland. Plant community characterized by a generally open growth of small trees.

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Appendix A: Notice of Intent

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reexamination proceeding has been granted. Acceleration will proceed from that point forward. All submissions in the accelerated matter should be filed electronically, except in accelerated examinations where submissions must be filed electronically. Conducting more than one examiner interview during prosecution should be avoided. Responses to all Office actions should be submitted within one month of receiving the Office action. Petitions should be avoided as much as possible. Failure to meet these conditions may result in longer processing times by the USPTO than the goals given above, but the matter will continue to receive accelerated processing as described herein to the extent possible.

In all instances, certificate redemption is subject to available USPTO resources at the Director's discretion. If accelerating the matter would negatively impact other applicants, the USPTO may decline to redeem the certificate at that time.

Dated: February 6, 2012.

David J. Kappos,

Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office.

[FR Doc. 2012–3040 Filed 2–7–12; 8:45 am]

BILLING CODE 3510–16–P

DEPARTMENT OF DEFENSE

Department of the Army

Notice of Availability of Ballistic Survivability, Lethality and Vulnerability Analyses

AGENCY: Department of the Army, DoD.

ACTION: Notice of availability.

SUMMARY: The US Army Research Laboratory's (ARL's), Survivability, Lethality Analysis Directorate (SLAD) is a leader in ballistic survivability, lethality and vulnerability (SLV) analyses. ARL/SLAD conducts SLV analyses, using the MUVES–S2 vulnerability model, to quantify system, subsystem and/or component level vulnerabilities of ground and air vehicles. These analyses are used to support production, design, trade and evaluation decisions. These capabilities are being made available to qualified interested parties. Collaborations will be governed by Cooperative Research and Development Agreements (15 U.S.C. 3710) and fee-based testing services will be governed by Test Service Agreements (10 U.S.C. 2539b).

FOR FURTHER INFORMATION CONTACT: Michael D. Rausa, telephone (410) 278–5028. For further technical information, please contact Denise Jordan, (410) 278–6322, *denise.a.jordan10.civ@mail.mil.*

SUPPLEMENTARY INFORMATION: None.

Brenda S. Bowen,

Army **Federal Register** *Liaison Officer.*

[FR Doc. 2012–2845 Filed 2–7–12; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army

Environmental Impact Statement for the Implementation of Energy, Water, and Solid Waste Sustainability Initiatives at Fort Bliss, TX

AGENCY: Department of the Army, DoD.

ACTION: Notice of intent.

SUMMARY: The Department of the Army advises interested parties of its intent to conduct public scoping under the National Environmental Policy Act to gather information to prepare an Environmental Impact Statement (EIS) that will evaluate the environmental impacts associated with the implementation of the Energy, Water, and Solid Waste Initiatives at Fort Bliss. These initiatives will work to enhance the energy and water security of Fort Bliss, Texas, which is operationally necessary, financially prudent and essential to the installation's mission. Elements of the implementation of the initiative would occur in Texas and New Mexico. By implementing these initiatives at Fort Bliss, the installation can help ensure that it has access to energy from renewable sources and ample water supplies now and into the future.

The decision maker at Fort Bliss will use the analysis in the EIS to determine which alternative(s) to implement. Actions to be evaluated in the EIS include: (1) The aggressive implementation of waste reduction, and energy and water conservation policies and practices; (2) the construction of a new pipeline to transport reclaimed water for best uses on Fort Bliss; (3) the construction of a Waste-to-Energy plant with adjacent landfill in the Southern Training Area of Fort Bliss, or on land to be exchanged with the Texas General Land Office; (4) the development and construction of dry-cooled concentrating solar thermal arrays in Fort Bliss Southern Training Area; (5) the development of geothermal resources on Fort Bliss in New Mexico for power generation and heating; (6) the development of existing wind energy resources on the eastern central and northern portions of Fort Bliss in New Mexico; and (7) the development of up to 20 MW of natural gas powered turbines as a complementary source of back-up power to renewable energy facilities to provide for Fort Bliss energy security. The EIS will also analyze a long-term program that considers the implementation of energy technologies on previously disturbed land, existing infrastructure, or other Army owned lands that would be compatible with Army mission and sustainability criteria. Alternatives include implementation of a combination of these projects and the no action alternative that will allow for a comparison of each of the possible actions to existing baseline environmental conditions. Other reasonable alternatives that are raised during the scoping process and capable of meeting the project purpose and need and criteria will be considered and included for evaluation in the EIS.

Environmental impacts associated with the implementation of the proposed action at Fort Bliss could include significant impacts to airspace, biological resources and migratory birds, soils and vegetation, noise impacts, increased traffic impacts, cultural resources, air quality, and surface and ground water.

ADDRESSES: Written comments should be forwarded to Dr. John Kipp, Fort Bliss Directorate of Public Works, Attention: IMBL–PWE (Kipp), Building 624 Pleasonton Road, Fort Bliss, Texas 79916; email: *john.m.kipp6.civ@mail.mil;* fax: (915) 568–3548.

FOR FURTHER INFORMATION CONTACT: Please contact Ms. Jean Offutt, Fort Bliss Public Affairs Office, ATTN: IMBL–PA (Offutt), Building 15 Slater Road, Fort Bliss, Texas 79916; phone: (915) 568–4505; email: *thelma.g.offutt.civ@mail.mil.*

SUPPLEMENTARY INFORMATION: The decisions to be made by the installation and cooperating agencies will be to determine whether and how best to implement energy, water, and solid waste technologies at Fort Bliss in both Texas and New Mexico. The EIS would assess the direct, indirect, and cumulative environmental impacts associated with various proposed alternatives. Alternatives evaluated in the EIS include different sitings and technologies that will be evaluated.

Cooperating Agencies: Some of the proposed projects considered in the alternatives being evaluated could occur on Bureau of Land Management (BLM) military-withdrawn lands in New Mexico. The BLM Las Cruces District Office and the US Air Force Holloman

Air Force Base will be invited as cooperating agencies for this proposal.

Scoping And Public Comments: Native Americans, federal, state, and local agencies, organizations, and the public are invited to be involved in the scoping process for the preparation of this EIS by participating in scoping meetings and/or submitting written comments. Written comments will be accepted within 30 days of publication of the NOI in the **Federal Register**. The scoping process will help identify possible alternatives, potential environmental impacts, and key issues of concern to be analyzed in the EIS. Scoping meetings will be held in El Paso, Texas, and Alamogordo and Las Cruces, New Mexico. Notification of the times and locations for the scoping meetings will be locally announced and published.

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. 2012–2844 Filed 2–7–12; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Defense Acquisition Regulations System

Acquisition of Items for Which Federal Prison Industries Has a Significant Market Share

AGENCY: Department of Defense (DoD).

ACTION: Notice.

SUMMARY: DoD is issuing this notification to set forth an up-to-date list of product categories for which the Federal Prison Industries' share of the DoD market is greater than five percent.

DATES: *Effective Date:* February 8, 2012.

FOR FURTHER INFORMATION CONTACT: Director, Defense and Acquisition Policy, Attn: Susan Pollack, 3060 Defense Pentagon, Washington, DC 20301–3060; telephone (703) 697–8336.

SUPPLEMENTARY INFORMATION:

I. Background

Section 827 of the National Defense Authorization Act of Fiscal Year 2008, Public Law 110–181, amended DoD's competition requirements for acquisition of products from Federal Prison Industries (FPI). On November 19, 2009, a final rule was published at 74 FR 59914, which amended the Defense Federal Acquisition Regulation Supplement (DFARS) at subpart 208.6 to implement section 827.

Among other things, section 827 required DoD to publish a list of product categories for which FPI's share of the DoD market was greater than five percent, based on the most recent fiscal year data available. Section 827 also provides for modification of the published list if DoD subsequently determines that new data require adding or omitting a product category from the list.

This notification provides a modified list of FPI product categories exceeding five percent of the DoD market, based on Fiscal Year 2011 data obtained from the Federal Procurement Data System. An identical list is also found in the Director, Defense Procurement and Acquisition Policy (DPAP) memorandum dated January 12, 2012. (The DPAP memorandum with the updated list of product categories for which FPI has a significant market share is posted at: *http://www.acq.osd.mil/dpap/policy/policyvault/USA007288–11–DPAP.pdf.)*

Accordingly, the updated product categories for which FPI's share of the DOD market is greater than five percent are:

- 3625 (Textile Industries Machinery);
- 3990 (Miscellaneous Materials Handling Equipment);
- 6020 (Fiber Optic Cable Assemblies and Harnesses);
- 7110 (Office Furniture);
- 7230 (Draperies, Awnings, and Shades);
- 8420 (Underwear and Nightwear, Men's); and
- 8465 (Individual Equipment).

Product categories on the updated list, and the products within each identified product category, must be procured using competitive or fair opportunity procedures in accordance with DFARS 208.602–70(c)(1). FPI must be included in the solicitation process and will be considered in accordance with the policy set forth in 8.602(a)(4)(ii) through (v) of the Federal Acquisition Regulation.

Mary Overstreet,

Editor, Defense Acquisition Regulations System.

[FR Doc. 2012–2846 Filed 2–7–12; 8:45 am]

BILLING CODE 5001–06–P

DEPARTMENT OF ENERGY

[OE Docket No. PP–334]

Notice of Availability for Public Comment of Interconnection Facilities Studies Prepared for the Proposed Energia Sierra Juarez Transmission Project

AGENCY: Office of Electricity Delivery and Energy Reliability, DOE.

ACTION: Notice of availability for public comment of Interconnection Facilities Studies.

SUMMARY: Sempra Generation applied to the Department of Energy (DOE), on behalf of Energia Sierra Juarez U.S. Transmission, LLC, for a Presidential permit to construct, operate, maintain, and connect an electric transmission line across the U.S. border with Mexico, currently referred to as the Energia Sierra Juarez Transmission Project (ESJ Project). The ESJ Project would connect a wind energy project to be built in the vicinity of La Rumorosa, Baja California, Mexico, to San Diego Gas and Electric Company's (SDG&E) existing Southwest Powerlink (SWPL) 500-kV transmission line. DOE hereby announces the availability for public comment of the Interconnection Studies prepared for the ESJ Project.

DATES: Comments must be submitted on or before March 9, 2012.

ADDRESSES: Comments should be addressed to: Dr. Jerry Pell, Office of Electricity Delivery and Energy Reliability, OE–20, U.S. Department of Energy, 1000 Independence Avenue SW., Washington, DC 20585–0001. Because of delays in handling conventional mail, it is recommended that documents be transmitted by overnight mail, by electronic mail to *Jerry.Pell@hq.doe.gov* (preferred), or by facsimile to (202) 318–7761.

FOR FURTHER INFORMATION CONTACT: Dr. Jerry Pell (Program Office) at (202) 586–3362, or by email to *Jerry.Pell@hq.doe.gov*, or contact Brian Mills at 2(02) 586–8267, or by email to *Brian.Mills@hq.doe.gov*.

SUPPLEMENTARY INFORMATION: The construction, operation, maintenance, and connection of facilities at the international border of the United States for the transmission of electric energy between the United States and a foreign country is prohibited in the absence of a Presidential permit issued pursuant to Executive Order (EO) 10485, as amended by EO 12038.

On December 20, 2007, Sempra Generation, on behalf of Energia Sierra Juarez U.S. Transmission, LLC, filed an application with the Office of Electricity Delivery and Energy Reliability of DOE for a Presidential permit. That application was originally noticed in the **Federal Register** for public comment on February 22, 2008 (73 FR 9782). The proposed transmission line project would connect up to 1,250 megawatts of electric power produced from wind turbines to be located in the vicinity of La Rumorosa, Baja California, Mexico, to SDG&E's existing Southwest

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Appendix B: Alternative 7 Environmental Screening Criteria

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Checklist of Environmentally Compatible Criteria for Alternative 7 (Programmatic Site Development)

Please note: The following checklist of environmentally compatible criteria for Alternative 7 are intended to be used for the screening potential future renewable energy projects under Alternative 7 and determine if a Record of Environmental Consideration may be prepared or if additional National Environmental Policy Act review is warranted.

CATEGORY		Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
Compliance with this EIS			
1	The proposed renewable energy project is within the scope of this environmental impact statement (EIS) and was identified within Alternatives 2, 4, 5, or 6.		If no, tiering from this EIS is dependent on the answer to question #2. If yes, continue to question #3.
2	The proposed renewable energy project is within the scope of this PEIS and is consistent with the range of renewable energy projects included in Alternative 7.		If no, the environmental analysis required under the National Environmental Policy Act (NEPA) may not be tiered from this EIS. Initiate a separate NEPA action. If yes, continue to question #3.
Air Quality			
3	Construction of the proposed project would cause violation(s) of National Ambient Air Quality Standards.		If yes, further analysis and coordination with air quality permitting authority may be required. If no, continue to question #4.
4	Construction of the proposed project would cause violation(s) of the installation's Title V Operating Permit.		If yes, further analysis and coordination with air quality permitting authority may be required. If no, continue to question #5.
5	Construction of the proposed project would cause violation(s) of emission standards for hazardous air pollutants at the installation or in the immediate surrounding area.		If yes, further analysis and coordination with air quality permitting authority may be required. If no, continue to question #6.
Airspace			
6	Construction of the proposed project would restrict movement of other air traffic or create conflicts with air traffic control		If yes, further analysis and coordination with the Federal Aviation Administration may be required. If no, continue to question #7.

CATEGORY		Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
Compliance with this EIS			
7	Construction of the proposed project would have potential to impacts operations at El Paso International Airport, Biggs Army Airfield, or Holloman Air Force Base		If yes, further analysis and coordination with the Federal Aviation Administration or U.S. Air Force may be required. If no, continue to question #8.
8	Construction of the proposed project would require a change in operations within airspace already designated for other purposes, result in the need to designate controlled airspace where previously none existed, result in the reclassification of controlled airspace, or result in a need to designate regulatory special use airspace		If yes, further analysis and coordination with the Federal Aviation Administration may be required. If no, continue to question #9.
Biological Resources			
8	The proposed project is located in an area where locally important natural resources such as black grama grasslands, sand sagebrush communities, shinnery oak islands, and riparian and wetland areas occur.		If yes, initiate preliminary survey. Further analysis may be required. If no, continue to question #9.
9	Construction of the proposed project would cause a significant decrease in the relative percentage of any one vegetation type within Fort Bliss, particularly if the vegetation type is not widespread within Fort Bliss or regionally		If yes, further analysis may be required. If no, continue to question #10.
10	Construction of the proposed project would cause fragmentation, loss, or degradation of high-quality natural areas or sensitive sites.		If yes, initiate preliminary survey. Further analysis may be required. If no, continue to question #11.
11	Construction of the proposed project would cause local destruction of rare or sensitive plant species.		If yes, initiate preliminary survey. Further analysis may be required. If no, continue to question #12.
12	Construction of the proposed project would cause local population impacts on local flora or fauna.		If yes, make necessary revisions. If no, continue to question #13.
13	Construction of the proposed project would cause long-term loss or impairment of local habitat.		If yes, make necessary revisions. If no, continue to question #14.

CATEGORY		Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
Compliance with this EIS			
Cultural Resources			
14	Construction or operation of the proposed project would alter the characteristics of a property that may qualify for or is listed on the National Register of Historic Places (NRHP).		If yes, you may need to initiate formal consultation with the State Historic Preservation Officer (SHPO). Consultation with the SHPO may be necessary if a historic or cultural resource is within the cantonment area or range complex. If no, continue to question #15.
15	Construction or operation of the proposed project would: • Cause physical destruction, damage, or alteration to all or part of the property that may qualify for or is listed on the NRHP. • Introduce visual, audible, or atmospheric elements that are out of character with the property or alter its setting. • Violate the provision of Archaeological Resources Protection Act or Native American Graves Protection and Repatriation Act. • Disturb sacred sites or properties of traditional cultural or religious importance.		If yes, you may need to initiate formal consultation with the SHPO or tribes. Consultation with the SHPO may be necessary if a historic or cultural resource is within the energy development site. If no, continue to question #16.
Geology and Soils			
16	Construction or operation of the proposed project would cause a substantial increase in soil compaction resulting in decreased re-vegetation potential.		If yes, contact the installation environmental office and consult with the Natural Resources Conservation Service, as needed. If no, continue to question #17.
17	Construction or operation of the proposed project would cause a substantial increase in soil erosion and/or loss of productivity due to soil mineral leaching.		If yes, contact the installation environmental office and consult with the Natural Resources Conservation Service as needed. Incorporate and document soil erosion control BMPs, as needed. If no, continue to question #18.
18	Construction or operation of the proposed project would cause a decrease of a unique soil type.		If yes, contact the installation environmental office and consult with the Natural Resources Conservation Service, as needed. If no, continue to question #19.

CATEGORY		Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
Compliance with this EIS			
19	The proposed project would require either or both a soil erosion control plan and a National Pollutant Discharge Elimination System (NPDES) permit for the construction process.		If yes, coordinate with the appropriate regulating authority to obtain the NPDES permit and submit the soil erosion control plan for review and approval. If no, continue to question #20.
Hazardous Waste and Hazardous Material			
20	Construction or operation of the proposed project would cause the storage, use, transport, or disposal of hazardous materials to increase risk to human health the environment.		If yes, initiate preliminary survey. Further analysis may be required. If no, continue to question #21.
21	Construction or operation of the proposed project would cause the installation to violate laws or regulations governing hazardous material/waste management and/or violate the installation's hazardous waste permit.		If yes, coordinate with installation hazardous waste management specialists and state regulator, as necessary. If no, continue to question # 22.
22	The installation has installed and has a maintenance program to ensure BMPs to reduce, to the maximum extent possible, migration of hazardous waste and other materials generated by the proposed project. If yes, specify and describe all implemented BMPs.		If no, additional evaluation or procedures to treat waste may be needed. If yes, specify implemented BMPs; continue to question #23.
Land Use			
23	Construction and operation of the proposed project would alter existing land use and cause severe incompatibility with adjacent land uses.		If yes, evaluate adjacent land uses or consider an alternate site. If no, continue to question #24.
24	Construction and operation of the proposed project would cause significant changes to existing or regional land use.		If yes, evaluate adjacent land uses or consider an alternate site. If no, continue to question #25.
Noise			
25	Noise from the construction and operation of the proposed project would exceed the standard for noise levels in Land Use Planning Zones (see Table 3-26 of the EIS).		If yes, initiate further analysis to determine noise contours and identify potential mitigations. If no, continue to question #26.

CATEGORY		Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
Compliance with this EIS			
26	Noise caused from construction would exceed City of El Paso noise standards (see Tables 3-29 and 3-30 of the EIS).		If yes, recommend contacting the installation natural resource specialist and state natural resource agency as appropriate. If no, continue to question #27.
27	A sensitive noise receptor (e.g., hospital, school, church, or day care facility) is located within 100 meters of the project.		If yes, evaluate the technology and need for any additional noise analysis. If no, continue to question # 28.
Socioeconomics and Environmental Justice			
28	Construction of the proposed project causes a public health hazard or adversely affects housing, school, or community services.		If yes, further analysis to determine the severity of impacts and identify potential mitigations If no, continue to question #29.
29	Construction or operation of the proposed project would cause a disproportionate environmental health or safety risk to children.		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #30.
30	Construction or operation of the proposed project would cause a disproportionate environmental, economic, social, or health impacts on minority of low-income populations (Executive Order 12898).		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #31.
31	Construction or operation of the proposed project would cause impacts to socioeconomics greater that those described in this EIS.		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #32.
32	Construction and operation of the proposed project would require the need for additional utilities to operate, including electrical, sewer, fiber optics, gas, and water, or would cause an impairment of utility service to local communities, homes, and businesses.		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #33.
Water Resources			
33	Construction and operation of the proposed project would involve direct or indirect discharge (or runoff) of sediment into a waterway or storm sewer or obstruct water flows.		If yes, further analysis needed to determine the severity or impacts and identify potential mitigations. If no, continue to question #34.

CATEGORY		Yes, No, N/A	RESPONSE DOCUMENTATION (as needed)
Compliance with this EIS			
34	Construction and operation of the proposed project would result in adverse impacts to surface water quality and result in chemical, physical, or biological effects that would adversely alter historical baseline or a change in surface water impairment status.		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #35.
35	Construction or operation of the proposed project would affect groundwater		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #36.
36	Construction or operation of the proposed project would result in ground disturbance of 1 acre or greater or result in an increase impermeable surfaces.		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #37.
Traffic and Transportation			
37	Construction and operation of the proposed project would increase traffic volumes or cause delays to levels that would impair a roadway's handling capacity or increase traffic safety hazards.		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, continue to question #38.
38	Construction and operation of the proposed project could cause road failure resulting in rutting, cracking, or other pavement problems that requires substantial maintenance or construction activities.		If yes, further analysis to determine the severity of impacts and identify potential mitigations. If no, and if the answer to all of the questions above was no, proceed with Record of Environmental Consideration signature and implementation of the Proposed Action.

Appendix C: Air Quality Study

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DRAFT
AIR QUALITY TECHNICAL STUDY

Implementation of Energy, Water, and Solid Waste Sustainability Initiatives

Fort Bliss, Texas and New Mexico

April 2013

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Appendix A – Construction Emission Calculations

Appendix B – Operational Emission Calculations

Appendix C –Conformity Analysis

Acronyms and Abbreviations

AQCR	Air Quality Control Region
APCD	air pollution control device
BACT	Best Available Control Technology
BMP	best management practice
CAA	Clean Air Act
CDD/CDF	total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofurans, 2,3,7,8-tetrachlorodibenzo-p-dioxin, and dibenzofurans
CEMS	continuous emission monitoring systems
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
COMS	continuous opacity monitoring systems
CSP	concentrating solar power
dscm	dry standard cubic meter
ECR	emission control requirements
EOs	Executive Orders
ESP	electrostatic precipitator
FOP	Federal Operating Permit
GCP	good combustion practices
GCR	General Conformity Rule
GHG	greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GWP	global warming potential
HAP	hazardous air pollutant
Hg	mercury
ISOWPP	Initial Scope of Work Planning Package
LAER	Lowest Achievable Emission Rate
MACT	Maximum Achievable Control Technology
MB/WW	mass burn/waterwall
$\mu g/m^3$	micrograms per cubic meter
mg/m^3	milligrams per cubic meter
MSW	municipal solid waste
MW	megawatt
MWC	municipal waste combustor
NAAQS	National Ambient Air Quality Standards
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NMOC	non-methane organic compound

N_2O	nitrous oxide
NO_2	nitrogen dixoide
NOx	nitrogen oxides
NSPS	New Source Performance Standards
NSR	New Source Review
NNSR	Non-attainment New Source Review
O_3	ozone
Pb	lead
ppb	parts per billion
$PM_{2.5}$	fine particulate matter less than or equal to 2.5 microns aerodynamic diameter
PM_{10}	particulate matter less than or equal to 10 microns aerodynamic diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
RICE	reciprocating internal combustion engine
ROI	region of influence
SCR	selective catalytic reduction
SIP	State Implementation Plan
SNCR	selective non-catalytic reduction
SO_2	sulfur dioxide
TAC	Texas Administrative Code
TCEQ	Texas Council on Environmental Quality
TPY	tons per year
USEPA	US Environmental Protection Agency
VOC	volatile organic compound
WTE	waste-to-energy

1.0 AFFECTED ENVIRONMENT

Potential air quality impacts of the Proposed Action to regional air quality include: 1) increasing ambient air pollution concentrations above the National Ambient Air Quality Standards (NAAQS), 2) contributing to an existing violation of the NAAQS, 3) interfering with, or delaying timely attainment of the NAAQS, 4) resulting in the potential for new stationary source(s) to be considered a major source of emissions as defined in 40 Code of Federal Regulations (CFR) Part 52.21 (total emissions of any pollutant subject to regulation under the Clean Air Act (CAA) that is greater than 250 tons per year (TPY) for attainment areas), or 5) exceeding either a State Implementation Plan (SIP) allowance, or if no allowance exists, exceeding the *de minimis* thresholds under 40 CFR 93.150, General Conformity.

The General Conformity Rule has been included as a potential air quality impact to fulfill the requirements of the Fort Bliss Net Zero Initial Scope of Work Planning Package (ISOWPP), which states that Fort Bliss expects that El Paso County will go into nonattainment for ozone if the NAAQS are lowered. The US Environmental Protection Agency (USEPA) is currently evaluating lowering the eight hour ozone standards from 75 parts per billion (ppb) to 60, 65, or 70 ppb.

Defining a region of influence (ROI) for air quality requires knowledge of: 1) the type of emissions; 2) location(s) of the sources of emissions (for stationary sources) and the horizontal and vertical extent of emissions from mobile sources, such as highway vehicles or construction equipment; 3) emission rates of the pollutant sources; 4) the proximity of existing emission sources to those sources associated with the Proposed Action; and 5) local and regional climate conditions. The ROI for emissions can vary from less than a mile to more than 30 miles, depending on the pollutant. For example, the affected area for emissions of inert pollutants (pollutants other than ozone (O_3), its precursors, or nitrogen dioxide (NO_2)) is generally limited to a few miles downwind of a source, while O_3 and NO_2 generally extend much farther downwind.

Many factors, including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions, influence a region's air quality. Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the ambient air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as carbon dioxide (CO), sulfur dioxide (SO_2), lead (Pb), and some particulates, are emitted directly into the atmosphere from emission sources. Secondary pollutants, such as O_3, NO_2, and some particulates, are

formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes.

In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants (HAPs), which are regulated under Section 112(b) of the 1990 CAA amendments. The National Emission Standards for Hazardous Air Pollutants regulate HAP emissions from stationary sources (40 CFR Parts 61 and 63).

1.1 National Ambient Air Quality Standards

Air quality is defined by ambient air concentrations of specific pollutants that the USEPA has determined to be of concern for the health and welfare of the general public and the environment. The primary pollutants of concern, called criteria pollutants, include CO, SO_2, NO_2, O_3, particulate matter less than or equal to 10 microns in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and Pb. Under the CAA, the USEPA has established NAAQS (40 CFR Part 50) for these pollutants. Areas that are and have historically been in compliance with the NAAQS are designated as attainment areas. Areas that violate a federal air quality standard are designated as nonattainment areas. Areas that have transitioned from non-attainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment. The NAAQS represent the maximum levels of background pollution that are considered safe, including an adequate margin of safety, to protect public health and welfare. Short-term standards (1-, 3-, 8-, and 24-hour periods) are established for pollutants contributing to chronic health effects.

The Texas Council on Environmental Quality (TCEQ) has adopted the NAAQS, which are presented in Table 1-1. In addition to the ambient air quality standards for criteria pollutants, national standards exist for HAPs, which are regulated under Section 112(b) of the 1990 CAA amendments. The National Emission Standards for Hazardous Air Pollutants (NESHAPs) regulate HAP emissions from stationary sources (40 CFR Parts 61 and 63).

The ROI for the air quality analysis includes portions of the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region (AQCR) (40 CFR 81.82). The entire AQCR includes the Texas counties of Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio; and the New Mexico counties of Doña Ana, Lincoln, Otero, and Sierra. Fort Bliss is located in the portion of the AQCR that includes El Paso County in Texas and Doña Ana and Otero counties in New Mexico. Fort Bliss, while located in parts of each of the three counties in the AQCR, is not located in any non-attainment area; therefore, the CAA General Conformity Rule (40 CFR Parts 51 and 93) does not currently apply. Fort Bliss, as well as the remainder of the three counties, will be the focus of the emissions impact analysis.

Table 1-1. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standards	Secondary Standards
Carbon monoxide	8-hours	9 ppm	None
	1-hour	35 ppm	
Lead	Rolling 3-month average	0.15 µg/m^3	Same as primary
Nitrogen dioxide	Annual (arithmetic average)	53 ppb	Same as primary
	1-hour	100 ppb	None
PM_{10}	24-hour	150 µg/m^3	Same as primary
$PM_{2.5}$	Annual (arithmetic average)	[1]12.0 µg/m^3	15 µg/m^3
	24-hour	35 µg/m^3	Same as primary
Ozone	8-hour	0.075 ppm	Same as primary
	3-hour	None	0.5 ppm
	1-hour	75 ppb	None

Source: USEPA (2012a)

Notes: PM_{10} – suspended particulate matter, $PM_{2.5}$ – fine particulate matter, ppb – parts per billion, ppm – parts per million, mg/m^3 – milligrams per cubic meter, µg/m^3 – micrograms per cubic meter

[1]Published December 14, 2012. EPA anticipates making initial attainment/nonattainment designations by December 2014, with those designations likely becoming effective in early 2015.

The USEPA has classified portions of the AQCR for criteria pollutants, including El Paso County (40 CFR 81.344). The only areas currently designated as non-attainment include a narrow strip of the city of El Paso along the Rio Grande, adjacent to Ciudad Juarez, Mexico, that is a designated "maintenance area" for CO, and the city of El Paso, which was designated as non-attainment for PM_{10} in 1990. The USEPA also has classified Doña Ana and Otero counties in New Mexico (40 CFR 81.332) for criteria pollutants. A portion of Doña Ana County (Anthony, New Mexico) is designated as moderate non-attainment for PM_{10}.

1.2 Installation Emissions

Based on the installation's potential to emit greater than 100 TPY of nitrogen oxides (NOx), Fort Bliss is categorized as a major source of air emissions. As a result, Fort Bliss holds a Title V Federal Operating Permit (FOP) that covers emissions of both criteria pollutants (including NOx) and HAPs installation-wide. This permit, O2865, was renewed on April 30, 2012 and will remain in force until April 30, 2017.

The 2010 total emissions for stationary sources at Fort Bliss are summarized in Table 1-2. Sources include boilers, generators, surface coating operations, underground storage tanks, and sanitary landfills.

Table 1-2. 2010 Estimates of Actual Emissions, Fort Bliss, TX

Annual Emissions	Emission Estimates (tons per year)						
	VOCs	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**HAPs**
Actual	41.99	42.28	77.80	7.27	11.63	8.23	3.64

Source: MACTEC 2011

1.3 Overview of Permitting Requirements

1.3.1 New Source Review

The New Source Review (NSR) permitting program requires proposed sources of air pollutant emissions to demonstrate their potential to emit will not result in exceedances of a NAAQS or contribute to a violation of a NAAQS. The NSR program is implemented in the state of Texas by TCEQ and the regulations that address the program can be found in Title 30 of the Texas Administrative Code, Chapter 116. TCEQ manages the entire NSR program for sources located in Texas, including Prevention of Significant Deterioration (PSD) reviews, with the exception of greenhouse gas (GHG) reviews. See **Sections 1.4 and 3.0** for additional information on GHGs.

TCEQ and USEPA Region 6 are actively working to resolve issues surrounding the determination by the USEPA that the TCEQ program in the SIP that grants flexible permits to facilities that emit air pollutants did not meet several requirements. This resolution has been ongoing since June 2010 when the USEPA disapproved the flexible permit program from being part of TCEQ's clean-air implementation plan (USEPA 2011b). Disapproval by the USEPA of this portion of the SIP affects how TCEQ implements the NSR and Title V permitting programs.

The TCEQ's NSR program includes Non-attainment New Source Review (NNSR) and PSD Review. Projects must be evaluated to determine whether they require a Federal, or major, NSR permit or a state, or minor, NSR permit. Major source permitting is done on a pollutant basis, and best available control technology (BACT) would have to be reviewed for each pollutant that exceeds the threshold. Minor NSR permitting is done on a facility basis, and all pollutants emitted from that facility are subject to review (TCEQ 2008). The TCEQ staff would conduct a preconstruction technology review during the air permitting process. For PSD permits, BACT needs to be addressed.

Significant emissions rates are defined for federal PSD regulations under 40 CFR 52.21 (b)(23)(i), and have been established for both criteria and non-criteria pollutants. HAPs are now exempt from PSD applicability because HAPS are specifically regulated under Title III of the CAA Amendments.

1.3.2 National Emission Standards for Hazardous Air Pollutants

The NESHAP regulations fall under Section 112 of the CAA. The NESHAPs regulate listed substances including arsenic, mercury, radio nucleotides, and asbestos. The 1990 CAA Amendments amended the NESHAP program to include designation of Hazardous Air Pollutants (HAPs). The amendments also regulate HAPs within identified source categories and establish control technology standards. The control technologies are now included in 40 CFR Part 63 and are based on the maximum achievable control technology (MACT) (TCEQ 2011a).

1.3.3 New Source Performance Standards

New Source Performance Standards (NSPS) are national emissions standards required under Section 111 of the CAA for criteria and other designated pollutants. NSPS are codified under 40 CFR Part 60. The provisions of 40 CFR Part 60 are applicable to new, modified, or reconstructed sources in specific source categories such as manufacturers of glass, cement, rubber tires, and wool fiberglass and municipal waste combustors. As of 2005, there were approximately 75 NSPS.

1.4 Greenhouse Gas Emissions

Greenhouse Gases (GHGs) are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce negative economic and social consequences across the globe.

USEPA issued the *Final Mandatory Reporting of Greenhouse Gases Rule* on October 30, 2009. Implementation of Part 98 is referred to as the Greenhouse Gas Reporting Program (GHGRP). GHGs covered under the GHGRP are CO_2, methane, nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, methane has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2, on an equal-mass basis. The equivalent CO_2 rate is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs, which is known as CO_2 equivalent, or CO_2e. Under the GHGRP, suppliers of fossil fuels or industrial GHGs, manufacturers of mobile sources and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions as CO_2 equivalent are required to submit annual

reports to USEPA. Fort Bliss is required to comply with the GHGRP, and reported CO_2e emissions of 45,091.2 metric tons for 2010 (USEPA 2012b).

On a national scale, federal agencies are addressing emissions of GHGs by reductions mandated in federal laws and Executive Orders (EOs). Most recently, EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management,* and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* were enacted to address GHGs, including GHG emissions inventory, reduction, and reporting.

In an effort to reduce energy consumption, reduce GHGs, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EO 13423 and the Energy Policy Act of 2005, the U.S. Army has implemented a number of renewable energy projects (The types of U.S. Army projects currently in operation within the Southwest include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. As an example, Fort Bliss has contracted to make $2 billion worth of energy efficiency upgrades over the next two years using Energy Savings Performance Contracting. This is also the first Army project to take advantage of a federal renewable energy tax credit, which totals $1.87 million. Energy efficiency improvements will be installed at Fort Bliss with no up-front costs to the government. The cost of the improvements will be paid for over time with energy costs saved on utility bills. The Army will purchase the renewable energy produced by 5,500 solar panels without owning or maintaining the equipment. In addition to the solar energy installation, the project will include new utility monitoring and control systems to manage energy at 120 buildings, a program to reduce electricity use during peak demand periods and other improvements to make Fort Bliss more energy efficient. Together, these measures are expected to reduce greenhouse gas emissions equivalent to removing 1,280 vehicles from the road annually or planting 1,400 acres of pine forest each year. The Army continues to promote and install new renewable energy projects at installations throughout the Southwest.

1.5 General Conformity

The USEPA General Conformity Rule applies to federal actions occurring in non-attainment or maintenance areas when the total direct and indirect emissions of pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements for a conformity analysis are called *de minimis* thresholds.

A conformity applicability analysis is the first step of a conformity evaluation and assesses if a federal action must be supported by a conformity determination. This is typically done by quantifying applicable

direct and indirect emissions that are projected to result from a federal action. Indirect emissions are those emissions caused by the federal action and originating in the region of interest, but which may occur at a later time and/or in a different location from the action itself and are reasonably foreseeable. The federal agency can control and will maintain control over the indirect action due to a continuing program responsibility of the federal agency. Reasonably foreseeable emissions are projected future direct and indirect emissions that are identified at the time the conformity evaluation is performed. The location of such emissions is known and the emissions are quantifiable, as described and documented by the federal agency based on its own information and after reviewing any information presented to the federal agency. If the results of the applicability analysis indicate that the total emissions would not exceed the *de minimis* thresholds of the proposed action, then the conformity evaluation process is completed.

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2.0 ENVIRONMENTAL CONSEQUENCES

Pollutants considered in this analysis include the criteria pollutants and where applicable, HAPs. Airborne emissions of Pb are only evaluated for waste-to-energy (WTE) plant emissions because that would be the only Pb emission source associated with the Proposed Action.

2.1 Alternative 1 - No Action Alternative

If the Proposed Action were not implemented, no impacts to air quality would occur.

2.2 Alternative 2 - Conservation Policies and Procedures

Fort Bliss' proposed energy actions were selected to meet the goals of the Army's Net Zero energy program. Energy demands would be reduced in the most cost effective manner by changing behavior and maximizing energy efficiency and conservation in existing facilities. No or little construction would occur, and no new stationary sources would result. The air quality impact of the conservation policies and procedures would be a net benefit to the region as there would be an associated decrease in energy consumption and likely reductions in the use of pollution-emitting equipment, as well as replacement of old equipment with new, cleaner technologies.

2.3 Alternative 3 – Water Reclamation Pipeline

Air emissions associated with the water reclamation pipeline would be essentially confined to the construction phase of this alternative. Implementation of the pipeline would result in construction of approximately 125,244 feet of trench, with the trench measuring approximately 7 feet wide at the top, 5 feet wide at the bottom, and an assumed depth of 7 feet. Construction assumptions include:

- Piping would be installed in 2016;
- Area would be graded the length of the pipe x 25' wide path;
- Excavator would be used to place pipe, same hours of operation as backhoe used for trenching;
- Adjusted trench with in site prep -excavate/fill - trenching calculation to equal actual trench dimensions (5 feet wide, 7 feet deep);

Construction activities would be required to comply with 30 TAC § 111.143, *Materials Handling* and § 111.145, *Construction and Demolition* to minimize fugitive dust emissions. Construction emissions are not estimated to be significant. Emission calculations can be found in **Tab A** of **Appendix A**.

No air emissions of any significance are expected to occur as a result of operation of the water reclamation pipeline.

2.4 Alternative 4 - Waste to Energy Plant

The analysis of operational emissions that would result from the implementation of any of the proposed action alternatives primarily is a concern for Alternative 4. Alternative 4 includes an up to 45 megawatt (MW) WTE.

2.4.1 WTE Plant Construction

Construction assumptions for the WTE plant include:

- total 40-acre footprint;
- 2 year (NREL 2012) construction period;
- 600 to 800 construction workers annually;
- The building itself would be average height of 5 stories;
- The complex of buildings in total would consume 11 acres; and
- The remainder of the property would be asphalt, concrete, or gravel depending upon use.

Assumptions used for construction of transmission lines required to connect the WTE plant to a substation include:

- Lattice steel towers or pylons;
- 14 miles of transmissions lines;
- 5 towers per mile;
- 3-acre staging area;
- 89-acre tower assembly area;
- 8-mile access road;
- One-third of a tower per delivery truck;
- 8 cable-pull sites; and
- 29 hours to install one tower.

Emission estimates for construction can be found in **Tab B** of **Appendix A.**

2.4.2 WTE Plant Operations

The WTE plant operations would include actual combustion of the waste, emissions from support equipment, and emissions from staff commutes. The majority of the pollutants associated with the WTE plant would be a result of the combustion of the MSW. The WTE plant would process 1,100 tons of MSW per day, and would combust approximately 70% of the MSW. Approximately 30% of the waste would likely require sorting out of the feed stream due to characteristics that would make it difficult to

combust. The WTE plant would not burn any hazardous wastes. It is assumed that no pre-processing of the MSW except for waste stream separation of recyclables and noncombustibles (e.g. no shredding or pelletizing). The WTE plant would be owned and operated by a private operator.

The WTE plant is in preliminary design at the time of this document, but is it assumed that the WTE Plant would have two "units" consisting of the basic elements of a combustion unit, a stack, a boiler/steam creation unit, and electrical generation equipment. These units are known as Municipal Waste Combustors (MWC). It is expected that the WTE plant would operate at least one of the two units 24 hours a day, 365 days a year to maintain electricity generation requirements, and would operate both units in tandem on a regular basis. It is assumed that all air pollutants emitted from the WTE plant would leave through the stack. State-of-the art air pollution control devices (APCD) would be utilized in the construction of the plant. These APCDs include, but are not limited to BACT. BACT and other APCD are discussed in **Section 2.4.2.9** and following subsections.

It is assumed that the WTE plant would be a Mass Burn Waterwall (MB/WW) Combustor. This type of municipal waste incinerator has water-filled tubes in the furnace walls that are used to recover heat for the production of steam and/or electricity. MB/WW design represents the predominant technology in existing MWCs, and the EPA expects that over 50% of new units would be MB/WW designs (USEPA 1996a). Other combustion technology possibilities are discussed in **Section 2.4.2.19.**

The combustor unit would be followed by a steam-generating system that may consist of a water wall radiant section, a super heater, a convection section, and an economizer. Final design would determine the actual layout. The steam-generating unit would supply a high-efficiency turbine generator set and air-cooled condenser assembly (SWAPBC 2010). The turbine generators would be rated to meet the goal of 45 MW for the Fort Bliss WTE plant.

Air pollutants emissions from the MWCs would be minimized through a combination of APCDs and good combustion practices (GCP). Each unit would have separate APCD controls that would be considered state-of-the art and are proven to be effective at other MWCs located throughout the US. The assumed APCD schema for the plant would be:

- Control of NOx by selective non-catalytic reduction (SNCR). Control assumed to be 45% (USEPA 1996a).
- Acid gases, including SO_2 and hydrogen chloride (HCl), would be controlled using a combination of a spray dry absorber (SDA) and a fabric filter (FF). Fabric filters are also known as baghouses.
- Metals and other particulate matter would be controlled by the FF device.
- Mercury would be controlled by activated carbon.

- Dioxins/Furans, CO, VOCs and other by-products of incomplete combustion would be controlled by GCP.

Additional ancillary equipment will also be a source of air pollutants. The ancillary equipment is listed in detail in **Section 2.4.2.17**.

In accordance with federal air quality permitting requirements, the WTE plant would be classified as a major source of air pollutant emissions based on calculations included in this analysis.

2.4.2.1 New Source Review

TCEQ has a specific NSR program that implements federal requirements for NSR review for new incinerator operations. This review would occur prior to construction of the WTE plant. The contractor would be required to submit an application for a Construction Permit in accordance with 30 TAC Chapter 116. The WTE plant permit applications would have to undergo review, and the TCEQ reviewer would prepare a Preliminary Determination Summary. Additionally, a public review of the permit application would be required.

2.4.2.2 Prevention of Significant Deterioration

As discussed previously in **Section 1.3.1**, PSD applicability is based on an assessment of the emissions associated with the given project for the given year. The calculated potential-to-emit for each pollutant is compared against the PSD Significant Source threshold from 40 CFR 52.21(b)(23)(i) as shown in **Table 2-1**. Calculations of the potential-to-emit for the WTE plant shown in this table indicate that the plant will be subject to the NSR Program.

TCEQ is not the current permitting authority for GHG permits regulated under PSD and the Title V Greenhouse Gas Tailoring Rule, due to a gap in the PSD program. NSR for GHGs would be completed with the USEPA as the permitting authority. PSD review for GHGs is required for new facilities with GHG emissions of at least 100,000 tons per year CO_2e in addition to being a major source for other NSR regulated pollutants, in this case, NOx (76 FR 25178, USEPA 2011a). The WTE plant would require a PSD preconstruction permit for GHG emissions based on potential-to-emit calculations. The permitting application would be obtained from USEPA Region 6 and all coordination would occur between the appropriate contractors and USEPA Region 6.

Table 2-1. PSD Pollutant Applicability

Pollutant	Controlled WTE[a] (ton per year)	Significant Source Threshold[b]	Subject to PSD Permitting?
Carbon monoxide (CO)	65	100	No
Nitrogen oxides (NOx)	275	40	**Yes**
Particulate matter (PM)	9	25	No
Sulfur dioxide (SO_2)	78	40	**Yes**
Volatile organic compounds(VOC)	17	40	No
Lead (Pb)	0.04	0.6	No
Fluoride (as HF)	3.97	3	**Yes**
Sulfuric acid mist	0.01	7	No
CDD/CDF	9.29E-06	3.50E-06	**Yes**
Arsenic (As)	5.94E-04	See MWC metals	
Cadmium (Cd)	3.81E-03		
Chromium (Cr)	4.22E-03		
Mercury (Hg)	0.31		
Nickel (Ni)	0.01		
Municipal waste combustor (MWC) metals	0.33	15	No
Hydrochloric acid (HCl)	30	40	No
Carbon dioxide equivalents (CO_2e)	253,357	100,000	**Yes**

Note: CDD/CDF = total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofurans, 2,3,7,8-tetrachlorodibenzo-p-dioxin, and dibenzofurans.

[a] Controlled emissions as estimated by AP-42 method or Mass Balance Method. The spray dryer/fabric filter/SNCR is a probable control technology.

[b] 40 CFR 52.21(b)(23)(i) PSD significant thresholds.

2.4.2.3 New Source Performance Standards (NSPS) for Large Municipal Waste Combustors (40 CFR 60, Subpart Eb)

The WTE plant would also have to meet NSPS requirements for Large MSW combustors. NSPS are national emissions standards required under Section 111 of the Clean Air Act for criteria and other designated pollutants.

This standard for Large MWCs includes requirements for:

- Metals, acid gases, organics and nitrogen oxides that would be emitted during combustion;
- Fugitive ash emissions;
- Siting;
- Operator training;
- Compliance and Performance; and,

- Reporting and Recordkeeping.

The siting requirements specify that a materials separation plan and siting analysis be prepared for the proposed facility.

Emission requirements for new MWCs are listed in **Table 2-2**.

Table 2-2. Emission Standard for New Large MWC

Pollutant	Emission Standard (corrected to 7% oxygen, dry basis)
Particulate Matter (PM)	20 mg/dscm
Opacity	10%; 6-minute average
Cadmium (Cd)	10 µg/dscm
Lead (Pb)	140 µg/dscm
Mercury (Hg)	50 µg/dscm (or 85% reduction)
MWC Acid Gases - SO2	30 ppmv (or 80% reduction); 24-hour geometric average
MWC Acid Gases – HCl	25 ppmv (or 95% reduction)
MWC Organics (as total dioxins/furans)	13 ng/dscm
Nitrogen Oxides (NOx)	150 ppmv; 24-hour arithmetic average (180 ppmv for 1st year)
Carbon Monoxide (CO)	100 ppmv; 4-hour average (for non-rotary, mass burn MWCs)
Fugitive Ash	Visible emissions from ash conveying system not to exceed 5% of the observation period (by USEPA Method 22)

Note: dscm = dry standard cubic meter

A large MWC is not to be operated at a unit level greater than 110 percent of the maximum load level that was attained during the most recent successful dioxin/furan performance testing. This maximum load level will limit the peak operation of the WTE plant and will have to be determined after construction. The unit load level restriction is applicable at all times except during testing.

It is recognized that the MWC emission standards are only expected to be met under steady state (normal) operating conditions with appropriate combustion control. Provisions in 40 CFR 60.58b(a) address compliance provisions for periods of startup, shut down, and malfunction. During the time periods of startup, shutdown, and malfunction, the emissions standards listed in **Table 2-2** do not apply for a limited duration for each event.

Subpart Eb also requires extensive testing and monitoring to demonstrate that controls are operating in compliance with all applicable emission standards. For certain pollutants, continuous emission monitoring systems (CEMS) or continuous opacity monitoring systems (COMS) would be required. For other

pollutants the facility may have the option of operating a CEMS or completing annual performance testing. **Table 2-3** presents a brief summary of the testing and monitoring requirements.

Table 2-3. Overview of Testing and Monitoring Requirements

Parameter/Pollutant	Testing and Monitoring Requirements
Oxygen (O_2) or Carbon Dioxide (CO_2)	• CEMS • Initial performance evaluation (Method 3, 3A, or 3B)
Particulate Matter (PM)	• Initial performance test (Method 5) • Annual performance tests (or CEMS)
Opacity	• COMS (6-minute average) • Initial performance test (Method 9) and annual performance tests
Cadmium (Cd), Lead (Pb), and Mercury (Hg)	• Initial performance test (Method 29) • Annual performance tests (or CEMS)
Sulfur Dioxide (SO_2)	• CEMS (24-hr daily geometric average of 1-hr average concentrations) • Initial performance test (Method 6, 6A, or 6C)
Hydrogen Chloride (HCl)	• Initial performance test (Method 26 or 26A) • Annual performance tests (or CEMS)
Dioxins/Furans	• Initial performance test (Method 23) • Annual performance tests
Nitrogen Oxides (NOx)	• CEMS (24-hr daily average of 1-hr average concentrations) • Initial performance test (Method 7, 7A, 7C, 7D, or 7E)
Carbon Monoxide (CO)	• CEMS (4-hr block average of 1-hr average concentrations) • As an alternate to CEMS, can request use of CO2 measurements
Fugitive Ash	• Initial performance test (Method 22) • Annual performance tests
MWC Load Level	• Establish highest 4-hour average unit load from most recent • dioxin/furans performance testing • Continuously monitor steam flow or feed water flow
Temperature (at inlet to PM control device)	• Establish highest 4-hour average temperature from most recent • dioxin/furans performance testing • Continuously monitor PM control device inlet temperature

Parameter/Pollutant	Testing and Monitoring Requirements
Carbon Mass Feed Rate for Activated Carbon Injection System	• Estimate average carbon feed rates during Hg and dioxin/furans • performance testing from ACI system operating parameters (screw • feeder speed, hopper volume/refill frequency, or other parameter) • Each quarter, estimate total carbon usage based on weight of carbon • deliveries received and from ACI system parameters • Continuously monitor pneumatic injection pressure or other operational • indicator (with audible and/or visual alarm) as an additional means to verify proper system operation

2.4.2.4 NSPS for Stationary Compression Ignition Engines (40 CFR 60, Subpart IIII)

Requirements for compression ignition internal combustion engines are applicable with respect to the emergency standby equipment (diesel fire pumps and emergency generators) that are required for safe operation of the WTE plant. 40 CFR Subpart IIII 60.4205(c) Table 4 lists compliance emission standards for fire pump engines. 40 CFR Subpart IIII 60.4205(b) and 60.4202(a) list applicable emission standards for new non-road compression ignition engines. Additionally 40 CFR Subpart 60.4211(c) requires purchasing an engine that is certified to meet the applicable emission standards. Diesel fuel utilized for the engines must meet fuel specifications listed in 40 CFR 80.510. This section requires the use of diesel fuel with the maximum sulfur content of 15 parts per million by weight, also known as ultra low sulfur diesel fuel.

2.4.2.5 NESHAPs

The WTE plant would also be subject to NESHAP control standards for the auxiliary equipment. TCEQ reviews emissions control standards during the NSR process prior to issuance of a permit (TCEQ 2011a). There are no current NESHAPs for municipal solid waste incinerators.

The emergency generators and diesel fire pumps that would be installed as part of the construction for the WTE plant are subject to 40 CFR 63, Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engine (RICE). The regulation lists requirements for RICE, including Maximum Achievable Control Technology (MACT). The specific requirements would be based on the horsepower rating, which is unknown at this time.

2.4.2.6 Texas-specific requirements

The WTE plant would be required to meet Texas-specific air emission requirements. The plant would have to meet the requirements of TAC Title 30, Part 1, Chapter 330 for Type V solid waste processing

facilities. The Texas Administrative Code also includes requirements for air contaminant sources from incinerators. Title 30, Part 1, Chapter 111, Subchapter A, Rule §111.121 through §111.129 include specific requirements for single-, dual-, and multiple-chamber incinerators to control visible emissions and particulate matter.

Finally, the WTE plant would have to meet the emissions requirements in TAC sections 30 TAC §112.41 regarding the control of sulfuric acid emissions.

2.4.2.7 Title V and Title VI Permits

The operation of the WTE plant will require a Title V operating permit, also known as Federal Operating Permit (FOP), due to its potential-to-emit. The WTE plant would be maintained separately by a private contractor who would operate the plant and ensure compliance with the conditions of the Title V permit.

Permit conditions would most likely be set with requirements for upset conditions, and the appropriate actions the contractor operator would be required to take to maintain compliance. Emission standards would be established based on the technologies determined during the NSR process and results of analyses included within its permit applications. TCEQ requirements related to Title V permits are included in 30 TAC Chapter 122 which implements and supplements the requirements of 40 CFR 70.

Title VI of the CAA, The Acid Rain Program, implemented by USEPA and managed in the state of Texas by the TCEQ includes reduction goals for SO_2 to 1980 levels. To achieve this reduction, the law requires a two-phase tightening of the restriction placed on fossil fuel –fired power plants. Based on a review of applicability for the Acid Rain Programs listed in 40 CFR Part 72, the WTE plant would not be required to participate in the Acid Rain Program unless the plant operations utilized more than 20% fossil fuels during the first 3 years of operations (40 CFR 72.6(b)(7)).

2.4.2.8 Applicable Control Technologies for WTE Plant

Table 2-4 describes the Emission Control Requirements (ECRs). This table summarizes the different ECR classifications and when they are required. The sections following briefly discuss the available technologies for the WTE plant. Final selection of control technologies must be completed during design and permit application stages of the project.

Analyses for each of the control technology groups would be required for the WTE plant. These analyses would be required to be completed prior to applying for a permit. The analyses would include the WTE plant as well as the auxiliary equipment. Based on the potential-to-emit calculations, the WTE plant would be required to undergo TCEQ PSD/NSPS review for the following pollutants (also listed in Appendix B, Tab A, Table 1).

- Nitrogen oxides (NOx),
- Sulfur dioxide (SO_2),
- Fluoride (as HF),
- Dioxins/furans, and
- CO_2e.

Table 2-4. Applicable Control Technologies

Analysis/Rule	Applicable Pollutants	Applicable Sources	[1]Requirement
BACT	[1]Each Regulated NSR pollutant (including but not limited to criteria pollutants and precursors. [2](Note: TCEQ does not regulate GHG, however, USEPA Region 6 does, therefore WTE plant BACT should include GHG controls)	Any proposed major stationary source or major modification emitting a regulated air pollutant	Ensure appropriate emissions limitations considering technical practicability and economic reasonableness.
MACT	HAPs	Major sources of a HAPs	MACT rules must be met if applicable.

Source: (TCEQ 2011b)
[1]See 40 CFR §51.66(b)(23)9i0 and (b)(23)(ii)
[2]30 TAC§ 101.1(107); See also §116.12(17) and (18)

2.4.2.9 BACT

Newly constructed and modified major sources located in areas in attainment with the NAAQS must implement BACT. Pursuant to 40 CFR 52.21(j)(2), if a proposed BACT is lower than or equivalent to the most stringent emission limit, then no further analysis is normally necessary. Once the most stringent emission limit has been identified, the technical feasibility of the selected BACT is then determined. A technically feasible technology is one that is available and applicable to the source under review. If the control technology is determined to be technically and economically feasible and would provide the most stringent emission level that control would be considered the BACT unless energy or environmental impacts preclude its use (USEPA 1990).

The determination of what constitutes BACT would ultimately be made by the TCEQ. This allows the TCEQ to consider the emphasis placed on the economic, environmental, and energy impact of the specific type of control. TCEQ could consider positive benefits to the area, the amount of pollutants emitted, and other major sources in the area. The applicable NSPS for Large MWCs reflect MACT performance and would establish a baseline for determining BACT for HAPs.

2.4.2.10 Emission units requiring BACT analysis

Due to the lack of specific information on the design of the WTE plant, detailed BACT analyses were not performed. However, a brief, general discussion of the most likely BACT for a WTE plant is included

below. The general categories for pollutants are defined for each emission unit and are listed in **Table 2-5.**

Table 2-5. BACT Analysis Emission Unit and Pollutant Categories

Emission Units	BACT Analysis Pollutant Categories
MWC	• NOx • MWC Acid Gases (SO2, HCl), Fluorides, SAM • PM(1), Pb, MWC Metals • CO • VOCs, MWC organics • Mercury
Storage Silos	PM (PM_{10} and $PM_{2.5}$)
Diesel Fire Pumps	• NOx • SO2 • PM (PM_{10} and $PM_{2.5}$) • CO • VOC
Emergency Generator	• NOx • SO2 • PM(PM_{10} and $PM_{2.5}$) • CO • VOC

2.4.2.11 Control of NOx emissions from MW combustion

For MWC units, formation of fuel-bound NOx is a function of the nitrogen content of the waste and the amount of oxygen in the combustion chamber. Thermal NOx is created by a high temperature reaction in the combustion chamber between atmospheric nitrogen and oxygen. The amount of NOx formed is a function of time, turbulence, temperature, and fuel-to-air ratios within the combustion flame zone. Since the formation of NOx is largely dependent on fuel-bound NOx and thermal NOx, several control technologies that employ techniques to reduce the precursors of NOx formation or use catalytic or non-catalytic systems to treat the post combustion emissions have been developed (SWAPBC 2010). There are several available control alternatives for the BACT analysis as detailed below.

<u>Combustion optimization</u>

Combustion techniques would have the potential to reduce the conversion rate of nitrogen from the waste stream to NOx and suppress thermal NOx formation. A number of technologies currently exist that have limited success, are difficult to obtain and maintain operationally, or do not have sufficient data available on reduction capabilities to warrant consideration as BACT. The most likely combustion technologies to be used for the WTE plant include Good Combustion Practices (GCP) and natural gas reburning and flue gas recirculation. Staged Combustion and Low Excess Air are two GCP techniques that are often used

together. The technology primarily reduces the amount of unfixed nitrogen present in the combustion air. Staged combustion technologies are difficult to maintain proper combustion control in all combustion zones. Improper control would increase generation of carbon monoxide, hydrocarbons and products of incomplete combustion. However, Staged Combustion and Low Excess Air have been demonstrated to be an effective technique for reducing NOx and would potentially be a BACT to consider for the WTE plant. Natural gas reburning works in concert with GCP. The natural gas is injected into the Low Excess Air combustion zone to create a fuel rich condition, which reduces NOx without increasing CO emissions. There is no long term operational data on natural gas reburning. This control technology would require additional engineering and testing, so it may not be a good candidate for BACT for the WTE plant.

Flue gas controls

Flue gas control techniques for reducing NOx include selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR). While there are several types of proprietary flue gas controls, only SNCR and SCR have been successfully demonstrated on MWCs or have shown significant potential for effective NOx control.

Selective Catalytic Reduction (SCR)

SCR systems directly inject ammonia or urea into the flue gas stream, and then passing the flue gas through a catalyst bed. Reductions achieved by an SCR system are up to 80% (USEPA 1996a). Currently, SCR use with MWC facilities is limited to plants located outside of the US, where emission limits vary widely. Operational issues with this technology include erosion of the catalyst and substrate material due to exposure to acid gases and particulate matter in the MWC exhaust streams. To avoid this problem requires installation downstream of the control devices for the acid gases and PM, which then requires additional system requirements for re-heating the flue gas. Additionally, SCRs themselves have a high capital cost.

Selective Non-Catalytic Reduction (SNCR)

SNCRs directly inject ammonia or urea into the furnace to reduce NOx to N_2 without the use of catalysts. NOx reductions of 45% are achievable.

SNCR systems have been utilized for most new and modified MWC units over the last decade. The emission limit for NOx in the NSPS for MWCs is based on the application of SNCR control technology. Consequently, a SNCR system with ammonia or urea injection is a candidate control system for reducing NOx emissions from the proposed WTE facility. SNCR with enhanced combustion control would incorporate the latest improvements in combustion design. The benefits of SNCR with enhanced

combustion control include increased furnace efficiency, reduced ammonia slip, and reduction in reagent use.

2.4.2.12 Control of Acid Gas Emissions from MW Combustion

Wet Scrubbers

Wet scrubbers are used for controlling acid gas emissions. Types of wet scrubber include spray towers, venture scrubbers, and centrifugal scrubbers. Wet scrubbers are frequently used in Japan and Europe, but have a high water requirement (USEPA 1996a). It is unlikely a wet scrubber would be appropriate for an arid location such as Fort Bliss.

Spray Dryer Absorber with Fabric Filter (FF)

Spray dryers are frequently used for acid gas control. Spray dryers can be used in combination with FF or an electrostatic precipitator (ESP) and can control CDD/CDF, PM, metals, SO_2, and HCl emissions. Spray dryer/FF combinations are more common and would be the likely BACT choice. Spray dryers use a process that injects lime slurry into the spray dryer. The water in the slurry evaporates and cools the flue gas. The lime reacts with the acid gases to form calcium salts. The calcium salts are removed by a PM control device (FF or ESP). The lime is added in sufficient quantities to reach the specific efficiency specified in the design (USEPA 1996a). This equipment is the most likely BACT for MWC acid gases control, and is utilized in the emissions calculations as the assumed control.

Dry Sorbent Injection (DSI)

DSI was developed to control acid gas emissions; however, DSI can be combined with flue gas cooling and either and FF or ESP to control CDD/CDF and PM emissions. The combination of DSI and flue gas cooling has proven effective for control of CDD/CDF (USEPA 1996a).

2.4.2.13 Control of PM and Metals from MW Combustion

Fabric Filter (FF)

PM is removed via a filtering action of the fabric. FFs are commonly referred to as “baghouses”. The differences between types of FFs are based on how they “clean” the flue gas, and if the flue gas comes through the large opening on the bag, or through the “bottom”. The two main types of filter cleaning mechanisms are reverse-air and pulse-jet. Reverse-air FFs collect PM on the inside of the filter as the flue gas flows through the filter and out. Pulse-jet filters collect PM on the outside of the filter, and only cleaned air passes through the bag. Based on successful uses of this technology in other MWC units, FF is a viable BACT for the WTE plant.

Electrostatic Precipitator (ESP)

ESPs utilize electrically charged plates or wires to create negatively charged ions that attach to the PM in the flue gas. Once the negatively charged ions attach to the PM, the charged particles are attracted toward the grounded plates and are collected on their surface. Common types of ESPs for WTE plants include plate wire units that are made of weighted or rigid wire and flat plate units that have large, flat collection plates. Generally, the larger the surface area of the collection surface (plate or wire) on an ESP, the more efficient it will be. Not all ESPs are designed the same, however, and performance varies. ESPs are cleaned by discharging the unit and cleaning the plates or wires (USEPA 1996a).

2.4.2.14 Control of CO from MW Combustion

Incomplete oxidation of carbon compounds during combustion would result in the generation of CO emissions. Control can be achieved through GCP or by flue gas controls. Post combustion flue gas controls are not considered as BACT for CO because they produce secondary pollutants. GCPs similar to those for NOx control can also be used to control CO. This is the most likely BACT and the control assumed for WTE plant analysis.

2.4.2.15 Control of VOCs/Organics from MW Combustion

VOC and MWC organics would be formed by incomplete oxidation of carbon compounds during the combustion process. MWC organics are measured as CDD/CDF. GCPs similar to those for NOx control can also be used to control VOCs and CDD/CDF. This control is the most likely BACT and the control assumed for WTE plant analysis.

2.4.2.16 Control of Mercury from MW Combustion

Mercury emissions come from mercury containing materials in the waste burned in the combustor (e.g. batteries). Mercury control is influenced by good PM control, low temperatures in the APCD system, and sufficient level of carbon in the fly ash. Available control technologies include activated carbon injection, sodium sulfide injection, and fixed bed carbon filters.

Activated Carbon Injection with Fabric Filter

Activated Carbon Injection with FF works by injecting activated carbon into the flue gas prior to the dry sorbent injection or spray dryer systems, and then the particles created after injection are captured in the FF control device. Activated carbon injection has proven to have removal efficiencies of 50 to 95% and is popular in the United States as the mercury APCD (USEPA 1996a). Activated carbon injection is the most likely BACT and is carried through the analysis as the control assumed for the WTE plant.

Carbon Filter Beds

Carbon filter beds work by trickling activated carbon through adsorber sections that act like a water fall through which flue gas flows. The activated carbon captures the particles in the gas as they flow past. This system can result in autoignition of the activated carbon, and requires close monitoring to prevent fires. This BACT is not used in the US and has not been chosen as a control due to operational problems.

2.4.2.17 Control of Emissions from Ancillary Equipment

Ancillary equipment anticipated to be included with the WTE plant would be two diesel fire pumps, an emergency generator, and storage silos for dry chemicals. Each source would be required to comply with all applicable NSPS and PSD control technology requirements as they are part of the WTE plant. Possible control technologies for each source that are assumed for the WTE plant are discussed below.

Storage Silos

Storage silos would probably have to be built to house lime and carbon for feedstock for the APCD at the WTE plant. The only pollutant to address is PM. The silos would likely be filled at intermittent times and PM emissions would be limited to those times. This scenario assumes the silos are closed buildings and that there is no windblown PM generation. Each silo would have an FF mounted on the roof to collect dust and discharge it directly back into the storage cycle. FF is the assumed BACT for the storage cycles for the WTE plant.

Diesel Fire Pumps and Emergency Generators

The fire pumps and emergency generators are diesel-fired compression engines. BACT pollutants to address are NOx, SO_2, CO, PM, and VOC and the BACT would be similar to each other. The BACT would depend somewhat on the final horsepower of the fire pumps, but 250 horsepower is assumed for this analysis. The emergency generator is assumed to be 250 kilowatts, or 373 horsepower. The most likely BACT for NOx, CO, and VOCs would include GCPs and engine design and compliance with the applicable NOx emissions limits in 40 CFR 60, Subpart III. The most likely BACT for SO_2 and PM is the use of ultra low sulfur diesel fuel, GCP, and efficient engine design.

2.4.2.18 BACT Summary

The most likely BACT for the WTE plant and auxiliary equipment is summarized in **Table 2-6** below.

Table 2-6. BACT Summary

Equipment	Pollutant(s)	Proposed Control Technology
MWC	NOx	Selective Non—Catalytic Reduction (SNCR)
	SO2	Spray Dryer Absorber (SDA) with Fabric Filter (FF)
	HCl	
	Fluorides (as HF)	
	MWC Acids: Sulfuric Acid Mist	
	PM, PM10, PM2.5, and MWC Metals	Fabric Filter (FF)
	PM, PM10, PM2.5, and MWC Metals	Fabric Filter (FF)
	Lead	
	CO	Good Combustion Practices (GCP) and Design
	VOCs	
	MWC Organics (CDD/CDF)	
	Mercury	Activate Carbon Injection with Fabric Filter
Storage Silos	PM	Fabric Filter
Diesel Fire Pumps	NOx, PM, SO2, CO, VOC	Good Combustion Practices & Design and Use of Ultra Low Sulfur Fuel
Emergency Generator	NOx, PM, SO2, CO, VOC	Good Combustion Practices & Design and Use of Ultra Low Sulfur Fuel

2.4.2.19 Other WTE Technologies

Gasification

This emerging WTE technology involves heating fuel in a limited-oxygen environment. Waste materials are delivered and stockpiled in a similar manner as mass-burn incineration. These facilities are typically smaller in scale and the rate of feedstock delivery is much smaller. They are also more likely to include sorting of feedstock to remove recyclable materials and help provide a more homogeneous fuel. The non-recyclable material is fed into the gasification chamber using an auger-feed mechanism. Once in the chamber, the fuel is heated and a portion of the fuel is combusted, using the small amount of oxygen present. This exothermic reaction releases heat necessary to produce endothermic reactions that produce a synthetic gas, or syngas, made up primarily of hydrogen and carbon monoxide. The syngas can be used in several ways:

- Steam creation: syngas can be combusted to create heat for converting water to steam, which drives a steam turbine to generate electricity.

- Direct motive force: syngas can be cooled and cleaned for use as fuel for an internal combustion engine or gas turbine, either of which can be coupled to a generator for electricity production.
- Liquid fuel conversion: cooled and cleaned syngas can be converted to various liquid fuels using the Fischer-Tropsch process, a series of chemical reactions occurring from introduction of a catalyst to the syngas.
- Energy storage: syngas can be stored for later use or transferred to another location.

Gasification systems have been shown in Japan to emit between 10% and up to 99% lower emissions than the USEPA standard, and the process is clean burning. For example, gasification systems emit 60% lower NOx than the USEPA standard and 99% lower mercury (NREL 2010).

Pyrolysis

This form of incineration chemically decomposes organic materials by heat in the absence of oxygen. Pyrolysis typically occurs under pressure and at operating temperatures above 430 degrees Celsius (ºC) (800 degrees Fahrenheit [ºF]). In practice, it is not possible to achieve a completely oxygen-free atmosphere. Because some oxygen is present in any pyrolysis system, a small amount of oxidation occurs. If volatile or semi-volatile materials are present in the waste, thermal desorption would also occur. Organic materials are transformed into gases, small quantities of liquid, and a solid residue containing carbon and ash. The off-gases may also be treated in a secondary thermal oxidation unit. Particulate removal equipment is also required. The feedstock is the same as for other technologies.

Anaerobic Digestion

This emerging WTE technology uses biologic methods to process waste materials. The feedstock collection and processes for anaerobic digestion are the same as discussed for mass-burn incineration and gasification. The importance of sorting materials is higher for anaerobic digestion than other WTE technologies. Therefore, manual or automatic sorting of materials is typically the first step, removing inorganic materials and recycling those materials with value. The organic materials are placed into a digester, where microorganisms break down the material and release a biogas high in methane. The resulting biogas is captured and serves several purposes:

- Steam creation: the biogas can be combusted to provide heat for steam to drive a turbine, coupled to a generator for power production.
- Motive force: the biogas can be conditioned and serve as fuel for an internal combustion engine or gas turbine, linked to an electrical generator for power production.
- Energy storage: the biogas can be stored for later use or transferred to another location.

Fermentation

This non-thermal technology uses microorganisms to convert waste into ethanol for use as fuel to power a turbine. It is unlikely this process would be an option for the WTE plant.

2.4.2.20 WTE Plant Estimated Operational Emissions Methodology and Results

Emissions from the WTE plant are calculated using methods presented in AP-42 – Compilation of Air Pollutant Emission Factors, Section 2.1 Refuse Combustion utilizing the assumed BACT presented in **Table 2-7** as the control technology. Emissions from the contract staff that would operate the plant are estimated utilizing emission factors from a USEPA model (MOVES2010) and estimated activity levels. Additional detail is provided below.

Detailed Methodology/Assumptions for WTE Plant Emissions

Two methods were used to calculate the potential emissions from the WTE plant. The two methods used are the AP-42 method based on ton/day of MSW combusted, and a method utilizing an estimated exhaust gas rate and the maximum concentration allowed to be emitted. AP-42 does not support all pollutants of concern from MWC as significant as listed in the PSD regulations (specifically 40 CFR 52.21(b)(23)(i)). Therefore, an alternative approach to estimating emissions is utilized. **Table 2-7** below documents the method used for each pollutant estimate for the MWCs and restates the PSD thresholds under 40 CFR 52.51. Detail calculations can be found in **Appendix B, Tab B.**

Table 2-7. Pollutant Significant Thresholds and Emission Estimation Method

Pollutant	Pollutant Classification Under PSD	40 CFR 52.21(b)(23)(i) Thresholds for "Significant"		Emission Estimation Method
		ton/year	Notes	
CO	Carbon monoxide	100	Total for CO	AP-42
NOx	Nitrogen Oxides	40	Total for NOx	AP-42
PM	Particulate Matter	25	Total for PM	AP-42
SO_2	Sulfur Dioxide/MWC acid gases	40	Total for SO_2 alone	AP-42
VOC	Ozone	40	Total for VOC + NOx	Mass-Balance
Lead (Pb)	Lead	0.6	Total for Lead	AP-42
Hydrogen Fluoride	Fluorides	3	Total for Fluorides under PSD. Could be negligible	Mass-Balance
Sulfuric Acid Mist	Sulfuric Acid Mist	7	Total for sulfuric acid mist	Mass-Balance
[1]CDD/CDF	MWC Organics	3.50E-06	Total for all MWC	AP-42

Pollutant	Pollutant Classification Under PSD	40 CFR 52.21(b)(23)(i) Thresholds for "Significant"		Emission Estimation Method
		ton/year	Notes	
			organics	
Arsenic (As)	MWC Metals	15	Total for MWC Metals	AP-42
Cadmium (Cd)	MWC Metals	15	Total for MWC Metals	AP-42
Chromium (Cr)	MWC Metals	15	Total for MWC Metals	AP-42
Mercury (Hg)	MWC Metals	15	Total for MWC Metals	AP-42
Nickel (Ni)	MWC Metals	15	Total for MWC Metals	AP-42
Hydrochloric Acid (HCl)	MWC Acid Gases	40	Total for HCl plus SO2	AP-42
H_2S	Hydrogen Sulfide	10	Total for H2S. Due to excess oxygen conditions in the MWC, production of H2S (a reduced form of SO2) is unlikely (SWAPBC 2010)	Mass-Balance
CO_2	Not PSD 40 CFR 52.21	NA	NA	AP-42/Federal GHG Guidance
CH_4	Not PSD 40 CFR 52.21	NA	NA	AP-42/Federal GHG Guidance
N_2O	Not PSD 40 CFR 52.21	NA	NA	AP-42/Federal GHG Guidance
CO_2e	Not PSD 40 CFR 52.21	NA	NA	AP-42/Federal GHG Guidance

[1]CDD/CDF = total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofurans, 2,3,7,8-tetrachlorodibenzo-p-dioxin, and dibenzofurans

The control technologies listed in **Table 2-6** are the technologies that were used when gathering emissions factors from AP-42.

The estimated results for the annual controlled potential to emit for the WTE plant are presented in **Table 7, Tab B** of **Appendix B.** The results indicate that the WTE plant would have to undergo PSD permitting prior to construction because the PSD thresholds are exceeded for several of the pollutants of concern.

Detailed Methodology for Preliminary Assessment of Impact on Nearby Class I Federal Areas

To evaluate the WTE plant emission impacts on the closest Class I area, Guadalupe Mountains National Park, the Federal Land Manager's Air Working Group (FLAG)-recommended "initial screening test" methodology was used (USFS 2010). This test is based on screening criteria introduced by the USEPA as part of its Regional Haze Regulation. For stationary sources located greater than 50 kilometers (31 miles) from the subject Class I area, the quantity over distance (Q/D) test is applied to determine whether or not any further visibility analysis is necessary. Q/D is the estimated annual emissions over distance value that constitutes the initial screening test. A value less than or equal to 10 is presumed to have no adverse impact and no further analysis is required. Based on these criteria, the USEPA has concluded that the following sources would not be considered to cause or contribute to visibility impairment:

- Stationary sources located more than 50 kilometers (31 miles) from any Class I area that emit less than 500 tons per year of NOx or SO_2 (or NOx and SO_2 combined), and
- Stationary sources located more than 100 kilometers (62 miles) from any Class I area that emit less than 1,000 tons per year of NOx or SO_2 (or NOx and SO_2 combined).

In addition to the above thresholds, the FLAG guidance also evaluates PM_{10}, and sulfuric acid (H_2SO_4) mist because these pollutants also adversely affect visibility and contribute to other resource impacts. The federal land manager (FLM) would consider a source located greater than 50 kilometers (31 miles) from Class I area to have negligible impacts with respect to Class I Air Quality Related Values if its total SO_2, NOx, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in kilometers) from the Class I area is 10 or less.

The WTE plant annual estimated emissions of total NOx, SO_2, PM_{10} and sulfuric acid would not be likely to exceed the Q/D threshold of 10. The estimated Q/D threshold, based on estimated annual emission rates, is 4.1. It should be noted that the annual WTE plant emissions estimate is based on assumptions for APCD, throughput, and operational characteristics because the 24-hour maximum emissions cannot be estimated at this time.

Section 165 of the CAA requires the USEPA or the state/local permitting authority to notify the FLM of any new or modified major facility proposing to locate within 100 kilometers (62 miles) of a Class I area. The TCEQ would be required to forward the WTE plant PSD application to the FLM for review and analysis as soon as possible after receipt.

Detailed Methodology/Assumptions for Diesel Fire Pumps and Emergency Generators

Diesel-fire fire pumps and emergency generator emissions were calculated using emissions from Cummins Diesel, a popular brand of equipment. Detailed calculations can be found in **Tables 4 and 5, Tab B**, in **Appendix B**.

The following assumptions were used when estimating emissions from the diesel fire pumps and emergency generators:

- The fire pump engines are assumed to be 252 horsepower. There are two engines assumed.
- The emergency generator is assumed to be 250 kilowatt, or approximately 373 horsepower.
- The load factor for the engines were taken from the USEPA document "Median Life, Annual Activity, and Load Factors Values for Nonroad Engine Emissions Modeling" (USEPA 2004).
- CO_2 emission factors are from NONROAD 2008.

Detailed Methodology/Assumptions for Garbage Truck Deliveries

Emissions from the proposed increased delivery of MSW from surrounding communities to the WTE plant is calculated using the estimated number of trucks each day and the distance each truck would travel. Emission factors for the pollutants are from the USEPA's MOVES2010 model for estimating emissions from motor vehicles. The following assumptions were utilized:

- 100 garbage trucks would daily travel six miles each way to the WTE plant versus driving south to the existing landfill;
- Garbage trucks would be a mix of ages, but can be estimated to be similar to the MOVES2010 default age mix for 2018;
- Thirty garbage trucks daily would travel from the WTE plant to the landfill in Clinton, Texas to dispose of noncombustible MW, a total roundtrip distance of 48 miles; and
- Deliveries occur every day of the year.

Table 3, Tab B in **Appendix B** presents the estimated emissions from waste hauler deliveries to the WTE plant and to the landfill in Clinton, Texas.

2.4.3 Commuting Emissions for Alternative 4

Operational emissions for the WTE plant would also include the commute of the staff. The staff is assumed to be 100 personnel, on site every day of the year. This number would not include the same people at the same time, but it is assumed that 100 personnel would make a motor vehicle trip to the WTE plant every day. Emissions from the proposed increased staffing commute are calculated using the

number of estimated miles traveled by each staff member coming to work on the site. Emission factors for the pollutants are from the USEPA's MOVES2010 model for estimating emissions from motor vehicles. The assumptions used include:

- 100 employees for the WTE.
- Employees would travel an average distance of 20 miles roundtrip to work (10 miles each way) (TXDOT 2006).
- 12% of personnel would arrive in a two person carpool utilizing a passenger vehicle. Emissions shown are for the vehicle, not for the personnel.
- 88% of the remaining personnel would drive some type of passenger car.
- 2018 would be the first year of operation of the WTE plant. The USPEA MOVES2010 model default mix of vehicles model year age was utilized to estimate emissions factors for the vehicles for criteria pollutants. These are average emission factors.
- Vehicle age is represented by the MOVES2010 default 2018 estimated car model year mix for Texas.
- Personnel would drive to the site every day of the year for support of year round operations.

The CO_2 emission factor used in the calculations is from Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document (CEQ 2010), Table D-11. The CH_4 and N_20 emission factors are from Table D-12 of the same document. Emissions from commuting staff for Alternative 4 would not be significant. The estimated emissions from commuters for Alternative 4 for can be found in **Table 1, Tab D** in **Appendix B**.

2.4.4 Alternative 5 – Geothermal Energy Facility

Assumptions used for the construction of the Geothermal Energy Facility include:

- Construction of 6,020 square feet of unpaved access roads to the geothermal wells;
- 20-acre installation of a Concentrating Solar Thermal Array
- 2 troughs delivered per truck
- 25 CF concrete foundation per post, 3 posts per trough.

Construction activities would be required to comply with 30 TAC § 111.143, *Materials Handling* and § 111.145, *Construction and Demolition* to minimize fugitive dust emissions.

Specifics on the geothermal facility are not available at this time to quantitatively assess operational air emissions. It is anticipated that the operations air emission impact would not be significant based on the relatively minimal emissions typically associated with geothermal energy facilities. Control equipment technology is readily available for potential geothermal-specific emissions, such as hydrogen sulfide and ammonia. Any requirements for these control technologies would be included during the plant air permitting process. The portion of the construction that could be estimated is found in **Tab C** of **Appendix A.**

Operation emissions also include an estimated 5 vehicles commuting to the facility each day. Commuter emissions can be found in **Table 2, Tab D** of **Appendix B**.

2.5 Alternative 6 – Dry-Cooled Concentrating Solar Power Technology

Assumptions used for estimating construction emissions include:

- The array complex would be approximately 300 acres in size;
- Each trough would be 39 feet long and 20 feet high;
- It would take approximately 6 hours to assemble one trough;
- Foundation would constitute concrete footers for posts;
- Six posts per trough;
- 25 cubic feet of concrete per post; and
- 4.4 miles of gravel access road for the CSP complex.

Construction emissions are estimated to be not significant. Emission calculations can be found in **Tab C** of **Appendix A**.

Operation of the CSP Array would not be a large source of air emissions. The CSP could have diesel-fuel operated generators for remote sites; however, none are specifically identified in the alternatives with CSP. Air pollutant emissions from the operation of the solar array include the staff commute of approximately 28 people and negligible fugitive emissions from the cooling system of the CSP.

Refrigeration systems, such as the ones that could be in use for the solar arrays, may require permitting under the TCEQ's Permit by Rule (TCEQ, 2009a). Fugitive emissions from the cooling system of the CSP could occur during maintenance of the system, as 100% capture is not possible. In addition, seals and pipes for the CSP may not be absolutely leak proof. However, the CSP would be maintained to keep fugitive emissions to the bare minimum, so they are not calculated as part of the impact analysis as the impact would be negligible.

2.6 Alternative 7 – Implement Additional Renewable Energy Development

Additional biomass, geothermal, wind, or solar resources would be developed in compatible footprints across the installation. Air quality impacts for additional geothermal or solar resources that would be implemented at Fort Bliss would be similar as those described for Alternatives 4, 5 and 6. Air emissions would be evaluated for each project as they are identified and evaluated under this programmatic alternative.

It is plausible that supplemental use of combined cycle gas turbines for peak shaving and moderating the renewable energy load going into the electrical grid can be implemented. Emissions were estimated for a single 2.5 megawatt turbine. The values for the representative single gas turbine can be aggregated additively for combinations of gas turbines or to assess a turbine with a greater energy output. Emission estimates can be found in **Tab C** of **Appendix B**.

3.0 CUMULATIVE IMPACTS

The important air quality cumulative impact issues considered in this analysis were:

- Potential for increased emissions of criteria pollutants by Fort Bliss activities, in combination with increased emissions due to population growth that could result in non-attainment of NAAQS for CO, ozone, or expansion of the non-attainment area for PM_{10}.
- Impact of increase in ground disturbance and exposure due to construction, off-road vehicle traffic and other activities that affect vegetative cover and soils on fugitive dust generation and particulate matter emissions.
- Cumulative effects of increased human-caused dust generation in combination with natural wind-blown dust events on ambient air quality in El Paso and Doña Ana Counties.
- While individual sources of GHG emissions are not large enough to have an appreciable effect on climate change, all of these sources incrementally increase concentrations. Therefore, cumulative impacts of GHG emissions occur when proposed GHG emissions combine with other GHG emissions from other natural and man-made activities on a global scale.

Section 3.3.2 of the EIS summarizes projected construction emissions for facilities and infrastructure on Fort Bliss, and operational emissions on Fort Bliss, including combustion emissions from heavy duty diesel equipment and private vehicles, stationary sources, and fugitive dust from construction. While these emission sources are analyzed separately, air quality in the ROI would be affected by the cumulative total of any combination of these sources if multiple alternatives are selected for the Proposed Action, in addition to other off-post sources.

The forecast baseline population growth, in combination with proposed Fort Bliss-induced population changes, is projected to result in a 28 percent increase in the population of El Paso County by 2035 (El Paso MPO 2010). This could ultimately result in exceedances of the NAAQS, especially of carbon monoxide and particulate matter (PM_{10}) (for which the City of El Paso is in moderate non-attainment). PM_{10} levels in El Paso and Doña Ana Counties are further aggravated by windblown dust, especially during dust storms. Additional ground disturbance due to construction both on and off installation, in combination with other fugitive dust sources in the region, could all contribute to short-term cumulative increases in PM_{10} emissions in the ROI.

In terms of long-term cumulative impacts, **Section 2** of this document includes a complete discussion of emissions due to construction and operations for each of the Alternatives for the Proposed Action. No

significant negative cumulative impacts to air quality are expected from implementation of Alternatives 1, 2, 3, 6, or 7, as follows:

Alternative 1 – No Action Alternative: The No Action Alternative would have no direct or indirect impacts to air quality; therefore, no cumulative impacts would occur.

Alternative 2 – Conservation Policies and Procedures: Alternative 2 would result in beneficial impacts to air quality through reduced air emissions including GHG emissions associated with Fort Bliss operations in both the short- and long-term.

Alternative 3 – Water Reclamation Pipeline: Implementation of conservation policies and procedures under Alternative 3 would result in beneficial impacts to air quality through reduced air emissions including GHG emissions associated with Fort Bliss operations in both the short- and long-term.

Alternative 5 – Geothermal Energy Facility: Implementation of conservation policies and procedures under Alternative 5 would result in beneficial impacts to air quality through reduced air emissions including GHG emissions associated with Fort Bliss operations in both the short- and long-term.

Alternative 6 – Dry-Cooled CSP Technology: Implementation of conservation policies and procedures under Alternative 6 would result in beneficial impacts to air quality through reduced air emissions including GHG emissions associated with Fort Bliss operations in both the short- and long-term.

Alternative 7 – Implement Additional Renewable Energy Development: The impacts of Alternative 7 are anticipated to be the same as those described for Alternatives 5 and 6. These impacts are less than significant to air quality and beneficial from the replacement of fossil-fuel energy sources with renewable energy sources.

Alternative 4, which involves the construction of an up to 45-MW WTE plant would produce the most significant cumulative impact on air quality. The WTE plant, while a major stationary source with significant potential to emit air pollutants, would require permitting under the PSD and Title V federal programs. These programs require significant analysis to assess both short- and long-range transport of pollutants of concern to ensure that impacts are known and can be addressed through implementation of state of the art control technologies and operational limits.

More extensive information on plant design and operation, as well as analysis of emissions transport would need to be known to determine if air pollutant emissions from WTE plant operations would significantly

affect visibility in Class I areas such as Guadalupe National Park. Cumulatively, increased emissions in the ROI, including the WTE plant, can be expected to contribute to increasing haze in those areas.

The cumulative effects for GHG emissions were evaluated for the proposed action alternatives. **Table 3-1** presents annual operational GHG emissions for each alternative.

Table 3-1. Comparison of GHG Emissions for Alternatives 4 through 7

Alternative	Metric Tons CO_2e per Year
Alternative 4	255,147
Alternative 5	[1]ND
Alternative 6	Negligible
Alternative 7	Negligible

[1]Not determined – awaiting additional information on the Geothermal plant operations.

It should be noted that the WTE plant could result in indirect beneficial impacts from extending the life of the landfills where MSW from the city of El Paso is currently deposited. According to the City of El Paso's *Carbon Footprint Report* (2010), nearly 95 percent of the GHGs for the city stem from the two primary landfills. Installing a landfill gas collection system could reduce, but not eliminate all of the projected 4.6 million tons of CO_2e generated by the landfills annually (City of El Paso 2010). Diversion of the MSW to the WTE is a more efficient way to reduce GHG emissions. Waste is combusted shortly after its generation, producing CO_2 whereas landfilling results in the long-term biodegradation of the MSW, which produces methane, a more damaging GHG with an atmospheric lifetime 21 times that of CO_2. Additionally, no landfill gas collection system can achieve 100 percent efficiency.

Emissions of GHGs from implementing Alternative 4 alone would not cause appreciable global warming that would lead to climate changes. However, these emissions could incrementally increase the atmosphere's concentration of GHGs, and, in combination with past and reasonably foreseeable future emissions from all other sources, contribute to the adverse effects of climate change. At present, no methodology exists that would enable estimating the specific impacts (if any) that this increment of climate change would produce locally or globally.

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APPENDIX A:
CONSTRUCTION EMISSION CALCULATIONS

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TAB A. CONSTRUCTION EMISSIONS - ALTERNATIVE 3

Basic Conversions

453.59	grams per pound
43,560	Conversion from Acre to SF
0.03704	Cubic feet to Cubic Yards
0.1111	Square Feet to Square Yards
1.4	tons/CY for Gravel
80,000	lbs/Truck Load for Delivery
1.66	CY for each CY of asphalt/concrete demo
0.333333333	asphalt thickness for demolition
0.333333333	asphalt thickness for pavement
2000	pounds per ton
145	lb/ft^3 density of Hot Mix Asphalt

Table 1. Site Prep - Water Reclamation Pipeline Trenching - Grading 2016

Trenching (LF)	125,244	LF	Assume 7 ft deep trench, 7 feet wide	227,313	CY	Assume 60% hauled in or out	136,388 CY hauled
Grading	3,131,100	SF	Convert	347,865	SY	Assume compact 0.5 feet (0.166 yards)	57,978 CY compacted

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Compactor	3,866	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	536	0.58	0.26	201.15	799.47	2,324.52	58.66	162.46	157.59	272,697.93	28.284022	12.679044
Grader	1,112	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	536	0.58	0.26	139.31	489.44	1,649.22	46.70	91.39	88.65	217,104.00	22.511331	10.091286
Excavator	3,247	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	536	0.58	0.26	352.97	1,241.07	4,135.60	118.29	228.67	221.81	549,895.16	56.051791	25.126665
Trenching with backhoe loader	3,247	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	536	0.58	0.26	128.14	458.69	1,555.54	42.35	87.72	85.09	196,870.68	20.067925	8.9959665
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (12 CY capacity)	2,336	230	35	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.1244E-05	1.0582E-05	124.39	657.53	2,949.19	1.48	123.01	119.19	281,145.23	0.92	0.87
Delivery Truck	314	365	45	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.1244E-05	1.0582E-05	21.50	113.63	509.67	0.25	21.26	20.60	48,586.58	0.16	0.15
												Tons per Year:	**0.48**	**1.88**	**6.56**	**0.13**	**0.36**	**0.35**	**783.15**	**0.06**	**0.03**
												CO2e in Metric Tons per Year:							**719.82**		

[1]Complied from 2010 National Estimator, Equipment Manufacture's websites such as Freightliner and Cat, PACES, U.S. EPA. Open Burning and Construction Activities: Improved PM Fine Emission Estimation Techniques in the Nation Emissions Inventory, Ohio Emergency Management Agency.
Appendix F Debris Estimating Guides, and Henderson, Chris. Project Management for Construction. Fundamental Concepts for Owners, Engineers, Architects, and Builders. Version 2.2. 2008
[2]US EPA NONROAD2008a Model
[3]MOVES (Motor Vehicle Emission Simulator) 2010
[2]Fuel flow rate based on 1 gal fuel consumed per hour per 18 Horsepower

Table 2. Fugitive Dust

Year	PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
2016	0.42	6	240	30.2	0.1	3.0

Table 3. Annual Construction Worker POVs 2016 ([1]while onsite)

50 construction workers

Vehicles	# vehicles	# days	[1]mi/day	[2]VOCs lb/mi	[2]CO lb/mi	[2]NOx lb/mi	[2]SO_2 lb/mi	[2]PM_{10} lb/mi	[2]$PM_{2.5}$ lb/mi	[3,4]CO_2 lb/mi	[3,4]CH_4 lb/mi	[3,4]N_2O lb/mi	VOCs lb	CO lb	NOx lb	SO_2 lb	PM_{10} lb	$PM_{2.5}$ lb	CO_2 lb	CH_4 lb	N_2O lb
passenger vehicles	23	240	10	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	53.17	1656.11	239.23	0.72	9.66	8.89	48,988	2	4
												Tons per Year:	**0.027**	**0.828**	**0.120**	**0.000**	**0.005**	**0.004**	**24.494**	**0.001**	**0.002**
												CO2e in Metric Tons per Year:							**22.86**		

[2] Emission factors from MOVES2010
[3]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-11
[4]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-12

Table 4. Alternative 3 Summary

VOC T/yr	CO T/yr	NOx T/yr	SO2 T/yr	PM10 T/yr	PM2.5 T/yr	CO_2e MT/yr
0.51	**2.71**	**6.68**	**0.13**	**30.55**	**3.37**	**743**

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TAB B. CONSTRUCTION EMISSIONS - ALTERNATIVE 4.

	Basic Conversions
453.59	grams per pound
43,560	Conversion from Acre to SF
0.03704	Cubic feet to Cubic Yards
0.1111	Square Feet to Square Yards
1.4	tons/CY for Gravel
80,000	lbs/Truck Load for Delivery
1.66	CY for each CY of asphalt/concrete demo
0.333333333	asphalt thickness for demolition
0.333333333	asphalt thickness for pavement
2000	pounds per ton
145	lb/ft^3 density of Hot Mix Asphalt

Table 1. Transmission Lines Clearing - 2017 118 Acres

Off-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dozer	137	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	9.56	35.90	105.93	2.92	7.51	7.29	13,597	1.41	0.63
Loader w/ integral Backhoe	137	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	7.90	40.53	35.01	0.82	5.86	5.69	3,814	0.85	0.38
Small backhoe	137	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	4.99	25.62	22.13	0.52	3.71	3.59	2,411	0.53	0.24
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck	63	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	1.55	8.18	36.67	0.02	1.53	1.48	3,496	0.01	0.01
												Tons per Year:	**0.01**	**0.06**	**0.10**	**0.00**	**0.01**	**0.01**	**11.66**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**10.78**		

Table 2. Transmission Lines Site Prep - Excavate/Fill - Trenching - Grading 2017

Site Prep - Excavate/Fill (CY)	1,099	CY	Assume 60% hauled in or out	660	CY hauled
Grading (SY)	5,135,110	SF	Convert	570,511	SY

Off-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Skid Steer Loader	4	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	0.12	0.48	1.41	0.04	0.10	0.10	173.84	0.05	0.02
Dozer	4	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	0.28	1.07	3.15	0.09	0.22	0.22	404.14	0.04	0.02
Scraper Hauler Excavator	2	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	0.35	1.32	3.91	0.11	0.28	0.27	500.03	0.05	0.02
Grader	203	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	25.43	89.36	301.10	8.53	16.69	16.19	39,636.89	4.11	1.84
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck (12 CY capacity)	34	230	35	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	1.12436E-05	1.05822E-05	1.81	9.57	42.92	0.02	1.79	0.01	0.01
Delivery Truck	420	365	45	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	1.12436E-05	1.05822E-05	28.75	151.99	681.72	0.34	28.43	0.21	0.20
												Tons per Year:	**0.01**	**0.05**	**0.17**	**0.09**	**0.37**	**0.01**	**20.37**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**18.82**		

Table 3. Transmission Lines Gravel Work - 2017

7,301 CY

Off-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dozer	73	185	0.59	0.34	1.21	4.08	0.12	0.23	0.22	535.79	0.58	0.26	6.04	21.21	71.68	2.02	3.97	3.85	9,412.86	0.96	0.43
Wheel Loader for Spreading	91	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	3.60	12.89	43.72	1.19	2.47	2.39	5,533.08	0.56	0.25
Compactor	283	103	0.43	0.36	1.34	4.45	0.12	0.26	0.25	535.74	0.58	0.26	9.94	36.99	123.01	3.18	7.10	6.89	14,804.17	2.07	0.93
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck (gravel delivery)	943	230	26	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	37.02	195.71	877.79	0.44	36.61	35.48	83,679.65	0.27	0.26
												Tons per Year:	**0.03**	**0.13**	**0.56**	**0.00**	**0.03**	**0.02**	**56.71**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**51.75**		

Table 4. Transmission Lines Concrete Work - 2017

Foundation Work 29,680 CY

Off-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Concrete Mixer (3 mixers total to one truck)	1,563	3.5	0.43	0.69	3.04	6.17	0.13	0.54	0.52	588.29	0.58	0.26	3.57	15.79	32.00	0.66	2.80	2.72	3,050.71	0.39	0.17
Concrete Truck	1,413	300	0.43	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.61	3.23	14.50	0.01	0.60	0.59	1,382.12	0.00	0.00
Concrete Mixing, Batch Plant	**Volume of Concrete (CY)**	**Weight of Concrete(tons)**		**VOC**	**CO**	**Nox**	**SO_2**	**PM10** lb/ton of concrete	**PM2.5**	**CO_2**	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Concrete Batch Plant	29,680	59,716		-	-	-	-	3.86E-02	-	-	-	-	-	-	-	-	2,306.84	-	-	-	-
												Tons per Year:	**0.00**	**0.01**	**0.02**	**0.00**	**1.16**	**0.00**	**2.22**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**2.04**		

Table 5. Transmission Lines Tower Construction- Structure - 2017

70 Towers

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Crane	560	330	0.58	0.25	1.22	5.26	0.11	0.21	0.20	530.30	0.58	0.26	58.06	288.17	1242.90	26.96	49.09	47.61	125,310.39	13.13	5.88
Cable Puller	2,016	160	0.43	0.40	1.59	4.60	0.12	0.32	0.31	535.63	0.58	0.26	121.43	485.50	1408.02	35.23	98.50	95.55	163,786.73	22.91	10.27
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Pickup Truck	2,576	250	30	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	74.43	2318.55	334.92	1.01	13.52	12.44	68,582.78	2.95	6.13
												Tons per Year:	**0.13**	**1.55**	**1.49**	**0.03**	**0.08**	**0.08**	**178.84**	**0.02**	**0.01**
												CO2e in Metric Tons per Year:							**165.75**		

Table 6. WTE Roads Clearing - 2016 15 Acres

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	17	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	1.18	4.42	13.06	0.36	0.93	0.90	1,676	0.17	0.08
Loader w/ integral Backhoe	17	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	0.97	4.99	4.31	0.10	0.72	0.70	470	0.10	0.05
Small backhoe	17	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	0.62	3.16	2.73	0.06	0.46	0.44	297	0.07	0.03
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	8	230	16	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	0.12	3.76	0.54	0.00	0.02	0.02	111	0.00	0.01
												Tons per Year:	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**1.28**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**1.18**		

Table 7. WTE Roads Site Prep - Excavate/Fill - Trenching - Grading 2016

Site Prep - Excavate/Fill (CY) 7,822 CY Assume 60% hauled in or out 4,693 CY hauled

Grading (SY) 633,600 SF Convert 70,393 SY Assume compact 0.5 feet (0.166 yards) 11,732 CY compacted

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Backhoe Excavator	26	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	535.79	0.58	0.26	2.83	9.94	33.11	0.95	1.83	1.78	4,403.14	0.45	0.20
Skid Steer Loader	31	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	0.96	3.70	10.91	0.29	0.77	0.75	1,347.24	0.35	0.16
Dozer	17	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	1.21	4.53	13.38	0.37	0.95	0.92	1,717.59	0.18	0.08
Scraper Hauler Excavator	17	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	2.99	11.26	33.22	0.91	2.35	2.28	4,250.29	0.44	0.20
Compactor	87	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	4.53	17.99	52.32	1.32	3.66	3.55	6,137.47	0.64	0.29
Grader	75	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	9.40	33.01	111.24	3.15	6.16	5.98	14,644.17	1.52	0.68
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC[3] lb/mile**	**CO[3] lb/mile**	**NOx[3] lb/mile**	**SO_2[3] lb/mile**	**PM10[3] lb/mile**	**PM2.5[3] lb/mile**	**CO_2[3] lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (12 CY capacity)	241	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	5.87	31.01	139.09	0.07	5.80	5.62	13,259.01	0.04	0.04
												Tons per Year:	**0.01**	**0.06**	**0.20**	**0.00**	**0.01**	**0.01**	**22.88**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**21.02**		

Table 8. WTE Roads Gravel Work - 2016

7,822 CY

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	78	185	0.59	0.34	1.21	4.08	0.12	0.23	0.22	535.79	0.58	0.26	6.47	22.73	76.80	2.17	4.26	4.13	10,085.19	1.03	0.46
Wheel Loader for Spreading	98	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	3.86	13.81	46.84	1.28	2.64	2.56	5,928.29	0.60	0.27
Compactor	58	135	0.43	0.36	1.34	4.45	0.12	0.26	0.25	535.74	0.58	0.26	2.67	9.93	33.01	0.85	1.91	1.85	3,972.74	0.56	0.25
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC[3] lb/mile**	**CO[3] lb/mile**	**NOx[3] lb/mile**	**SO_2[3] lb/mile**	**PM10[3] lb/mile**	**PM2.5[3] lb/mile**	**CO_2[3] lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (gravel delivery)	1,010	230	26	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	39.67	209.69	940.49	0.47	39.23	38.01	89,656.68	0.29	0.28
												Tons per Year:	**0.03**	**0.13**	**0.55**	**0.00**	**0.02**	**0.02**	**54.82**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**49.93**		

Table 9. WTE Roads Paving Surface and Paving HMA - 2016

Pavement - Surface Area 633,600 SF 7,823 CY

Paving - HMA 211,200 CF

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Grader	320	145	0.59	0.34	2.46	5.53	0.12	0.34	0.33	535.80	0.58	0.26	20.60	148.64	334.05	6.96	20.44	19.83	32,338	3.30	1.48
Steel drum roller/vibratory roller	480	401	0.59	0.38	1.44	4.25	0.12	0.30	0.29	535.68	0.58	0.26	95.14	361.15	1,064.58	28.85	75.11	72.86	134,116	13.67	6.13
Paving Machine	320	164	0.59	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	26.97	107.19	311.67	7.87	21.78	21.13	36,564	3.73	1.67
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	80	230	17	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	2.07	10.94	49.06	0.02	2.05	1.98	4,676.42	0.02	0.01
Water Truck	62	230	10	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.94	4.99	22.36	0.01	0.93	0.90	2,132	0.01	0.01
Hot Mix Asphalt (HMA)	**Volume of HMA (ft^3)**	**Weight of HMA (tons)**		**VOC lb/ton of asphalt**	**CO**	**NOx**	**SO_2**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**N_2O**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**

Standard Hot Mix Asphalt	211,200	15,312	0.04	-	-	-	-	-	-	-	-	612.48	-	-	-	-	-	-	-	-	-
											Tons per Year:	**0.38**	**0.32**	**0.89**	**0.02**	**0.06**	**0.06**	**104.91**	**0.01**	**0.00**
											CO2e in Metric Tons per Year:							**96.68**		

Table 10. WTE Plant Clearing - 2016/2017 40 Acres

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	46	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	3.24	12.17	35.90	0.99	2.55	2.47	4,609	0.48	0.21
Loader w/ integral Backhoe	46	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	2.68	13.74	11.87	0.28	1.99	1.93	1,293	0.29	0.13
Small backhoe	46	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	1.69	8.68	7.50	0.18	1.26	1.22	817	0.18	0.08
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	21	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.52	2.77	12.43	0.01	0.52	0.50	1,184	0.00	0.00
												Tons per Year:	**0.00**	**0.02**	**0.03**	**0.00**	**0.00**	**0.00**	**3.95**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**3.65**		

Table 11. WTE Plant Site Prep - Excavate/Fill - Trenching - Grading 2016/2017

Site Prep - Excavate/Fill (CY) 164,853 CY Assume 60% hauled in or out 98,912 CY hauled
Grading (SY) 1,112,760 SF Convert 123,628 SY Assume compact 0.5 feet (0.166 yards) 20,605 CY compacted

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Backhoe Excavator	550	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	535.79	0.58	0.26	59.79	210.22	700.50	20.04	38.73	37.57	93,143.25	9.49	4.26
Skid Steer Loader	659	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	20.49	78.59	231.95	6.16	16.33	15.84	28,639.61	7.49	3.36
Dozer	358	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	25.43	95.50	281.80	7.78	19.99	19.39	36,170.38	3.69	1.65
Scraper Hauler Excavator	358	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	63.03	237.15	699.57	19.25	49.54	48.06	89,506.07	9.28	4.16
Compactor	153	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	7.96	31.64	92.01	2.32	6.43	6.24	10,793.48	1.12	0.50
Grader	44	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	5.51	19.37	65.26	1.85	3.62	3.51	8,591.25	0.89	0.40
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (12 CY capacity)	5,083	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	123.73	654.04	2,933.51	1.47	122.36	118.56	279,649.66	0.91	0.86
Delivery Truck	254	365	45	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	17.40	91.97	412.52	0.21	17.21	16.67	39,325.73	0.13	0.12
												Tons per Year:	**0.16**	**0.71**	**2.71**	**0.03**	**0.14**	**0.13**	**292.91**	**0.02**	**0.01**
												CO2e in Metric Tons per Year:							**268.19**		

Table 12. WTE Plant Gravel Work - 2016/2017

27,475 CY

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	275	185	0.59	0.34	1.21	4.08	0.12	0.23	0.22	535.79	0.58	0.26	22.73	79.82	269.76	7.62	14.95	14.50	35,423.93	3.61	1.62
Wheel Loader for Spreading	343	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	13.55	48.52	164.53	4.48	9.28	9.00	20,822.94	2.12	0.95
Compactor	1,065	135	0.43	0.36	1.34	4.45	0.12	0.26	0.25	535.74	0.58	0.26	49.01	182.47	606.76	15.71	35.04	33.99	73,020.32	10.21	4.58
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (gravel delivery)	3,549	230	26	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	139.33	736.52	3,303.45	1.65	137.79	133.51	314,916.26	1.03	0.97
												Tons per Year:	**0.11**	**0.52**	**2.17**	**0.01**	**0.10**	**0.10**	**222.09**	**0.01**	**0.00**
												CO2e in Metric Tons per Year:							**202.78**		

Table 13. WTE Plant Paving Surface and Paving HMA - 2016/2017

Pavement - Surface Area 149,971 SF 1,852 CY
Paving - HMA 99,980 CF

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Grader	76	145	0.59	0.38	1.41	4.16	0.12	0.30	0.29	536.00	0.58	0.26	5.43	20.14	59.43	1.65	4.29	4.14	7,657	0.78	0.35
Steel drum roller/vibratory roller	114	401	0.59	0.34	2.46	5.53	0.12	0.34	0.33	536.00	0.58	0.26	20.15	145.78	327.71	6.83	20.15	19.56	31,764	3.24	1.45
Paving Machine	76	164	0.59	0.38	1.44	4.25	0.12	0.30	0.29	536.00	0.58	0.26	6.14	23.27	68.67	1.86	4.85	4.69	8,660	0.88	0.40
Asphalt Curbing Machine	38	130	0.59	0.40	1.57	4.57	0.12	0.32	0.31	536.00	0.58	0.26	2.56	10.05	29.27	0.77	2.05	1.99	3,432	0.35	0.16
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	38	230	17	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12E-05	1.06E-05	0.98	5.18	23.22	0.01	0.97	0.94	2,214	0.01	0.01
Water Truck	38	230	10	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12E-05	1.06E-05	0.58	3.05	13.66	0.01	0.57	0.55	1,302	0.00	0.00
Hot Mix Asphalt (HMA)	**Volume of HMA (ft^3)**	**Weight of HMA (tons)**		**VOC lb/ton of asphalt**	**CO**	**NOx**	**SO_2**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**N_2O**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Standard Hot Mix Asphalt	99,980	7,249		0.04	-	-	-	-	-	-			289.94	-	-	-	-	-	-		
												Tons per Year:	**0.16**	**0.10**	**0.26**	**0.01**	**0.02**	**0.02**	**27.51**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**25.34**		

Table 14. WTE Plant Concrete Work - Foundation and Sidewalks -2016/2017

Foundation Work 39,655 CY

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Concrete Mixer (3 mixers total to one truck)	2,088	3.5	0.43	0.69	3.04	6.17	0.13	0.54	0.52	588.29	0.58	0.26	4.76	21.09	42.76	0.88	3.74	3.63	4,076.03	0.52	0.23
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Concrete Truck	1,888	300	0.43	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.82	4.32	19.37	0.01	0.81	0.78	1,846.64	0.01	0.01
Concrete Mixing, Batch Plant	**Volume of Concrete (CY)**	**Weight of Concrete(tons)**		**VOC**	**CO**	**NOx**	**SO_2**	**PM10 lb/ton of concrete**	**PM2.5**	**CO_2**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Concrete Batch Plant	39,655	79,786		-	-	-	-	3.86E-02	-	-			-	-	-	-	3,082.14	-	-	-	-
												Tons per Year:	**0.00**	**0.01**	**0.03**	**0.00**	**0.00**	**0.00**	**2.96**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**2.73**		

Table 15. WTE Plant Building Construction- Structure - 2016/2017

823,190 SF

Off-road Equipment	Cumulative Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Crane	4,939	330	0.58	0.25	1.22	5.26	0.11	0.21	0.20	530	0.58	0.26	512.07	2541.57	10961.89	237.74	432.91	419.93	1,105,193	115.78	51.90
Telehandler	8,232	99	0.59	0.51	3.94	4.93	0.13	0.52	0.51	594.61	0.58	0.26	540.14	4176.34	5224.99	135.59	552.42	535.84	630,324	57.89	25.95
Scissors Lift	6,586	83	0.59	0.51	3.94	4.93	0.13	0.52	0.51	594.61	0.58	0.26	362.30	2801.27	3504.65	90.94	370.53	359.42	422,789	38.83	17.41
Skid steer loader	4,116	67	0.59	1.69	7.97	6.70	0.15	1.19	1.15	690.87	0.58	0.26	607.07	2858.06	2402.58	53.30	426.55	413.76	247,820	19.59	8.78
pile driver	4,065	260	0.43	0.46	1.55	5.90	0.11	0.31	0.30	529.64	0.58	0.26	464.94	1554.82	5913.38	114.15	314.47	305.04	530,661	75.08	33.66
all terrain forklift	4,065	84	0.59	0.51	3.94	4.93	0.13	0.52	0.51	594.61	0.58	0.26	226.31	1749.83	2189.20	56.81	231.45	224.51	264,097	24.26	10.87
Diesel Generator (Assume 5 generators)	1,646	40	0.59	0.33	2.54	4.53	0.13	0.54	0.53	595	0.58	0.26	28.07	217.64	387.72	10.96	46.41	45.02	50,970	4.68	2.10
On-road Equipment	**Cumulative Hours of Operation**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Pickup Truck	2,789	250	30	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	80.59	2510.27	362.62	1.10	14.64	13.47	74,254	3.19	6.64
Delivery Truck	23,905	365	60	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12E-05	1.06E-05	2182.03	11534.60	51735.27	25.88	2157.86	2090.86	4,931,899	16.13	15.18
												Tons per Year:	**2.50**	**14.97**	**41.34**	**0.36**	**2.27**	**2.20**	**4,129.00**	**0.18**	**0.09**
												CO2e in Metric Tons per Year:							**3,773.41**		

[1]Complied from 2010 National Estimator, Equipment Manufacture's websites such as Freightliner and Cat, PACES, U.S. EPA. Open Burning and Construction Activities: Improved PM Fine Emission Estimation Techniques in the Nation Emissions Inventory, Ohio Emergency Management Agency. Appendix F Debris Estimating Guides, and Henderson, Chris. Project Management for Construction. Fundamental Concepts for Owners, Engineers, Architects, and Builders. Version 2.2. 2008

[2]US EPA NONROAD2008a Model

[3]MOVES (Motor Vehicle Emission Simulator) 2010

[4]California Air Resources Board. "Comparison of Asphalt Paving Emission Factors." Draft 5/11/05

[5]US EPA AP-42, 11.12 Concrete Batching. June 2006.

Table 16. Fugitive Dust

Year	PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
2016	0.42	6	240	30.2	0.1	3.0
2017	0.42	6	240	30.2	0.1	3.0

Table 17. Annual Construction Worker POVs 2016/2017 ([1]while onsite)

700 construction workers

Vehicles	# vehicles	# days	[1]mi/day	VOC lb/mi	CO lb/mi	NOx lb/mi	SO_2 lb/mi	PM10 lb/mi	PM2.5 lb/mi	CO_2 lb/mi	CH_4 lb/mi	N_2O lb/mi	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
carpool	25	240	10	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	57.79	1800.12	260.03	0.79	10.50	9.66	53,247	2	5
passenger vehicles	400	240	10	8.96E-04	2.86E-02	4.11E-03	1.31E-05	1.62E-04	1.49E-04	8.87E-01	3.81E-05	7.94E-05	859.94	27420.80	3946.80	12.55	155.70	143.49	851,960	37	76
												Tons per Year	**0.46**	**14.61**	**2.10**	**0.01**	**0.08**	**0.08**	**452.60**	**0.02**	**0.04**
												CO2e in Metric Tons per Year:							**422.35**		

[2] Emission factors from MOVES2010

[3]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-11

[4]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-12

Table 18. Alternative 4 Summary

YEAR	VOC T/yr	CO T/yr	NOx T/yr	SO2 T/yr	PM10 T/yr	PM2.5 T/yr	CO_2 MT/yr
2016	**2.35**	**23.29**	**27.02**	**0.24**	**31.68**	**4.42**	**2,729**
2017	**2.11**	**24.57**	**27.72**	**0.34**	**33.23**	**4.45**	**2,810**

TAB C. CONSTRUCTION EMISSIONS - ALTERNATIVE 5

Basic Conversions

453.59	grams per pound
43,560	Conversion from Acre to SF
0.03704	Cubic feet to Cubic Yards
0.1111	Square Feet to Square Yards
1.4	tons/CY for Gravel
80,000	lbs/Truck Load for Delivery
1.66	CY for each CY of asphalt/concrete demo
0.333333333	asphalt thickness for demolition
0.333333333	asphalt thickness for pavement
2000	pounds per ton
145	lb/ft^3 density of Hot Mix Asphalt

Table 1. Geothermal Well Roads - Site Prep - Excavate/Fill - Trenching - Grading 2016

Site Prep - Excavate/Fill (CY) 74 CY Assume 60% hauled in or out 45 CY hauled

Grading (SY) 6,020 SF Convert 669 SY Assume compact 0.5 feet (0.166 yards) 111 CY compacted

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Skid Steer Loader	15	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	0.46	1.77	5.23	0.14	0.37	0.36	645.99	0.17	0.08
Dozer	45	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	3.17	11.90	35.10	0.97	2.49	2.41	4,505.39	0.46	0.21
Scraper Hauler Excavator	45	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	7.85	29.54	87.14	2.40	6.17	5.99	11,148.89	1.16	0.52
Compactor	111	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	5.80	23.05	67.03	1.69	4.68	4.54	7,863.74	0.82	0.37
Grader	669	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	83.80	294.41	992.03	28.09	54.97	53.33	130,591.25	13.54	6.07
Trenching with backhoe loader	74	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	2.93	10.50	35.60	0.97	2.01	1.95	4,506.10	0.46	0.21
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (12 CY capacity)	45	230	35	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	2.37	12.55	56.30	0.03	2.35	2.28	5,366.67	0.02	0.02
												Tons per Year:	**0.05**	**0.19**	**0.64**	**0.02**	**0.04**	**0.04**	**82.31**	**0.01**	**0.00**
												CO2e in Metric Tons per Year:							**75.88**		

Table 2. Geothermal Well Roads Gravel Work - 2016

74 CY

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	1	185	0.59	0.34	1.21	4.08	0.12	0.23	0.22	535.79	0.58	0.26	0.06	0.22	0.73	0.02	0.04	0.04	95.82	0.01	0.00
Wheel Loader for Spreading	1	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	0.04	0.13	0.45	0.01	0.03	0.02	56.33	0.01	0.00
Compactor	1	135	0.43	0.36	1.34	4.45	0.12	0.26	0.25	535.74	0.58	0.26	0.03	0.09	0.31	0.01	0.02	0.02	37.75	0.01	0.00
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (gravel delivery)	10	230	26	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.38	1.99	8.94	0.00	0.37	0.36	851.85	0.00	0.00
												Tons per Year:	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.52**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**0.47**		

Table 3. CST Array - Clearing - 2016 20 Acres

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	23	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	1.62	6.08	17.95	0.50	1.27	1.23	2,304	0.24	0.11
Loader w/ integral Backhoe	23	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	1.34	6.87	5.93	0.14	0.99	0.96	646	0.14	0.06
Small backhoe	23	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	0.85	4.34	3.75	0.09	0.63	0.61	409	0.09	0.04
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	11	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.26	1.39	6.21	0.00	0.26	0.25	592.25	0.00	0.00
												Tons per Year:	**0.00**	**0.01**	**0.02**	**0.00**	**0.00**	**0.00**	**1.98**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**1.83**		

Table 4. CST Array - Site Prep - Excavate/Fill - Trenching - Grading 2016

Site Prep - Excavate/Fill (CY) 10,756 CY Assume 60% hauled in or out 6,453 CY hauled

Grading (SY) 871,200 SF Convert 96,790 SY Assume compact 0.5 feet (0.166 yards) 16,132 CY compacted

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Backhoe Excavator	36	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	535.79	0.58	0.26	3.91	13.76	45.85	1.31	2.54	2.46	6,096.65	0.62	0.28
Skid Steer Loader	43	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	1.34	5.13	15.13	0.40	1.07	1.03	1,868.75	0.49	0.22
Dozer	23	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	1.63	6.14	18.10	0.50	1.28	1.25	2,323.80	0.24	0.11
Scraper Hauler Excavator	23	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	4.05	15.24	44.94	1.24	3.18	3.09	5,750.39	0.60	0.27
Compactor	119	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	6.19	24.61	71.56	1.81	5.00	4.85	8,394.93	0.87	0.39
Grader	34	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	4.26	14.97	50.43	1.43	2.79	2.71	6,638.69	0.69	0.31

On-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Productivity based Speed (miles/hour)	VOC lb/mile	CO lb/mile	NOx lb/mile	SO_2 lb/mile	PM10 lb/mile	PM2.5 lb/mile	CO_2 lb/mile	CH_4 lb/mi	N_2O lb/mi	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dump Truck (12 CY capacity)	332	230	35	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	17.68	93.45	419.13	0.21	17.48	16.94	39,955.85	0.13	0.12
												Tons per Year:	**0.02**	**0.09**	**0.33**	**0.00**	**0.02**	**0.02**	**35.51**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**32.49**		

Table 5. CST Array - Concrete Work - Foundation - 2016

Foundation Work 5,672 CY

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Concrete Mixer (3 mixers total to one truck)	299	3.5	0.43	0.69	3.04	6.17	0.13	0.54	0.52	588.29	0.58	0.26	0.68	3.02	6.12	0.13	0.54	0.52	583.04	0.07	0.03
Concrete Truck	270	300	0.43	0.38	1.75	6.18	0.11	0.27	0.26	529.89	0.58	0.26	29.16	134.11	474.93	8.76	20.64	20.02	40,705.77	5.76	2.58
Concrete Mixing, Batch Plant	**Volume of Concrete (CY)**	**Weight of Concrete(tons)**		**VOC**	**CO**	**Nox**	**SO_2**	**PM10[4] lb/ton of concrete**	**PM2.5**	**CO_2**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Concrete Batch Plant	5,672	11,413		-	-	-	-	3.86E-02	-	-			-	-	-	-	440.87	-	-		
												Tons per Year:	**0.01**	**0.07**	**0.24**	**0.00**	**0.23**	**0.01**	**20.64**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**19.15**		

Table 6. CST Array - Construction- Structure - 2016

20 MW

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Crane	6,094	330	0.58	0.25	1.22	5.26	0.11	0.21	0.20	530.30	0.58	0.26	631.79	3135.79	13524.81	293.32	534.13	518.10	1,363,589.58	142.85	64.04
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Pickup Truck	720	250	30	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	20.80	648.04	93.61	0.28	3.78	3.48	19,169.10	0.82	1.71
Delivery Truck	2,031	365	60	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	185.41	980.11	4396.04	2.20	183.36	177.66	419,072.18	1.37	1.29
												Tons per Year:	**0.42**	**2.38**	**9.01**	**0.15**	**0.36**	**0.35**	**900.92**	**0.07**	**0.03**
												CO2e in Metric Tons per Year:							**828.11**		

Table 7. Geothermal Well Parking - Clearing - 2016 1 Acres

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	1	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	0.08	0.30	0.90	0.02	0.06	0.06	115	0.01	0.01
Loader w/ integral Backhoe	1	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	0.07	0.34	0.30	0.01	0.05	0.05	32	0.01	0.00
Small backhoe	1	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	0.04	0.22	0.19	0.00	0.03	0.03	20	0.00	0.00
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	1	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.01	0.07	0.31	0.00	0.01	0.01	30	0	0
												Tons per Year:	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**0.09**		

Table 8. Geothermal Well Parking - Site Prep - Excavate/Fill - Trenching - Grading 2016

Site Prep - Excavate/Fill (CY) 538 CY Assume 60% hauled in or out 323 CY hauled

Grading (SY) 43,560 SF Convert 4,840 SY Assume compact 0.5 feet (0.166 yards) 807 CY compacted

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Backhoe Excavator	2	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	535.79	0.58	0.26	0.22	0.76	2.55	0.07	0.14	0.14	338.70	0.03	0.02
Skid Steer Loader	2	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	0.06	0.24	0.70	0.02	0.05	0.05	86.92	0.02	0.01
Dozer	1	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	0.07	0.27	0.79	0.02	0.06	0.05	101.03	0.01	0.00
Scraper Hauler Excavator	1	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	0.18	0.66	1.95	0.05	0.14	0.13	250.02	0.03	0.01
Compactor	6	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	0.31	1.24	3.61	0.09	0.25	0.24	423.27	0.04	0.02
Grader	2	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	0.25	0.88	2.97	0.08	0.16	0.16	390.51	0.04	0.02
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (12 CY capacity)	17	230	35	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.91	4.78	21.46	0.01	0.90	0.87	2,045.93	0.01	0.01
												Tons per Year:	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**1.82**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**1.66**		

Table 9. Geothermal Well Parking - Gravel Work - 2016

538 CY

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	5	185	0.59	0.34	1.21	4.08	0.12	0.23	0.22	535.79	0.58	0.26	0.44	1.56	5.28	0.15	0.29	0.28	693.36	0.07	0.03
Wheel Loader for Spreading	7	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	0.27	0.95	3.22	0.09	0.18	0.18	407.57	0.04	0.02
Compactor	4	135	0.43	0.36	1.34	4.45	0.12	0.26	0.25	535.74	0.58	0.26	0.18	0.68	2.27	0.06	0.13	0.13	273.13	0.04	0.02
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (gravel delivery)	69	230	26	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	2.73	14.42	64.66	0.03	2.70	2.61	6,163.90	0.02	0.02
												Tons per Year:	**0.00**	**0.01**	**0.04**	**0.00**	**0.00**	**0.00**	**3.77**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**3.43**		

Table 10. Geothermal Well Parking - Paving Surface and Paving HMA - 2016

Pavement - Surface Area 43,560 SF 538 CY

Paving - HMA 14,520 CF

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Grader	22	145	0.59	0.34	2.46	5.53	0.12	0.34	0.33	535.80	0.58	0.26	1.42	10.22	22.97	0.48	1.41	1.36	2,223	0.23	0.10
Steel drum roller/vibratory roller	33	401	0.59	0.38	1.44	4.25	0.12	0.30	0.29	535.68	0.58	0.26	6.54	24.83	73.19	1.98	5.16	5.01	9,220	0.94	0.42
Paving Machine	22	164	0.59	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	1.85	7.37	21.43	0.54	1.50	1.45	2,514	0.26	0.11
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	6	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.13	0.71	3.17	0.00	0.13	0.13	303	0	0
Water Truck	4	230	10	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.06	0.34	1.54	0.00	0.06	0.06	147	0	0
Hot Mix Asphalt (HMA)	**Volume of HMA (ft^3)**	**Weight of HMA (tons)**		**VOC[4] lb/ton of asphalt**	**CO**	**Nox**	**SO_2**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**N_2O**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Standard Hot Mix Asphalt	14,520	1,053		0.04	-	-	-	-	-	-			42.11	-	-	-	-	-	-	-	-
												Tons per Year:	**0.03**	**0.02**	**0.06**	**0.00**	**0.00**	**0.00**	**7.20**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**6.64**		

Table 11. Fugitive Dust

Year	PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
2016	0.42	1	240	4.4	0.1	0.4

Table 12. Annual Construction Worker POVs 2016

9 construction workers

Vehicles	# vehicles	# days	[1]mi/day	VOC lb/mi	CO lb/mi	NOx lb/mi	SO_2 lb/mi	PM10 lb/mi	PM2.5 lb/mi	CO_2 lb/mi	CH_4 lb/mi	N_2O lb/mi	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
carpool	1	240	10	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	1.25	38.88	5.62	0.02	0.23	0.21	1,150	0	0
passenger vehicles	8	240	10	8.96E-04	2.86E-02	4.11E-03	1.31E-05	1.62E-04	1.49E-04	8.87E-01	3.81E-05	7.94E-05	18.19	579.95	83.47	0.27	3.29	3.03	18,019	1	2
												Tons per Year	**0.01**	**0.31**	**0.04**	**0.00**	**0.00**	**0.00**	**9.58**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**8.94**		

[2] Emission factors from MOVES2010

[3]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-11

[4]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-12

Table 13. Alternative 5 Summary

YEAR	VOC T/yr	CO T/yr	NOx T/yr	SO2 T/yr	PM10 T/yr	PM2.5 T/yr	CO_2 MT/yr
2016	**0.55**	**3.08**	**10.40**	**0.18**	**5.09**	**0.87**	**979**

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TAB D. CONSTRUCTION EMISSIONS - ALTERNATIVE 6

Basic Conversions

453.59	grams per pound
43,560	Conversion from Acre to SF
0.03704	Cubic feet to Cubic Yards
0.1111	Square Feet to Square Yards
1.4	tons/CY for Gravel
80,000	lbs/Truck Load for Delivery
1.66	CY for each CY of asphalt/concrete demo
0.333333333	asphalt thickness for demolition
0.333333333	asphalt thickness for pavement
2000	pounds per ton
145	lb/ft^3 density of Hot Mix Asphalt

Table 1. Transmission Lines - Clearing - 2016 70 Acres

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	81	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	5.67	21.29	62.81	1.73	4.45	4.32	8,062	0.84	0.37
Loader w/ integral Backhoe	81	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	4.68	24.03	20.76	0.49	3.48	3.37	2,261	0.50	0.22
Small backhoe	81	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	2.96	15.19	13.12	0.31	2.20	2.13	1,430	0.32	0.14
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck	37	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.92	4.85	21.74	0.01	0.91	0.88	2,072	0.01	0.01
												Tons per Year:	**0.01**	**0.03**	**0.06**	**0.00**	**0.01**	**0.01**	**6.91**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**6.39**		

Table 2. Transmission Lines - Site Prep - Excavate/Fill - Trenching - Grading 2016

Site Prep - Excavate/Fill (CY)	550 CY	Assume 60% hauled in or out	330 CY hauled			
Trenching (LF)	0 LF	Assume 10 ft deep trench, 5 feet wide	0 CY		Assume 60% hauled in or out	0 CY hauled
Grading (SY)	3,048,120 SF	Convert	338,646 SY		Assume compact 0.5 feet (0.166 yards)	56,441 CY compacted

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Backhoe Excavator	2	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	535.79	0.58	0.26	0.22	0.76	2.55	0.07	0.14	0.14	339	0.03	0.02
Skid Steer Loader	2	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	0.06	0.24	0.70	0.02	0.05	0.05	87	0.02	0.01
Dozer	1	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	0.07	0.27	0.79	0.02	0.06	0.05	101	0.01	0.00
Scraper Hauler Excavator	1	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	0.18	0.66	1.95	0.05	0.14	0.13	250	0.03	0.01
Compactor	418	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	21.75	86.45	251.36	6.34	17.57	17.04	29,488	3.06	1.37
Grader	120	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	15.03	52.82	177.99	5.04	9.86	9.57	23,431	2.43	1.09
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (12 CY capacity)	17	230	16	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.12436E-05	1.05822E-05	0.41	2.19	9.81	0.00	0.41	0.40	935.28	0.00	0.00
												Tons per Year:	**0.02**	**0.07**	**0.22**	**0.01**	**0.01**	**0.01**	**27.32**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**25.19**		

Table 3. Transmission Lines - Gravel Work - 2016

6,388 CY

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Dozer	64	185	0.59	0.34	1.21	4.08	0.12	0.23	0.22	535.79	0.58	0.26	5.28	18.56	62.72	1.77	3.48	3.37	8,236.25	0.84	0.38
Wheel Loader for Spreading	80	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	3.15	11.28	38.25	1.04	2.16	2.09	4,841.44	0.49	0.22
Compactor	47	135	0.43	0.36	1.34	4.45	0.12	0.26	0.25	535.74	0.58	0.26	2.18	8.11	26.96	0.70	1.56	1.51	3,244.41	0.45	0.20
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC lb/mile**	**CO lb/mile**	**NOx lb/mile**	**SO_2 lb/mile**	**PM10 lb/mile**	**PM2.5 lb/mile**	**CO_2 lb/mile**	**CH_4 lb/mi**	**N_2O lb/mi**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Dump Truck (gravel delivery)	825	230	26	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	34.39	230.09	249.75	0.59	9.92	8.06	73,283.72	0.24	0.23
												Tons per Year:	**0.02**	**0.13**	**0.19**	**0.00**	**0.01**	**0.01**	**44.80**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**40.81**		

Table 4. Transmission Lines - Concrete Work - Foundations - 2016

Foundation Work 14,840 CY

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
Concrete Mixer (3 mixers total to one truck)	781	3.5	0.43	0.69	3.04	6.17	0.13	0.54	0.52	588.29	0.58	0.26	1.78	7.89	16.00	0.33	1.40	1.36	1,525	1.50	0.67
Concrete Truck	707	300	0.43	0.38	1.75	6.18	0.11	0.27	0.26	529.89	0.58	0.26	76.28	350.85	1,242.51	22.91	54.00	52.38	106,495	116.57	52.25
Concrete Mixing, Batch Plant	**Volume of Concrete (CY)**	**Weight of Concrete(tons)**		**VOC**	**CO**	**Nox**	**SO_2**	**PM10[4] lb/ton of concrete**	**PM2.5**	**CO_2**	**CH_4**	**N_2O**	**VOC lb**	**CO lb**	**NOx lb**	**SO2 lb**	**PM10 lb**	**PM2.5 lb**	**CO_2 lb**	**CH_4 lb**	**N_2O lb**
Concrete Batch Plant	14,840	29,858		-	-	-	-	3.86E-02	-	-	-	-	-	-	-	-	1,153.42	-	-	-	-
												Tons per Year:	**0.04**	**0.18**	**0.63**	**0.01**	**0.60**	**0.03**	**54.01**	**0.06**	**0.03**
												CO2e in Metric Tons per Year:							**57.56**		

Table 5. Transmission Lines - Tower Construction- Structure - 2016

35 Towers

Off-road Equipment	Cumulative Hours of Operation[1]	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO_2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CO_2 g/hp-hr	CH_4 g/gal	N_2O g/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb

Crane	280	330	0.58	0.25	1.22	5.26	0.11	0.21	0.20	530.30	0.58	0.26	29.03	144.09	621.45	13.48	24.54	23.81	62,655.19	68.53	30.72
Cable Puller	1,008	160	0.43	0.40	1.59	4.60	0.12	0.32	0.31	535.63	0.58	0.26	60.72	242.75	704.01	17.62	49.25	47.77	81,893.36	88.68	39.75
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Pickup Truck	1,000	250	30	0.00057178	0.00502881	4.73E-04	0.00001071	0.00009494	0.00006234	3.44	1.12436E-05	1.05822E-05	17.15	150.86	14.19	0.32	2.85	1.87	103,246.42	0.34	0.32
Delivery Truck	1,008	365	60	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	97.69	653.51	709.36	1.67	28.19	22.90	208,144.79	0.68	0.64
												Tons per Year:	**0.10**	**0.60**	**1.02**	**0.02**	**0.05**	**0.05**	**227.97**	**0.08**	**0.04**
												CO2e in Metric Tons per Year:							**218.36**		

Table 6. CSP Access Roads - Clearing - 2016 7 Acres

Off-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dozer	9	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	0.60	2.26	6.66	0.18	0.47	0.46	855	0.93	0.42
Loader w/ integral Backhoe	9	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	0.50	2.55	2.20	0.05	0.37	0.36	240	0.20	0.09
Small backhoe	9	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	0.31	1.61	1.39	0.03	0.23	0.23	152	0.13	0.06
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck	4	230	16	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	0.10	0.69	0.75	0.00	0.03	0.02	220	0.00	0.00
												Tons per Year:	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.73**	**0.00**	**0.00**
												CO2e in Metric Tons per Year:							**0.76**		

Table 7. CSP Access Roads - Site Prep - Excavate/Fill - Trenching - Grading 2016

Site Prep - Excavate/Fill (CY) 3,993 CY Assume 60% hauled in or out 2,396 CY hauled
Grading (SY) 323,400 SF Convert 35,930 SY Assume compact 0.5 feet (0.166 yards) 5,988 CY compacted

Off-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Backhoe Excavator	13	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	535.79	0.58	0.26	1.41	4.97	16.56	0.47	0.92	0.89	2,201.57	2.38	1.07
Skid Steer Loader	16	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	0.50	1.91	5.63	0.15	0.40	0.38	695.35	0.75	0.34
Dozer	9	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	0.64	2.40	7.08	0.20	0.50	0.49	909.31	0.98	0.44
Scraper Hauler Excavator	9	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	1.58	5.96	17.59	0.48	1.25	1.21	2,250.15	2.44	1.09
Compactor	44	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	2.29	9.10	26.46	0.67	1.85	1.79	3,104.01	3.36	1.51
Grader	13	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	1.63	5.72	19.28	0.55	1.07	1.04	2,538.32	2.75	1.23
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck (12 CY capacity)	123	230	16	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	3.18	21.27	23.08	0.05	0.92	0.75	6,772.97	0.02	0.02
												Tons per Year:	**0.01**	**0.03**	**0.06**	**0.00**	**0.00**	**0.00**	**9.24**	**0.01**	**0.00**
												CO2e in Metric Tons per Year:							**9.30**		

Table 8. CSP Access Roads - Gravel Work - 2016

3,993 CY

Off-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dozer	40	185	0.59	0.34	1.21	4.08	0.12	0.23	0.22	535.79	0.58	0.26	3.30	11.60	39.20	1.11	2.17	2.11	5,147.65	5.57	2.50
Wheel Loader for Spreading	50	87	0.59	0.35	1.25	4.23	0.12	0.24	0.23	535.77	0.58	0.26	1.97	7.05	23.91	0.65	1.35	1.31	3,025.90	3.28	1.47
Compactor	30	135	0.43	0.36	1.34	4.45	0.12	0.26	0.25	535.74	0.58	0.26	1.36	5.07	16.85	0.44	0.97	0.94	2,027.75	2.20	0.98
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck (gravel delivery)	516	230	26	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	21.50	143.81	156.09	0.37	6.20	5.04	45,802.28	0.15	0.14
												Tons per Year:	**0.01**	**0.08**	**0.12**	**0.00**	**0.01**	**0.00**	**28.00**	**0.01**	**0.00**
												CO2e in Metric Tons per Year:							**26.23**		

Table 9. Solar Array - Clearing - 2016 300 Acres

Off-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dozer	348	145	0.58	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	24.30	91.26	269.29	7.43	19.10	18.52	34,564	37.42	16.78
Loader w/ integral Backhoe	348	87	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	20.07	103.02	88.99	2.09	14.90	14.46	9,695	8.13	3.64
Small backhoe	348	55	0.21	1.43	7.35	6.35	0.15	1.06	1.03	691.66	0.58	0.26	12.69	65.13	56.26	1.32	9.42	9.14	6,129	5.14	2.30
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck	159	230	16	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	4.17	27.92	30.30	0.07	1.20	0.98	8,891	0.03	0.03
												Tons per Year:	**0.03**	**0.14**	**0.22**	**0.01**	**0.02**	**0.02**	**29.64**	**0.03**	**0.01**
												CO2e in Metric Tons per Year:							**30.57**		

Table 10. Solar Array - Site Prep - Excavate/Fill - Trenching - Grading 2016/2017

Site Prep - Excavate/Fill (CY) 161,892 CY Assume 60% hauled in or out 97,135 CY hauled
Grading (SY) 13,068,000 SF Convert 1,451,855 SY Assume compact 0.5 feet (0.166 yards) 241,976 CY compacted

Off-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Backhoe Excavator	540	243	0.59	0.34	1.21	4.03	0.12	0.22	0.22	535.79	0.58	0.26	58.70	206.39	687.77	19.67	38.03	36.89	91,449.74	99.00	44.38
Skid Steer Loader	648	160	0.23	0.38	1.47	4.34	0.12	0.31	0.30	535.67	0.58	0.26	20.15	77.28	228.08	6.06	16.05	15.57	28,161.56	30.49	13.67
Dozer	352	145	0.59	0.38	1.41	4.17	0.12	0.30	0.29	535.69	0.58	0.26	25.01	93.90	277.08	7.65	19.65	19.06	35,564.17	38.51	17.26

Scraper Hauler Excavator	352	365	0.58	0.38	1.42	4.19	0.12	0.30	0.29	535.69	0.58	0.26	61.98	233.18	687.85	18.93	48.71	47.25	88,005.97	95.29	42.71
Compactor	1,792	103	0.58	0.40	1.57	4.57	0.12	0.32	0.31	535.63	0.58	0.26	93.25	370.62	1,077.60	27.19	75.32	73.06	126,417.71	136.89	61.36
Grader	516	285	0.58	0.34	1.21	4.07	0.12	0.23	0.22	535.79	0.58	0.26	64.65	227.14	765.36	21.67	42.41	41.14	100,751.90	109.07	48.89
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Dump Truck (12 CY capacity)	4,992	230	16	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	129.01	863.05	936.80	2.21	37.23	30.25	274,883.28	0.90	0.85
												Tons per Year:	**0.23**	**1.04**	**2.33**	**0.05**	**0.14**	**0.13**	**372.62**	**0.26**	**0.11**
												CO2e in Metric Tons per Year:							**375.11**		

Table 11. Solar Array - Concrete Work - Foundations - 2016/2017

Foundation Work 36,870 CY

Off-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Concrete Mixer (3 mixers total to one truck)	1,942	3.5	0.43	0.69	3.04	6.17	0.13	0.54	0.52	588.29	0.58	0.26	4.43	19.61	39.76	0.82	3.48	3.38	3,789.75	3.74	1.67
Concrete Truck	1,756	300	0.43	0.38	1.75	6.18	0.11	0.27	0.26	529.89	0.58	0.26	189.53	871.69	3,087.02	56.91	134.17	130.14	264,587.54	289.61	129.82
Concrete Mixing, Batch Plant	**Volume of Concrete (CY)**	**Weight of Concrete(tons)**		**VOC**	**CO**	**Nox**	**SO_2**	**PM10[4]** lb/ton of concrete	**PM2.5**	**CO_2**	**CH_4**	**N_2O**	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Concrete Batch Plant	36,870	74,183		-	-	-	-	3.86E-02	-	-			-	-	-	-	2,865.67	-	-	-	-
												Tons per Year:	**0.10**	**0.45**	**1.56**	**0.03**	**1.50**	**0.07**	**134.19**	**0.15**	**0.07**
												CO2e in Metric Tons per Year:							**143.02**		

Table 12. Solar Array - Construction- Structure - 2016/2017

65 MW

Off-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Load Factor**	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM10** g/hp-hr	**PM2.5** g/hp-hr	**CO_2** g/hp-hr	**CH_4** g/gal	**N_2O** g/gal	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Crane	39,609	330	0.58	0.25	1.22	5.26	0.11	0.21	0.20	530.30	0.58	0.26	4106.62	20382.65	87911.27	1906.60	3471.84	3367.68	8,863,332.30	9,694.03	4,345.60
On-road Equipment	**Cumulative Hours of Operation[1]**	**Engine HP**	**Productivity based Speed (miles/hour)**	**VOC** lb/mile	**CO** lb/mile	**NOx** lb/mile	**SO_2** lb/mile	**PM10** lb/mile	**PM2.5** lb/mile	**CO_2** lb/mile	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
Pickup Truck	1,000	250	30	0.00057178	0.00502881	4.73E-04	0.00001071	0.00009494	0.00006234	3.44	1.12436E-05	1.05822E-05	17.15	150.86	14.19	0.32	2.85	1.87	103,246.42	0.34	0.32
Delivery Truck	13,203	365	60	0.00161521	1.08E-02	1.17E-02	2.77E-05	4.66E-04	3.79E-04	3.44	1.12436E-05	1.05822E-05	1279.55	8559.92	9291.42	21.92	369.21	299.98	2,726,350.90	8.91	8.38
												Tons per Year:	**2.70**	**14.55**	**48.61**	**0.96**	**1.92**	**1.83**	**5,846.46**	**4.85**	**2.18**
												CO2e in Metric Tons per Year:							**6,008.53**		

Appendix F Debris Estimating Guides, and Henderson, Chris. Project Management for Construction. Fundamental Concepts for Owners, Engineers, Architects, and Builders. Version 2.2. 2008

[2]US EPA NONROAD2008a Model

[3]MOVES (Motor Vehicle Emission Simulator) 2010/08/26

[4]US EPA AP-42, 11.12 Concrete Batching. June 2006.

Table 13. Fugitive Dust

Year	**PM_{10} tons/acre/mo**	**acres**	**days of disturbance**	**PM_{10}** Total	**$PM_{2.5}/PM_{10}$** Ratio	**$PM_{2.5}$** Total
2016	0.42	19	240	95.5	0.1	9.5
2017	0.42	12	240	63.0	0.1	6.3

Table 14. Annual Construction Worker POVs 2016/2017 ([1]while onsite)

400 construction workers

Vehicles	# vehicles	# days	[1]mi/day	**VOC** lb/mi	**CO** lb/mi	**NOx** lb/mi	**SO_2** lb/mi	**PM10** lb/mi	**PM2.5** lb/mi	**CO_2** lb/mi	**CH_4** lb/mi	**N_2O** lb/mi	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM10** lb	**PM2.5** lb	**CO_2** lb	**CH_4** lb	**N_2O** lb
carpool	24	240	10	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	55.48	1728.11	249.63	0.75	10.08	9.27	51117.60	2.20	4.57
passenger vehicles	376	240	10	8.96E-04	2.86E-02	4.11E-03	1.31E-05	1.62E-04	1.49E-04	8.87E-01	3.81E-05	7.94E-05	808.35	25775.55	3710.00	11.80	146.36	134.88	800842.34	34.42	71.62
												Tons per Year	**0.43**	**13.75**	**1.98**	**0.01**	**0.08**	**0.07**	**425.98**	**0.02**	**0.04**
												CO2e in Metric Tons per Year:							**397.50**		

[2] Emission factors from MOVES2010

[3]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-11

[4]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-12

Table 15. Alternative 6 Summary

YEAR	**VOC** T/yr	**CO** T/yr	**NOx** T/yr	**SO2** T/yr	**PM10** T/yr	**PM2.5** T/yr	**CO_2** MT/yr
2016	**2.19**	**23.04**	**30.76**	**0.57**	**98.07**	**10.77**	**4,076**
2017	**1.94**	**21.77**	**28.23**	**0.53**	**64.85**	**7.39**	**3,661**

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TAB E. CONSTRUCTION SUMMARY BY PROJECT

Project Name	Task Number	Type (Renov or Const)	Phase	FootPrint (AC)	Clearing (AC)	Grading (sf)	Demo Bldgs (SF)	Demo asphalt/ concrete (SF)	Site Prep - Excavate/Fill (CY)	Trenching (LF)	Building Construction - Total Size (sf)	Building Construction- foundation footprint (sf)	# Stories	Paving - Surface area (SF)	Pavement type, vehicle or aircraft	Paving - HMA (CF)	Sidewalks (sf)	Gravel Work (CY)	Concrete Work - sidewalks, etc (CY)	Concrete Work -foundation (CY)	Additional excavation, please specify type (washrack, sw pond, etc.)	
CONSTRUCTION PROJECTS																						
Water Reclamation Pipeline	3	Construction	1	72	N/A	3,131,100	N/A	N/A	227,295	125,244	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Electrical Transmission Lines	4	Construction	1	118	118	5135110	N/A	N/A	1,099	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7301	N/A	29680	70	towers
WTE Plant	4	Construction	1	40	40	1112760	N/A	N/A	164,853	N/A	823,190	411,595	5	149,971	vehicle	99980	N/A	27475	9,167	30,489		
WTE Roads	4	Construction	1	15	15	633600	N/A	N/A	7822	N/A	N/A	N/A	N/A	633,600	vehicle	211200	N/A	7822	N/A	N/A	N/A	
Geothermal Well Roads	5	Construction	1	0.14	0.14	6020	N/A	N/A	74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	74	N/A	N/A	N/A	
CST Array	5	Construction	1	20	20	871200	N/A	N/A	10756	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5672	20	MW
Geothermal Well Parking	5	Construction	1	1	1	43560	N/A	N/A	538	NA	N/A	N/A	N/A	43,560	vehicle	14520	N/A	538	N/A	N/A	N/A	
CSP Transmission Lines	6	Construction	1	70	70	3048120	N/A	N/A	550	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6388	N/A	14840	35	towers
CSP Solar Array	6	Construction	1	300	300	13068000	N/A	N/A	161892	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36,870	65	MW
CSP Access Roads	6	Construction	1	7	7	323400	N/A	N/A	3993	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3993	N/A	N/A	N/A	

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TAB F. CONSTRUCTION ASSUMPTIONS

Alternative 3 - Purple Pipe
Assumed Piping is installed in 2016
Assumed area is graded the length of the pipe x 25' wide path.
Assumed excavator is used to place pipe, same hours of operation as backhoe used for trenching.
Adjusted trench with in site prep -excavate/fill - trenching calculation to equal actual trench dimensions (7' wide, 7' deep)
Total length to be trenched is 125,244 linear feet

Alternative 4 - WTE Plant
Electrical Transmission Lines
Assume Lattice Steel Towers or Pylons
14 miles of transmission lines at 5 towers per mile 70 Towers
assume one 3 acre staging area
Tower assembly area - Number of towers x 80,000 SF x 0.75 (reduction for over lap) 4200000 SF
Assume 175 ft right of way.
Assume 8 turns/ends equals 8 cable-pull sites. **Figure 3-2, Conceptual Layout. "Initial Scope of Work Planning Package." 8 x 37,500 300000 SF
14 foot access road x 8 miles 591360 SF
Tower sites: number of towers x 625 sf each 43750 SF
Foundation: Each footer 3' diameter footers 15 ' deep, at 4 per tower = 424 CF per tower 29680 CF
Delivery Trucks: 1/3 tower per truck. 1 hour to metro area, 1 hour return to metro. 0.166667 towers/hour
Pickup Truck assumed to operate throughout the whole installation process

Argonne National Laboratory, Environmental Since Division. "The Design, Construction, and Operation of Long-Distance High-Voltage Electricity Transmission Technologies." November 2007.
Typical Tower info
100 ft high - typical for horizontal configuration
500 kV power line, 126 to 175 ft right of way most common
Access roads 14 feet with 3 foot temporary disturbance on either side
Staging areas every 8 to 10 miles ranging from 1 to 3 acre for materials, vehicle and equipment parking
Tower assembly, construction and conductor pulling: 80,000 sf per tower for construction. Overlap of assembly areas reduce impact areas by 25%
Any given time during construction two cable-pulling sites of 37,500 SF (150' x 250') would be in use or preparation.
Span: 4 -6 towers per mile

Transmission Line Construction Fact Sheet. ftp://ftp.cpuc.ca.gov/gopher-data/environ/tehachapi_renewables/FS6.pdf
Auger 4 holes for footings. For lattice steel towers each hole is usually 3 to 4 feet wide and 15 to 30 feet deep. **Assuming smaller tower so 3 ft wide and 15 ft deep **Assume auger attachment on excavator

Per Mike O'Conner: 1 day to construct a tower with one crane. Three truck loads to deliver the tower. Towers are likely going to be 200'.
line puller: 160 HP http://www.timberland-group.com/store/catalogue.php?category_id=2086&object_id=37093
5 miles = 6 months at 5 towers per mile, 25 towers = 6 months 6 months = 1440 hours 28.8 hours/tower Time cut in half because foundations and clearing are accounted for elsewhere
Draft Solar PEIS. DEC 2010. 3 Overview of Solar Energy Power Production Technologies, development, and regulation.

WTE Plant Construction Frederick/Carrol County MD 55 MW WTE plant layout used as guide
40 acre footprint
11 acres developed for plant and associated infrastructure
1,112,760 SF footprint of plant, roads, and gravel
149,971 SF Asphalt Area
9 acres building 411595 SF
526444 SF gravel Area
24750 SF Concrete Ramp
Assume 5 stories high.
Assume 2 cranes are needed due to structure type.
Construction split evenly over 2 year span
New road construction 6 miles
633,600 Total SF assuming 2 lane & 20 ft wide

Alternative 5
Access Roads to Geothermal Wells
#1 180 LF
#2 250 LF
Total 430 LF
Assume 14 feet wide 6020 SF

CST Solar Array

20 Acres From ISOWPP
20 MW
3 hours to install one solar trough Assume half the length of a CSP.
Assume Pickup Truck runs the entire time of installation.

http://www.saint-gobain-solar-power.com/saint-gobain-solar-power/solar-power-new-technologies-5
Solar trough dimensions 39 feet long 20 feet high 28 mirrors
http://www.acciona-na.com/About-Us/Our-Projects/U-S-/Nevada-Solar-One
Nevada Solar One 64 MW 182000 mirrors 2843.75 mirrors/MW

101.5625 39' x 20' Solar troughs/MW 1 39' x 20' Solar troughs/truck 2 Two hour round trip for Solar trough delivery

Asusme CST are half the length of a CSP 20 ft long 2 CSTs /truck

National Renewable Energy Laboratory. Parabolic Trough Reference Plant for Cost Modeling with the Solar Advisor Model (SAM). July 2010 http://www.nrel.gov/docs/fy10osti/47605.pdf
Foundation 8 ft deep 2 feet diameter
25 CF foundation per post 6 post/solar trough 150.7964 CF/Solar Trough

Parking
1 acre

Alternative 6- Dry-cooled CSP Array
Transmission Lines
Assume Lattice Steel Towers or Pylons
7 miles of transmission lines at 5 towers per mile 35 towers
assume 1 - 3 acre staging areas 130680 sf
Tower assembly area - 35 towers x 80,000 SF x 0.75 (reduction for over lap) 2100000 sf
Assume 175 ft right of way.
Assume 8 turns/ends equals 8 cable-pull sites. 300000 SF 37,500 sf for each pull site.
14 foot access road x 7 miles 517440 SF
Tower sites 35 towers x 625 sf each 21875 SF
Foundation: Each footer 3' diameter footers 15 ' deep, at 4 per tower = 424 CF per tower 14840 CF
Delivery Trucks: 1/3 tower per truck. 1 hour to metro area, 1 hour return to metro. 0.166667 towers/hr
Pickup Truck assumed to operate throughout the whole installation process

CSP Solar Array
300 Acres From ISOWPP
65 MW
6 hours to install one solar trough
Assume Pickup Truck runs the entire time of installation.

http://www.saint-gobain-solar-power.com/saint-gobain-solar-power/solar-power-new-technologies-5
Solar trough dimensions 39 feet long 20 feet high 28 mirrors

http://www.acciona-na.com/About-Us/Our-Projects/U-S-/Nevada-Solar-One
Nevada Solar One 64 MW 182000 mirrors 2843.75 mirrors/MW

101.5625 39' x 20' Solar troughs/MW 1 39' x 20' Solar troughs/truck 2 Two hour round trip for Solar trough delivery

National Renewable Energy Laboratory. Parabolic Trough Reference Plant for Cost Modeling with the Solar Advisor Model (SAM). July 2010 http://www.nrel.gov/docs/fy10osti/47605.pdf
Foundation 8 ft deep 2 feet diameter
25 CF foundation per post 6 post/solar trough 150.7964 CF/Solar Trough

CSP Access Roads
4.375 miles Measured from Figure 3-2 of ISOWPP From existing roads to center of CSP site.
323400 SF
Assume 14 FT wide.
Assume gravel roads.

All clearing hours of operation were reduced by 90% to account for the desert environment.

APPENDIX B:
OPERATIONAL EMISSION CALCULATIONS

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TAB A. POLLUTANT CLASSIFICATION AND LIMITS UNDER PSD

Pollutant	Pollutant Classification Under PSD	40 CFR 52.21(b)(23)(i) Thresholds for "Significant"		Emission Estimation Method
		ton/year	Notes	
CO	Carbon monoxide	100	Total for CO	AP-42
NOx	Nitrogen Oxides	40	Total for NOx	AP-42
PM	Particulate Matter	25	Total for PM	AP-42
SO_2	Sulfur Dioxide/MWC acid gases	40	Total for SO2 alone	AP-42
VOC	Ozone	40	Total for VOC + NOx	Mass-Balance
Lead (Pb)	Lead	0.6	Total for Lead	AP-42
Hydrogen Fluoride	Fluorides	3	Total for Fluorides under PSD. Could be negligible	Mass-Balance
Sulfuric Acid Mist	Sulfuric Acid Mist	7	Total for sulfuric acid mist	Mass-Balance
[1]CDD/CDF	MWC Organics	3.50E-06	Total for all MWC Organics	AP-42
Arsenic (As)	MWC Metals	15	Total for MWC Metals	AP-42
Cadmium (Cd)	MWC Metals	15	Total for MWC Metals	AP-42
Chromium (Cr)	MWC Metals	15	Total for MWC Metals	AP-42
Mercury (Hg)	MWC Metals	15	Total for MWC Metals	AP-42
Nickel (Ni)	MWC Metals	15	Total for MWC Metals	AP-42
Hydorchloric Acid (HCl)	MWC Acid Gases	40	Total for HCl + SO2	AP-42
H_2S	Hydrogen Sulfide	10	Total for H2S. Due to excess oxygen conditions in the MWC, production of H2S (a reduced form of SO2) is unlikely	Mass-Balance
CO_2	Not PSD 40 CFR 52.21	NA	NA	AP-42/Federal GHG Guidance
CH_4	Not PSD 40 CFR 52.21	NA	NA	AP-42/Federal GHG Guidance
N_2O	Not PSD 40 CFR 52.21	NA	NA	AP-42/Federal GHG Guidance

[1]CDD/CDF = total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofurans, 2,3,7,8-tetrachlorodibenzo-p-dioxin, and dibenzofurans

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TAB B. OPERATIONAL EMISSION CALCULATIONS FOR ALTERNATIVE 4

Table 1. Estimate Emissions from WTE Plant (AP-42 Method)

Feedstock: 1,100 Tons per Day — **770 tons/day burned**

330 30% diverted to landfill — 365 Day per year operation

281,050 Tons of Waste per Year Burned in WTE

Pollutant	[1,2,14]Emission Factors (in lb/ton of MSW burned)						Annual Emissions (ton/year except CO2e in metric ton/year)					
	Uncontrolled	[3]ESP	[4]DSI/ESP	[5]SD/ESP	[6]DSI/FF	[7]SD/FF	Uncontrolled	[3]ESP	[4]DSI/ESP	[5]SD/ESP	[6]DSI/FF	[7]SD/FF (Most Likely Control)
[8]CO	4.63E-01	4.63E-01	4.63E-01	4.63E-01	4.63E-01	4.63E-01	65.06	65.06	65.06	65.06	65.06	65.06
[8]NOx	3.56E+00	3.56E+00	3.56E+00	3.56E+00	3.56E+00	3.56E+00	500.27	500.27	500.27	500.27	500.27	500.27
[9]NOx with SNCR	-	-	-	-	-	-	275.15	275.15	275.15	275.15	275.15	275.15
[9]NOx with SCR	-	-	-	-	-	-	55.03	55.03	55.03	55.03	55.03	55.03
[10]PM	2.51E+01	2.10E-01	5.90E-02	7.03E-02	1.79E-01	6.20E-02	3,527.18	29.51	8.29	9.88	25.15	8.71
SO_2	3.46E+00	ND	9.51E-01	6.53E-01	1.43E+00	5.54E-01	486.22	ND	133.64	91.76	200.95	77.85
Lead (Pb)	2.13E-01	3.00E-03	2.90E-03	9.15E-04	2.97E-04	2.61E-04	29.93	0.42	0.41	0.13	0.04	0.04
[11]CDD/CDF	1.67E-06	1.17E-06	NA	6.21E-07	1.60E-07	6.61E-08	2.35E-04	1.64E-04	NA	8.73E-05	2.25E-05	9.29E-06
[12]Arsenic (As)	4.37E-03	2.17E-05	ND	1.37E-05	1.03E-05	4.23E-06	0.61	0.00	ND	0.00	0.00	0.00
[12]Cadmium (Cd)	1.09E-02	6.46E-04	8.87E-05	7.51E-05	2.34E-05	2.71E-05	1.53	0.09	0.01	0.01	0.00	0.00
[12]Chromium (Cr)	8.97E-03	1.13E-04	3.09E-05	2.59E-04	2.00E-04	3.00E-05	1.26	0.02	0.00	0.04	0.03	0.00
[12]Mercury (Hg)	5.60E-03	5.60E-03	3.96E-03	3.26E-03	2.20E-03	2.20E-03	0.79	0.79	0.56	0.46	0.31	0.31
[12]Nickel (Ni)	7.85E-03	1.12E-04	3.22E-05	2.70E-04	1.43E-04	5.16E-05	1.10	0.02	0.00	0.04	0.02	0.01
[12]Hydrochloric Acid (HCl)	6.40E+00	ND	2.78E-01	4.58E-01	6.36E-01	2.11E-01	899.36	ND	39.07	64.36	89.37	29.65
[13]CO_2	1.97E+03	1.97E+03	1.97E+03	1.97E+03	1.97E+03	1.97E+03	276,834	276,834	276,834	276,834	276,834	276,834
[14]CH_4	6.48E-01	6.48E-01	6.48E-01	6.48E-01	6.48E-01	6.48E-01	91	91	91	91	91	91
[14]N_2O	1.22E-02	1.22E-02	1.22E-02	1.22E-02	1.22E-02	1.22E-02	2	2	2	2	2	2
[15]CO_2e (metric tons)	-	-	-	-	-	-	253,357	253,357	253,357	253,357	253,357	253,357

[1]Emissions factors were calculated from concentration using an F-Factor of 9570 dscf/Mbtu and a heating value of 4,500 BTU/lb. Source:
AP-42 Chapter 2.1 Refuse Combustion. Table 2.1-2 (English Units). Particulate Matter, Metals, and Acid Gas Emission Factors for Mass Burn and Modular Excess Air Combustors
AP-42 Chapter 2.1 Refuse Combustion. Table 2.1.4 (English Units). Organic, Nitrogen Oxides, Carbon Monoxide, and Carbon Dioxide Emission Factors for Mass Burn Waterwall Combustors

[2]These emission factors are for long-term emission levels, not short-term emissions.

[3]ESP = Electrostatic Precipitator

[4]DSI/ESP = Duct Sorbent Injection/Electrostatic Precipitator

[5]SD/ESP = Spray Dryer/Electrostatic Precipitator

[6]DSI/FF = Duct Sorbent Injection/Fabric Filter

[7]SD/FF = Spray Dryer/Fabric Filter (note, this is used on a similar plant in West Palm Beach, Florida) "Prevention of Significant Deterioration Permit Application for Palm Beach Renewable Energy Facility #2" May 2010. Solid Waste Authority of Palm Beach County.

[8]Control of NOx and CO is not tied to traditional acid gas/PM control devices, therefore, these pollutants remain at the uncontrolled emission factor for all control technologies.

[9]Selective Noncatalytic Reduction (SNCR) can reduce NOx Emissions by 45% (EPA 1996). Selective catalytic converters (SCR) can reduce NOx emissions by upwards of 80%, but may be cost prohibitive.

[10]PM = Filterable particulate matter, as measured with EPA Method 5

[11]CDD/CDF = total tetra-through octa-chlorinated dibenzo-p-dioxin/chlorinated dibenzofurans, 2,3,7,8-tetrachlorodibenzo-p-dioxin, and dibenzofurans. Also a HAP in the CAA of 1990

[12]Also Hazardous Air Pollutants (HAPs) listed in the Clean Air Act

[13]Calculated assuming a dry carbon content of 26.8% for the feed refuse.

[14]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-3

CH_4	3.20E-02 kg/MMBTU	2.88E-01 kg/Ton of MSW calculated based on 4500 BTU/lb		6.48E-01 lb/ton of MSW
N_2O	6.00E-04 kg/MMBTU	5.40E-03 kg/Ton of MSW calculated based on 4500 BTU/lb		1.22E-02 lb/ton of MSW
Heating Value	4500.00 BTU/lb MSW	1 kg = 2.205lb		
	9.00E+06 BTU/Ton MSW			
	9.00 MMBTU/TON MSW			

[15]CO2e = CO2 + (21 * CH4) + (310 * N20) in Metric Tons/year

Table 2. Emissions Estimate from WTE for Pollutants not listed in AP-42

Air Pollution Control Device (APCD) assumed to be used: SNCR/Spray Dryer Absorber/FF/Activated Carbon Injection

Pollutant	[1]Estimated Exhaust Gas Rate scfm at 7% Oxygen	[1]Estimated Exhaust Gas Rate acfm	[2]Maximum Concentration	[3]Maximum Concentration (Units)	[4]Controlled TPY
VOC	83,188	143,350	7	ppmv	17.46
Fluoride (as HF)	83,188	143,350	3.5	ppmv	3.97
Sulfuric Acid Mist (SAM)	83,188	143,350	15	µg/m^3	0.01

[1]Exhaust Gas Flow Rates from a similar plant that would process 1,500 tpd MSW. Plant is located in Frederick/Carroll County MD. Exhaust Flow Rates from Appendix B of "Frederick/Carroll County Renewable Waste-To-Energy Plant Prevention of Significant Deterioration/Air Construction Permit Application" May 2012.

F/CC	1500 tpd	
Fort Bliss WTE	770 tpd	
	0.51	Fort Bliss WTE Scale to F/CC

[2]Maximum concentration is based on the minimum of the maximum allowable emissions for each regulated pollutant under various environmental regulations. Each maximum concentration source is as follows:

VOC	From Appendix B of "Frederick/Carroll County Renewable Waste-To-Energy Plant Prevention of Significant Deterioration/Air Construction Permit Application" May 2012. Based on Federal PSD regulations.
Fluoride (as HF)	From Appendix B of "Frederick/Carroll County Renewable Waste-To-Energy Plant Prevention of Significant Deterioration/Air Construction Permit Application" May 2012. Based on Federal PSD regulations.
Sulfuric Acid Mist	30 TAC §112.41

This Maximum Concentration assumes the use of APCD to reach at least this level. Actual emissions once APCD has been chosen for the design may be less.

[3]ppmv = parts per million volume-based. Assume m^3 is Actual standard cubic meter

[4]Controlled tpy calculated using by mass balance using exhaust rate, maximum concentration and the universal gas constant for ambient air.

Molecular Weights Used:

VOC 44 lb/lbmol

HF 20 lb/lbmol

SAM NA

Standard Temperature = 68 degrees F Standard Pressure = 1 atm

Universal Gas Constant = 0.7302 atm-ft^3/lbmol-R

Conversions:

Fahrenheit to Rankine degrees F + 480 = degrees R

Table 3. Emissions from Garbage Truck Delivery

Number of Vehicles	# Days	[2]Number of Miles/Day	VOC lb/mile	CO lb/mile	NOx lb/mile	SO_2 lb/mile	PM_{10} lb/mile	$PM_{2.5}$ lb/mile	CO_2 lb/mile	CH_4 lb/mi	N_2O lb/mi	VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CO_2 lb	CH_4 lb	N_2O lb
100	365	12	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.1244E-05	1.05822E-05	666.34	3,522.38	15,798.68	7.90	658.96	638.50	1,506,080.94	4.92	4.64
30	365	48	1.52E-03	8.04E-03	3.61E-02	1.80E-05	1.50E-03	1.46E-03	3.44	1.1244E-05	1.05822E-05	799.61	4,226.86	18,958.42	9.48	790.75	766.20	1,807,297.13	5.91	5.56
											Tons per Year:	**0.73**	**3.87**	**17.38**	**0.01**	**0.72**	**0.70**	**1,656.69**	**0.01**	**0.01**
											CO2*e* Metric Tons per Year							**1,504**		

[1]Miles per day estimated to be 5.25 miles one way on Fort Bliss on the new road.

Note: Emission factors from MOVES2010.

Table 4. Diesel Fire Pumps

Pump Number	[1]Generator size HP	[2]Hours of operation	[3]Load Factor	Emission Factors: [4]VOC g/hp-hr	[4]CO g/hp-hr	[4]NOx g/hp-hr	[5]SO_2 g/hp-hr	[4]PM g/hp-hr	[5]CO2 g/hp-hr	Annual Emissions: VOC lb/yr	CO lb/yr	NOx lb/yr	SO_2 lb/yr	PM lb/yr	CO_2 lb/yr
1	252	100	0.59	0.15	1.42	2.39	0.10	0.13	536	4.9	46.4	78.2	3.1	4.4	17,578
2	252	100	0.59	0.15	1.42	2.39	0.10	0.13	536	4.9	46.4	78.2	3.1	4.4	17,578
									Subtotal (tons/year):	**4.88E-03**	**0.05**	**0.08**	**3.14E-03**	**4.39E-03**	**15.96**

[1]Fire pumps based on 252 hp fire pump similar to the generator utilized for F/CC. From Appendix B of "Frederick/Carroll County Renewable Waste-To-Energy Plant Prevention of Significant Deterioration/Air Construction Permit Application" May 2012.

[2]Typical hours of operation for maintenance and readiness testing. From Appendix B of "Frederick/Carroll County Renewable Waste-To-Energy Plant Prevention of Significant Deterioration/Air Construction Permit Application" May 2012.

[3]Load Factor from USEPA "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling". EPA420-P-04-005. April 2004

[4]Emission factors for Cummins Inc, CPF9E-F30 Fire Pump Driver

[5]Emission Factor from Nonroad 2008 for MY2012 equipment.

Table 5. Emergency Generator

[1]Generator size HP	[2]Hours of operation	[3]Load Factor	Emission Factors: [4]VOC g/hp-hr	[4]CO g/hp-hr	[4]NOx g/hp-hr	[5]SO_2 g/hp-hr	[4]PM g/hp-hr	[5]CO2 g/hp-hr	Annual Emissions: VOC lb/yr	CO lb/yr	NOx lb/yr	SO_2 lb/yr	PM lb/yr	CO_2
373	100	0.59	0.06	1.19	2.54	0.10	0.11	536	3.0	57.9	123.4	4.6	5.4	26,018
								Subtotal (tons/year):	**1.50E-03**	**0.03**	**0.06**	**2.32E-03**	**2.69E-03**	**11.81**

[1]Generator based on 250 KW emergency generator.

[2]Typical hours of operation for maintenance and readiness testing.

[3]Load Factor from USEPA "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling". EPA420-P-04-005. April 2004

[4]Emission factors from vendor for Cummins Inc, 250DQDAA 60 Hz Diesel Generator Set

[5]Emission Factor from Nonroad 2008 for MY2012 equipment.

Table 6. Estimated Uncontrolled PTE from Proposed WTE Plant

Pollutant	[1]Uncontrolled ton/year	[2]Significant SourceThreshold	Exceeds Threshold?
CO	65	100	**No**
NOx	500	40	**Yes**
PM	30	25	**Yes**
SO_2	486	40	**Yes**
VOC	NA	40	NA
Lead (Pb)	30	0.6	**Yes**
Fluoride (as HF)	NA	3	NA
Sulfuric Acid Mist (SAM)	NA	7	NA
[1]CDD/CDF	2.35E-04	3.50E-06	**Yes**
Arsenic (As)	0.61	See MWC Metals	
Cadmium (Cd)	1.53		
Chromium (Cr)	1.26		
Mercury (Hg)	0.79		
Nickel (Ni)	1.10		
MWC Metals	5.30	15	**No**
Hydrochloric Acid (HCl)	899	40	**Yes**
CO_2e	253,357	100,000	**Yes**

[1]Uncontrolled Emissions as estimated by AP-42 method. Uncontrolled assumes no control at all (does not account for emission limits).

[2]40 CFR 52.21(b)(23)(i) Thresholds for "Significant"

Table 7. Estimated Controlled PTE from Proposed WTE Plant

Pollutant	[7]SD/FF ton/year	[2]Significant Source Threshold	Exceeds Threshold?
CO	65	100	No
NOx	275	40	**Yes**
PM	9	25	**Yes**
SO_2	78	40	**Yes**
VOC	17.46	40	No
Lead (Pb)	0.04	0.6	No
Fluoride (as HF)	3.97	3	**Yes**
Sulfuric Acid Mist (SAM)	0.01	7	No
[1]CDD/CDF	9.29E-06	3.50E-06	**Yes**
Arsenic (As)	5.94E-04	See MWC Metals	
Cadmium (Cd)	3.81E-03		
Chromium (Cr)	4.22E-03		
Mercury (Hg)	0.31		
Nickel (Ni)	0.01		
MWC Metals	0.33	15	No
Hydorchloric Acid (HCl)	30	40	**Yes**
CO_2e	253,357	100,000	**Yes**

[1] Controlled Emissions as estimated by AP-42 method or Mass Balance Method. SD/FF is probable control schema.
[2]40 CFR 52.21(b)(23)(i) PSD Thresholds for "Significant"

Table 8. Estimated Total Emissions From WTE Plant Including Auxiliary Stationary Sources

Pollutant	[7]SD/FF Tons/Year	Auxilliary Equipment Tons/year	Total Tons/Year
CO	65	0.08	65.14
NOx	275	0.14	275.29
PM	9	7.09E-03	8.72
SO_2	78	5.46E-03	77.86
VOC	17.46	6.39E-03	17.47
Lead (Pb)	0.04	-	0.04
Fluoride (as HF)	3.97	-	3.97
Sulfuric Acid Mist (SAM)	0.01	-	0.01
[1]CDD/CDF	9.29E-06	-	9.29E-06
Arsenic (As)	5.94E-04	-	5.94E-04
Cadmium (Cd)	3.81E-03	-	3.81E-03
Chromium (Cr)	4.22E-03	-	4.22E-03
Mercury (Hg)	0.31	-	0.31
Nickel (Ni)	0.01	-	0.01
MWC Metals	0.33	-	0.33
Hydorchloric Acid (HCl)	30	-	29.65
CO_2e	253,357	27.77	253,384
HAPs	34.31	[1]-	34.31

[1]Negligible HAPs would be emitted from the auxilliary equipment

Table 9. Total Mobile Sources (Garbage Trucks and Commuting Plant Workers)

	VOC Tons/Yr	CO Tons/Yr	NOx Tons/Yr	SO2 Tons/Yr	PM10 Tons/Yr	PM2.5 Tons/Yr	CO_2 Tons/Yr	CH_4 Tons/Yr	N_2O Tons/Yr
Garbage Trucks	0.73	3.87	17.38	0.01	0.72	0.70	1,656.69	0.01	0.01
Commuting Workers	0.31	9.89	1.42	0.00	0.06	0.05	306.11	0.01	0.03
Total	1.04	13.76	18.80	0.01	0.78	0.75	1,962.80	0.02	0.03
CO2*e* Metric Tons per Year							**1,790.10**		

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TAB C. OPERATIONAL EMISSION CALCULATIONS FOR ALTERNATIVE 7 - PROGRAMMATIC

Table 1: Emissions for one average sized turbine, operating at high load, uncontrolled emissions

Turbine Size MW	Hours of operation	[1]Fuel Efficiency (BTU/kWh)	Fuel Usage (Maximum) per year (MMBTU/yea	[2]Emission Factors in lb/MMBtu								Annual Emissions							
				VOC	CO	NOx	SO_2	PM	N_2O	CH4	CO_2	VOC lb/yr	CO lb/yr	NOx lb/yr	SO_2 lb/yr	PM lb/yr	N_2O lb/yr	CH4 lb/yr	CO_2 lb/yr
2.5	8760	131,130	2,871,747	0.00	0.08	0.32	0.00	0.01	0.00	0.01	110	6,031	235,483	918,959	9,764	18,954	8,615	24,697	315,892,170
											Tons per year	3	118	459	5	9			
											Metric tons per year						4	11	143,286
																	CO2e (metric tons/year)		146,841

[1]Fuel efficiency from ZM Turbines Product data for Gas Turbine UGT 2500, Simple 2.5 MW turbine

[2]Emission Factor from USEPA AP-42 Section 3.1 Stationary Gas Turbines, Table 3.1.1 and Table 3.1.2a

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TAB D. OPERATIONAL EMISSION CALCULATIONS FOR POV COMMUTERS - ALL ALTERNATIVES

Table 1. Alternative 4 Vehicle Emissions from Contract Workers

100 [1]Contractor Workers WTE

Vehicles	# vehicles	# days	[2]mi/day	VOC lb/mi	CO lb/mi	NOx lb/mi	SO_2 lb/mi	PM10 lb/mi	PM2.5 lb/mi	CO_2 lb/mi	CH_4 lb/mi	N_2O lb/mi	VOCs lb	CO lb	NOx lb	SO_2 lb	PM_{10} lb	$PM_{2.5}$ lb	CO_2 lb	CH_4 lb	N_2O lb
[6]Carpool	7	365	20	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	45.70	1423.59	205.64	0.62	8.30	7.64	42110	1.81	3.77
[7]POVs	88	365	20	8.96E-04	2.86E-02	4.11E-03	1.31E-05	1.62E-04	1.49E-04	8.87E-01	3.81E-05	7.94E-05	575.45	18349.08	2641.07	8.40	104.19	96.02	570103	24.50	50.99
												Tons per Year	**0.31**	**9.89**	**1.42**	**0.00**	**0.06**	**0.05**	**306.11**	**0.01**	**0.03**
												CO2e Metric Tons per Year							**285.64**		

[1]Contract workers estimated for each Alternative. See Assumptions Tab.
[2] Average vehicles miles per day for El Paso registered car
[3] Emission factors from onroadEF07_26.xls (SCAQMD 2009)
[4]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-11
[5]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-12
[6]Carpools are 2 people per car. Table D-12 show emissions per passenger. Multiplies EF by 2 for emissions by car. Assume 13% of personnel will use carpools. Based on 2006-2010 American Community Survey 5-Year Estimates. US Census
[7]Assume POV mixture is 50% cars and 50% trucks after carpoolers are accounted for.

Table 2. Alternative 5 Vehicle Emissions from Workers (Geothermal)

10 Workers Geothermal

Vehicles	# vehicles	# days	[2]mi/day	VOC lb/mi	CO lb/mi	NOx lb/mi	SO_2 lb/mi	PM10 lb/mi	PM2.5 lb/mi	CO_2 lb/mi	CH_4 lb/mi	N_2O lb/mi	VOCs lb	CO lb	NOx lb	SO_2 lb	PM_{10} lb	$PM_{2.5}$ lb	CO_2 lb	CH_4 lb	N_2O lb
[6]Carpool	1	365	20	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	4.57	142.36	20.56	0.06	0.83	0.76	4211	0.18	0.38
[7]POVs	4	730	20	8.96E-04	2.86E-02	4.11E-03	1.31E-05	1.62E-04	1.49E-04	8.87E-01	3.81E-05	7.94E-05	56.89	1814.06	261.11	0.83	10.30	9.49	56362	2.42	5.04
												Tons per Year	**0.03**	**0.98**	**0.14**	**0.00**	**0.01**	**0.01**	**30.29**	**0.00**	**0.00**
												CO2e Metric Tons per Year							**28.26**		

Table 3. Alternative 6 Vehicle Emissions from Workers (CSP)

28 Workers CSP

Vehicles	# vehicles	# days	[2]mi/day	[3]VOCs lb/mi	[3]CO lb/mi	[3]NOx lb/mi	[3]SO_2 lb/mi	[3]PM_{10} lb/mi	[3]$PM_{2.5}$ lb/mi	[4,5]CO_2 g/mi	[4,5]CH_4 g/mi	[4,5]N_2O g/mi	VOCs lb	CO lb	NOx lb	SO_2 lb	PM_{10} lb	$PM_{2.5}$ lb	CO_2 g	CH_4 g	N_2O g
[6]Carpool	2	365	20	9.63E-04	3.00E-02	4.33E-03	1.31E-05	1.75E-04	1.61E-04	8.87E-01	3.81E-05	7.94E-05	12.80	398.61	57.58	0.17	2.32	2.14	11791	0.51	1.05
[7]POVs	12	730	20	8.96E-04	2.86E-02	4.11E-03	1.31E-05	1.62E-04	1.49E-04	8.87E-01	3.81E-05	7.94E-05	159.29	5079.36	731.10	2.33	28.84	26.58	157815	6.78	14.11
												Tons per Year	**0.09**	**2.74**	**0.39**	**0.00**	**0.02**	**0.01**	**84.80**	**0.00**	**0.01**
												CO2e Metric Tons per Year							**79.13**		

[1]Contract workers estimated for each Alternative. See Assumptions Tab.
[2] Average vehicles miles per day for El Paso registered car
[3] Emission factors from onroadEF07_26.xls (SCAQMD 2009)
[4]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-11
[5]Emission Factors from *Federal Greenhouse Gas Accounting and Reporting Guidance: Technical Support Document* (CEQ. 2010), Table D-12
[6]Carpools are 2 people per car. Table D-12 show emissions per passenger. Multiplies EF by 2 for emissions by car. Assume 13% of personnel will use carpools. U.S. Census data
[7]Assume POV mixture is approximately 50% cars, 50% trucks/SUVs of the remaining personnel

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TAB E. INDIRECT EMISSION IMPACTS AS A RESULT OF IMPLEMENTING ALTERNATIVES

Table 1. Estimated Emissions from EPEC Power Plants Generating Same Power as Maximum Power from Alternative 4 - WTE Plant

Power Generated MW	Annual Operation Hours	Estimated offset MWh	Total Output Emissions Rates							Annual Emissions from equivalent powerplant						
			NOx TPY/MWhr	CO TPY/MWhr	VOC TPY/MWhr	PM_{10} TPY/MWhr	$PM_{2.5}$ TPY/MWhr	SO_2 TPY/MWhr	CO_2 TPY/MWhr	NOx tons/year	CO tons/year	VOC tons/year	PM_{10} tons/year	$PM_{2.5}$ tons/year	SO_2 tons/year	CO_2 MT/year
45	8,760	394,200	0.001	0.00017	0.000049	0.000021	0.0000211	0.0000037	0.7880	394	67	19	8	8	1	281,798

Power Generated equilvalent to proposed technology for alternatives

Note: Emission factors from *The Electric Company - El Paso Electric 2012.* El Paso Electric currently supplies Fort Bliss with power generated in natural gas fired power plants (El Paso Electric. 2012. Letter to Vicki G. Hamilton, Chief Environmental Division, Directorate of Public Works, US Army Installation Management Command, Department of the Army from Roger Chacon, Manager, Environment Department El Paso Electric)

Note: the WTE Plant has significant emissions of certain pollutants. See Tab B.

Table 2. Estimated Emissions from EPEC Power Plants Generating Same Power as Maximum Power from Alternative 5 - Geothermal Plant.

Power Generated MW	Annual Operation Hours	Estimated reduction MWh	Total Output Emissions Rates							Annual Emissions from equivalent powerplant						
			NOx TPY/MWhr	CO TPY/MWhr	VOC TPY/MWhr	PM_{10} TPY/MWhr	$PM_{2.5}$ TPY/MWhr	SO_2 TPY/MWhr	CO_2 TPY/MWhr	NOx tons/year	CO tons/year	VOC tons/year	PM_{10} tons/year	$PM_{2.5}$ tons/year	SO_2 tons/year	CO_2 MT/year
20	8,760	175,200	0.001	0.00017	0.000049	0.000021	0.0000211	0.0000037	0.7880	175	30	9	4	4	1	125,244

[1]Power Generated equilvalent to proposed technology for alternatives

[2]Emission factors from The Electric Company - El Paso Electric 2012.

Table 3. Estimated Emissions from EPEC Power Plants Generating Same Power as Maximum Power from Alternative 6 - CSP Array.

Power Generated MW	Annual Operation Hours	Estimated reduction MWh	Total Output Emissions Rates							Annual Emissions from equivalent powerplant						
			NOx TPY/MWhr	CO TPY/MWhr	VOC TPY/MWhr	PM_{10} TPY/MWhr	$PM_{2.5}$ TPY/MWhr	SO_2 TPY/MWhr	CO_2 TPY/MWhr	NOx tons/year	CO tons/year	VOC tons/year	PM_{10} tons/year	$PM_{2.5}$ tons/year	SO_2 tons/year	CO_2 MT/year
50	8,760	438,000	0.001	0.00017	0.000049	0.000021	0.0000211	0.0000037	0.7880	438	74	21	9	9	2	313,109

[1]Power Generated equilvalent to proposed technology for alternatives

[2]Emission factors from The Electric Company - El Paso Electric 2012.

Table 4. Estimated Emissions from EPEC Power Plants Generating Same Power as Maximum Power from Alternative 7 - Supplemental Gas Turbines. (For each individual 2.5 MW turbine)

Power Generated MW	Annual Operation Hours	Estimated reduction MWh	Total Output Emissions Rates							Annual Emissions from equivalent powerplant						
			NOx TPY/MWhr	CO TPY/MWhr	VOC TPY/MWhr	PM_{10} TPY/MWhr	$PM_{2.5}$ TPY/MWhr	SO_2 TPY/MWhr	CO_2 TPY/MWhr	NOx tons/year	CO tons/year	VOC tons/year	PM_{10} tons/year	$PM_{2.5}$ tons/year	SO_2 tons/year	CO_2 MT/year
2.5	8,760	21,900	0.001	0.00017	0.000049	0.000021	0.0000211	0.0000037	0.7880	22	4	1	0	0	0	15,655

[1]Power Generated equilvalent to proposed technology for alternatives

[2]Emission factors from The Electric Company - El Paso Electric 2012.

Table 5. Potential Indirect Emissions Impacts from Alternative 4 WTE Plant

Emissions	VOCs T/Yr	CO T/Yr	NOx T/Yr	SO_2 T/Yr	PM_{10} T/Yr	$PM_{2.5}$ T/Yr	CO_2e MT/Yr
45 MW generated at EPEC NG Power Plants	19	67	394	1	8	8	281,798
Controlled WTE Emissions	17	65	275	78	9	<9	253,357
Comparative Emissions Result	-2	-2	-119	76	0	<1	-28,442

Table 6. Potential Indirect Emissions Impactsfrom Alternative 6 CSP

Emissions	VOCs T/Yr	CO T/Yr	NOx T/Yr	SO_2 T/Yr	PM_{10} T/Yr	$PM_{2.5}$ T/Yr	CO_2e MT/Yr
50 MW generated at EPEC NG Power Plants	21	74	438	2	9	9	313,109
[1]Emissions from CSP Plant power generation	0	0	0	0	0	0	0
Comparative Emissions Result	-21	-74	-438	-2	-9	-9	-313,109

[1]CSP array power generation would produce negligible emissions, rounded to 0.

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APPENDIX C:
CONFORMITY ANALYSIS

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CONFORMITY ANALYSIS

Section 176(c) of the CAA, as amended, requires federal agencies to ensure that actions undertaken in non-attainment or maintenance areas are consistent with the CAA and with federally enforceable air quality management plans. The CAA places responsibility on individual states to achieve and maintain the NAAQS through USEPA-approved SIPs.

Under the GCR (40 CFR 93, Subpart B), emissions of criteria pollutants and their precursors (the ozone precursors VOCs and NOx) that are associated with a proposed action that is in a non-attainment area for a given pollutant must be below *de minimis* emission rates for that pollutant to be exempt from a formal conformity determination. **Table 1** below shows the *de minimis* thresholds that would be applicable if El Paso County were to be designated non-attainment for ozone. Proposed actions that contribute less than these amounts and have no other conformity requirements are exempt from the GCR. Proposed actions that exceed the pollutant *de minimis* thresholds in any given year must undergo a detailed analysis and a formal conformity determination is required. Finally, mitigation would be required if the detailed analysis indicates an exceedance of the *de minimis* levels for any of the pollutants of concern.

Table 1 Criteria Pollutant General Conformity de minimis Emission Rates (tons/year)

	de minimis Thresholds in tons per year
VOCs	100
NOx	100

Source: 40 CFR 93.153

Alternative 1 - No Action

The Net Zero initiatives for energy, water, and waste would not be implemented at Fort Bliss. If the Proposed Action were not implemented, no impacts to air quality would occur.

Alternative 2 - Conservation Policies and Procedures

Under Alternative 2, Fort Bliss would implement policies, procedures, and BMPs to maximize resource re-use, limit waste generation, increase resource re-purposing, and increase water and energy use efficiencies in new and existing facilities. No or very limited construction would occur, and no new stationary sources would result by implementing Alternative 2. The air quality impact of the conservation policies and procedures would be a net benefit to the region as there would be an associated decrease in

energy consumption and likely reductions in the use of pollution-emitting equipment, as well as replacement of old equipment with new, cleaner technologies.

Alternative 3 - Water Reclamation Pipeline

Air emissions associated with the water reclamation pipeline would be essentially confined to the construction phase of this alternative. The annual emissions for the estimated construction year of 2016 are presented in **Table 2.**

Table 2. Alternative 3 Annual Emissions compared to de minimis Threshold (tons per year)

	VOC	NOx
2016 Construction	0.51	6.68
de minimis threshold	100	100

Based on the comparison of the annual emissions to *de minimis* thresholds, the construction of the water reclamation pipeline would not exceed the thresholds and would not be subject to additional conformity reviews.

Alternative 4 – Waste-to-Energy Plant with Concentrating Solar Panel Array

Alternative 4 includes the construction and operation of a WTE plant. The construction impacts of the WTE plant for two years. Construction emissions for the WTE plant would occur during 2016 and 2017 and are compared to *de minimis* thresholds in **Table 3.**

Table 3. Alternative 4 Construction Compared to de minimis Threshold (tons per year)

Year	VOC	NOx
2016	2.35	27.02
2017	2.11	24.57
de minimis threshold	100	100

Emissions of the ozone precursors NOx and VOCs from the construction equipment would not exceed *de minimis* thresholds.

Because the WTE plant (Alternative 4) would be subject to NSR permitting requirements including PSD and NNSR, it would be exempt from General Conformity Rule requirements.

Requirements of the PSD and NNSR programs include submitting a detailed application to the TCEQ. This application will contain but is not limited to the potential-to-emit for criteria pollutants and hazardous air pollutants under the minor source NSR program in Texas, and details on the proposed control technologies. It is expected that the WTE plant would be controlled by the appropriate Air Pollution Control Devices (APCD) to meet emissions requirements of the PSD and NNSR permit programs. These APCD are evaluated to obtain the Best Available Control Technology (BACT) for PSD and Lowest Achievable Emissions Rate (LAER) technology for NNSR. Best management practices would be in place to ensure proper combustion to meet air pollutant control requirements.

Specific analysis requirements for the PSD permitting program include:

- Control technology analyses would be required on a pollutant-specific basis to define BACT
- Evaluation of ambient impacts is required with respect to PSD increments and the NAAQS resulting from the project related emissions. Dispersion modeling analyses would most likely be required. Additional analyses including "full impact" PSD increment and NAAQS analyses could be required depending on the results of the modeling. (40 CFR Part 51, Appendix W).
- Evaluation of project impacts on soils, vegetation, and visibility would be required. Additionally, impacts relative to general commercial, residential and other impacted areas would be required.

NNSR review occurs when the source, in this case the WTE plant, would exceed the threshold for a pollutant for which the geographical area is non-attainment. A major stationary source under NNSR is any pollutant that exceeds 100 tons per year in any pollutant and is in a non-attainment area. The difference between the PSD and NNSR applications are the control technology required. NNSR requires LAER while PSD requires BACT. Therefore, the LAER would be required for VOCs and NOx.

Mobile sources associated with the operation of the WTE plant are also compared with *de minimis* thresholds. These mobile sources include the workers who would commute to the site and the garbage trucks that would deliver waste to the WTE plant and transport up to 30% of the waste (determined to be noncombustible) to the municipal landfill in Clinton, Texas. **Table 5** presents the results.

Table 5. Alternative 4 Mobile Operation Emissions Compared to de minimis Threshold (tons/year)

	VOC	NOx
WTE Commuters	0.73	17.38
Garbage trucks	0.31	1.42
Total All Mobile Sources	**1.04**	**18.80**
de minimis threshold	100	100

None of the operational mobile sources categories would be anticipated to exceed the *de minimis* thresholds. Therefore, no further conformity review would be required for mobile sources alone; however these emissions may need to be accounted for in the NNSR review that would be required for the WTE plant.

Alternative 5 - Geothermal Energy Facility

Air emissions from the geothermal energy facility would include emissions from short-term construction activities and emissions from the staff commutes during facility operation of the geothermal energy facility and associated CSP. **Table 7** compares the construction emission estimates to the *de minimis* thresholds.

Table 7. Alternative 5 Construction Emissions Compared to de minimis Threshold (tons/year)

	VOC	NOx
2016	0.55	10.40
de minimis threshold	100	100

Based on the comparison of the annual emissions to *de minimis* thresholds, the construction of the geothermal energy facility would not exceed the thresholds and would not be subject to additional conformity reviews.

Table 8 presents the comparison between the operation emissions resulting from the employee commutes to the geothermal energy facility and CSP to *de minimis* thresholds.

Table 8. Alternative 5 Operational Mobiles Sources Compared to de minimis Threshold (tons/year)

	VOC	NOx
Staff Commute	0.03	0.14
de minimis threshold	100	100

The operational mobile source emissions would not be likely to exceed *de minimis* thresholds, but if it were to require permitting under the NSR program it would be exempt from General Conformity Rule requirements.

Alternative 6 – Dry-cooled CSP Technology

Air emissions from Alternative 6 would be a result of short-term construction activities. There would be no new additional staff requirements for the operation of the CSP, therefore no operational emissions increases would be associated with Alternative 6. **Table 9** presents the comparison.

Table 9. Alternative 6 Construction Emissions Compared to de minimis Threshold (tons/year)

	VOC	NOx
2016	2.19	30.76
2017	1.94	28.23
de minimis threshold	100	100

The construction mobile source emissions would not be likely to exceed *de minimis* thresholds, and therefore would not be subject to additional conformity reviews.

Alternative 7 – Implement Additional Renewable Energy Development

Air emissions from Alternative 7 are not quantifiable due to the nature of this alternative. Alternative 7 is intended to be programmatic; therefore the air emissions would be evaluated for each project as it was identified. While this alternative includes the use of natural gas turbines to provide backup power for renewable power sources in an effort to provide stability to the power supply, these stationary sources would be covered under the New Source Review program and would be exempt from General Conformity Rule requirements.

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Appendix D: Economic Forecast System

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1.0 Socioeconomic Impact Assessment

Socioeconomic impacts are linked through cause-and-effect relationships. Military payrolls and local procurement contribute to the economic base for the region of influence (ROI). In this regard, the action alternatives would have a multiplier effect on the local and regional economy. With the action alternatives, direct jobs would be created, generating new income and increasing personal spending. This spending generally creates secondary jobs, increases business volume, and increases revenues for schools and other social services.

2.0 Economic Impact Forecast System

The U.S. Army, with the assistance of many academic and professional economists and regional scientists, developed the Economic Impact Forecast System (EIFS) to address the economic impacts of the National Environmental Policy Act (NEPA)-requiring actions and to measure their significance. As a result of its designed applicability, and in the interest of uniformity, EIFS should be used in NEPA assessments for the action alternatives. The entire system is designed for the scrutiny of a populace affected by the actions being studied. The algorithms in the EIFS model are simple and easy to understand, but still have firm, defensible bases in regional economic theory.

EIFS was developed under a joint project of the U.S Army Corps of Engineers (USACE); the Army Environmental Policy Institute (AEPI); and the Computer and Information Science Department of Clark Atlanta University, Georgia. EIFS is an online system, and the EIFS Web application is hosted by USACE, Mobile District. The system is available to anyone with an approved user-id and password. University staff and the staff of USACE, Mobile District are available to assist with the use of EIFS.

The databases in EIFS are national in scope and cover the approximately 3,700 counties, parishes, and independent cities that are recognized as reporting units by federal agencies. EIFS allows the user to define an economic ROI by identifying the counties, parishes, or cities to be analyzed. Once the ROI is defined, the system aggregates the data, calculates multipliers and other variables used in the various models in EIFS, and prompts the user for forecast input data.

3.0 Economic Impact Forecast System Model

The basis of the EIFS analytical capabilities is the calculation of multipliers that are used to estimate the impacts resulting from military-related changes in local expenditures or employment. In calculating the multipliers, EIFS uses the economic base model approach, which relies on the ratio of total economic activity to basic economic activity. Basic, in this context, is defined as the production or employment engaged to supply goods and services outside the ROI or by federal activities (such as military installations and their employees). According to economic base theory, the ratio of total income to basic income is measurable (as the multiplier) and sufficiently stable so that future changes in economic activity can be forecast. This technique is especially appropriate for estimating aggregate impacts and makes the economic base model ideal for the environmental assessment (EA) and environmental impact statement (EIS) process.

The multiplier is interpreted as the total impact on the economy of the region resulting from a unit change in its base sector; for example, a dollar increase in local expenditures due to an expansion of its military installation. EIFS estimates its multipliers using a location quotient approach based on the concentration of industries within the region relative to the industrial concentrations for the nation.

The user inputs into the model the data elements that describe the Army action: the change in expenditures, or dollar volume of the construction project(s); change in civilian or military employment; average annual income of affected civilian or military employees; the percent of civilians expected to relocate due to the Army's action; and the percent of military living on-post. Once these are entered into the EIFS model, a projection of changes in the local economy is provided. These are projected changes in sales volume, income, employment, and population. These four indicator variables are used to measure and evaluate socioeconomic impacts. Sales volume is the direct and indirect change in local business activity and sales (total retail and wholesale trade sales, total selected service receipts, and value-added by manufacturing). Employment is the total change in local employment due to the Proposed Action, including not only the direct and secondary changes in local employment, but also those personnel who are initially affected by the military action. Income is the total change in local wages and salaries due to the Proposed Action, which includes the sum of the direct and indirect wages and salaries, plus the income of the civilian and military personnel affected by the Proposed Action. Population is the increase or decrease in the local population as a result of the Proposed Action.

4.0 Significance of Socioeconomic Impacts

Once model projections are obtained, the rational threshold value (RTV) profile allows the user to evaluate the significance of the impacts. This analytical tool reviews the historical trends for the defined region and develops measures of local historical fluctuations in sales volume, income, employment, and population. These evaluations identify the positive and negative changes within which a project can affect the local economy without creating a significant impact. The greatest historical changes define the boundaries that provide a basis for comparing an action's impact on the historical fluctuation in a particular area. Specifically, EIFS sets the boundaries by multiplying the maximum historical deviation of the following variables: the sales volume, income, employment, and population (see Table 1).

Table 1. Historical Deviation Variables

		Increase	Decrease
Sales Volume	X	100%	75%
Income	X	100%	67%
Employment	X	100%	67%
Population	X	100%	50%

These boundaries determine the amount of change that will affect an area. The percentage allowances are arbitrary, but sensible. The maximum positive historical fluctuation is allowed with expansion because economic growth is beneficial. While cases of damaging economic growth have been cited, and although the zero-growth concept is being accepted by many local planning groups, military base reductions and closures generally are more injurious to local economics than are expansion actions.

The major strengths of the RTV are its specificity to the region under analysis and its basis on actual historical data for the region. The EIFS impact model, in combination with the RTV, has proven successful in addressing perceived socioeconomic impacts. The EIFS model and the RTV technique for measuring the intensity of impacts have been reviewed by economic experts and have been deemed theoretically sound.

The following are the EIFS inputs and output data and the RTVs for the ROI. These data form the basis for the socioeconomic impact analysis presented in Section 3.11 of the EIS.

4.1 Summary of Assumptions

Two EIFS models each were run for Alternatives 4, 5, and 6 and for the combined alternatives as these alternatives had both construction period and operations period economic impacts. One EIFS model was run for Alternative 3 as this alternative had no associated operations period employment; therefore, only socioeconomic impacts from construction related spending were analyzed under this alternative. Alternatives 1, 2, and 7 did not have any costs explicitly associated with them; therefore, no EIFS analysis was performed on these alternatives.

For purposes of running the EIFS model, the overall construction spending associated with each alternative and all of the alternatives combined was selected to determine the maximum impact that the action alternatives could have on the regional economy. Though a small number of construction and operations period workers may relocate to the ROI, they are not included in this analysis as it is unclear as to exactly how many construction workers would relocate to the ROI during the construction period or how many operations period workers would relocate to new operations period jobs, and the total number of those relocating during these periods is not anticipated to have any significant socioeconomic impacts. Therefore, only construction costs, and not civilian or military employment associated with them, were used to determine the impact of the Proposed Action during the construction period of each action alternative. Operations period impacts are assessed separately under alternatives that have operations period employment associated with them.

Construction cost estimates are shown in Tables 2, 4, 8, and 12 for each of the action alternatives with construction costs available. Table 16 shows the total estimated combined construction costs for all of the action alternatives combined. The costs for all of these models were obtained through various sources for each action alternative. These sources are identified in Section 3.10.2 under their respective action alternatives. The impacts from construction related spending on sales, income, and employment generated for the economy and the percent annual fluctuation these represent are shown in Tables 3, 5, 9, and 13 for each of the action alternatives with construction costs available. Table 17 shows the impacts from the estimated total combined construction costs of all of the action alternatives. Tables 6, 10, and 14 show the average operations income per civilian and the change in civilian employment for the operations period of each action alternative that have operations period employment associated with them. Table 18 shows the total combined average operations period income and total employment levels for the combined alternatives that have operations period employment. Tables 7, 11, and 15 show the socioeconomic impacts on sales, income, and employment generated for the economy and the percent annual fluctuation associated with the operations period employment of those alternatives with operations period

employment. Table 19 shows the impacts from the total combined operations period employment of all of the action alternatives. Table 20 shows the annual fluctuations in RTV for the ROI above or below which the action would be considered significant.

4.1.1 Alternative 3 – Construction Period – Water Reclamation Pipeline

Table 2 shows the input value into the EIFS model for the total anticipated construction cost of the water reclamation pipeline. These costs do not include the costs related to the removal or replacement of asphalt.

Table 2. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$17,538,000
Change In Civilian Employment	0
Average Income of Affected Civilian	$0
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 3 shows the EIFS model outputs that would result from construction-related spending on the water reclamation pipeline.

Table 3. EIFS Report for ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$12,302,780	
Sales Volume – Induced	$28,911,520	
Sales Volume – Total	$41,214,300	0.18%
Income – Direct	$2,217,212	
Income - Induced	$5,210,448	
Income – Total (place of work)	$7,427,659	0.05%
Employment – Direct	62	
Employment – Induced	146	
Employment – Total	209	0.05%

4.1.2 Alternative 4 – Construction Period

Table 4 shows the input value into the EIFS model for the total construction cost of the WTE plant. These costs do not include costs associated with connecting these energy sources to the electric grid.

Table 4. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$350,000,000
Change In Civilian Employment	0
Average Income of Affected Civilian	$0
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 5 shows the EIFS model outputs that would result from construction-related spending on the WTE plant.

Table 5. EIFS Report for ROI – Forecast Output

• Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$245,522,400	
Sales Volume – Induced	$576,977,600	
Sales Volume – Total	$822,500,000	10.023.51%
Income – Direct	$44,248,150	
Income - Induced	$103,983,200	
Income – Total (place of work)	$148,231,300	2.911.02%
Employment – Direct	1,243	
Employment – Induced	83482,922	
Employment – Total	119004,165	2.931.03%

4.1.3 Alternative 4 – Operations Period

Table 6 shows the input value into the EIFS model for the average operations income per civilian and change in civilian employment for the operations period of the WTE plant.

Table 6. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$0
Change In Civilian Employment	100
Average Income of Affected Civilian	$58,725
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 7 shows the EIFS model outputs that would result from operations-related spending that would result from the 100 person increase in employment capacity as a result of the operation of a WTE plant.

Table 7. EIFS Report for the ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$4,721,490	
Sales Volume – Induced	$11,095,500	
Sales Volume – Total	$15,816,990	0.07%
Income – Direct	$5,872,500	
Income – Induced	$1,999,636	
Income – Total (place of work)	$7,872,136	0.05%
Employment – Direct	124	
Employment – Induced	56	
Employment – Total	180	0.04%

4.1.4 Alternative 5 – Construction – Geothermal Energy Facility

Table 8 shows the input value into the EIFS model for the highest estimated total construction cost of the Geothermal Energy Facility.

Table 8. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$30,000,000
Change In Civilian Employment	0
Average Income of Affected Civilian	$0
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 9 shows the EIFS model outputs that would result from construction-related spending on the Geothermal Energy Facility Development.

Table 9. EIFS Report for the ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$21,044,780	
Sales Volume – Induced	$49,455,200	
Sales Volume – Total	$70,499,990	0.3%
Income – Direct	$3,792,699	
Income - Induced	$8,912,841	
Income – Total (place of work)	$12,705,540	0.09%
Employment – Direct	107	
Employment – Induced	250	
Employment – Total	357	0.09%

4.1.5 Alternative 5 – Operations Period - Geothermal Energy Facility

Table 10 shows the input value into the EIFS model for the average operations income per civilian and change in civilian employment for the operations period of the Geothermal Energy Facility.

Table 10. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$0
Change In Civilian Employment	6
Average Income of Affected Civilian	$58,725
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 11 shows the EIFS model outputs that would result from operations-related spending that would result from the six person increase in employment capacity as a result of the operation of Geothermal Energy Facility on Ft. Bliss.

Table 11. EIFS Report for the ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$283,289	
Sales Volume – Induced	$665,730	
Sales Volume – Total	$949,020	0.00%
Income – Direct	$352,350	
Income – Induced	$119,978	
Income – Total (place of work)	$472,328	0.00%
Employment – Direct	7	
Employment – Induced	3	
Employment – Total	11	0.0%

4.1.6 Alternative 6 – Construction Period – Dry-cooled Concentrating Solar Power Technology

Table 12 shows the input value into the EIFS model for the estimated total construction cost of Dry-cooled CSP technology on Fort Bliss.

Table 12. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$217,000,000
Change In Civilian Employment	0
Average Income of Affected Civilian	$0
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 13 shows the EIFS model outputs that would result from construction-related spending on the development of Dry-cooled CSP technology on Ft. Bliss.

Table 13. EIFS Report for the ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$152,223,900	
Sales Volume – Induced	$357,726,100	
Sales Volume – Total	$509,950,000	2.17%
Income – Direct	$27,433,850	
Income - Induced	$64,469,550	
Income – Total (place of work)	$91,903,410	0.63%
Employment – Direct	771	
Employment – Induced	1811	
Employment – Total	2582	0.64%

4.1.7 Alternative 6 – Operations Period – Dry-cooled CSP Technology

Table 14 shows the input value into the EIFS model for the average operations income per civilian and change in civilian employment for the operations period of the development dry-cooled CSP technology.

Table 14. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$0
Change In Civilian Employment	28
Average Income of Affected Civilian	$60,275
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 15 shows the EIFS model outputs that would result from operations-related spending that would result from the 28 person increase in employment capacity as a result of the operation of Dry-cooled CSP Technology on Ft. Bliss.

Table 15. EIFS Report for the ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$1,356,906	
Sales Volume – Induced	$3,188,728	
Sales Volume – Total	$4,545,634	0.02%
Income – Direct	$1,687,693	
Income - Induced	$574,674	
Income – Total (place of work)	$2,262,367	0.02%
Employment – Direct	35	
Employment – Induced	16	
Employment – Total	51	0.01%

4.1.8 Alternatives Combined – Construction Period

Table 16 shows the input value into the EIFS model for the estimated total construction cost of all of the action alternatives combined, excluding Alternative 6 which would not be implemented if Alternative 4 is

implemented, if they occurred at the same time. Construction costs associated with Alternative 4 are included in this model's input.

Table 16. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$614,538,000
Change In Civilian Employment	0
Average Income of Affected Civilian	$0
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 17 shows the EIFS model outputs that would result from the combined impacts of all of the action alternatives occurring at the same time.

Table 17. EIFS Report for the ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$431,093,800	
Sales Volume – Induced	$1,013,070,000	
Sales Volume – Total	$1,444,164,000	6.16%
Income – Direct	$77,691,910	
Income - Induced	$182,576,000	
Income – Total (place of work)	$260,267,900	1.79%
Employment – Direct	2,138	
Employment – Induced	5,130	
Employment – Total	7,313	1.80%

4.1.9 Alternatives Combined – Operations Period

Table 18 shows the input value into the EIFS model for the average operations income per civilian and change in civilian employment for the operations period of all of the action alternatives combined if they occurred at the same time. Operations period employment impacts associated with Alternatives 4 and 6 are included in this model's input.

Table 18. Forecast Input for the EIFS Model

Forecast Input	
Change In Local Expenditures	$0
Change In Civilian Employment	134
Average Income of Affected Civilian	$59,049
Percent Expected to Relocate	0
Change In Military Employment	0
Average Income of Affected Military	$0
Percent of Military Living On-base	0

Table 19 shows the EIFS model outputs that would result from operations-related spending that would result from the 154 person increase in employment capacity as a result of all of the action alternatives occurring at the same time.

Table 19. EIFS Report for the ROI – Forecast Output

Forecast Output		
Employment Multiplier	3.35	
Income Multiplier	3.35	
Sales Volume – Direct	$6,361,703	
Sales Volume – Induced	$14,950,000	
Sales Volume – Total	$21,311,710	0.09%
Income – Direct	$7,912,566	
Income – Induced	$2,694,296	
Income – Total (place of work)	$10,606,860	0.07%
Employment – Direct	166	
Employment – Induced	76	
Employment – Total	242	0.06%

Table 20 shows the annual fluctuations in RTV for the ROI above or below which the forecast outputs of the action alternatives would have a significant socioeconomic impact.

Table 20. EIFS Report for the ROI – RTV Summary

RTV Summary				
	Sales Volume	Income	Employment	Population
Positive RTV	7.98%	8.07%	3.9%	1.21%
Negative RTV	-7.15%	-6.54%	-4.29%	-1.66%