Draft

Environmental Assessment

Addressing a Modern Entry Control Point

Joint Base San Antonio-Bullis, Texas

August
2017

ABBREVIATIONS AND ACRONYMS

ABW	Air Base Wing
ACM	asbestos-containing material
AFI	Air Force Instruction
APE	area of potential effect
AQCR	Air Quality Control Region
AST	aboveground storage tank
AVB	active vehicle barrier
BMPs	best management practices
BO	Biological Opinion
BUL	Bullis
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CSATP	City of San Antonio Thoroughfare Plan
CWA	Clean Water Act
CZP	Contributing Zone Plan
dB	decibels
dBA	A-weighted decibels
DoD	Department of Defense
EA	Environmental Assessment
EAPP	Edwards Aquifer Protection Plan
ECP	entry control point
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant impact
ft^2	square foot/feet
GHG	greenhouse gas
I	Interstate
IRP	Installation Restoration Program
JBSA	Joint Base San Antonio
KPA	karst protection area
LBP	lead-based paint
LOS	level of service
MBTA	Migratory Bird Treaty Act
MMRP	Military Munitions Response Program
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards

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NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	notice of availability
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSR	noise-sensitive receptor
NW	northwest
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
pCi/L	picocuries per liter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POV	privately owned vehicle
RCRA	Resource Conservation and Recovery Act
ROI	region of impact
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasures
SWPPP	Stormwater Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TIA	Traffic Impact Assessment
TMI	Texas Military Institute—The Episcopal School of Texas
TPWD	Texas Parks and Wildlife Department
tpy	tons per year
TxDOT	Texas Department of Transportation
UFC	Unified Facilities Criteria
UFGS	Unified Facilities Guide Specifications
USAF	U.S. Air Force
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VCC	visitor control center
VOC	volatile organic compounds
vpd	vehicles per day
WPAP	Water Pollution Abatement Plan

Cover Sheet

Environmental Assessment Addressing a Modern Entry Control Point at Joint Base San Antonio-Bullis, Texas

Responsible Agencies: U.S. Air Force and 502 Air Base Wing.

Affected Locations: Joint Base San Antonio (JBSA)-Bullis (BUL), San Antonio, Texas.

Report Designation: Draft Environmental Assessment (EA).

Abstract: The U.S. Air Force and 502 Air Base Wing propose to construct and operate a modern entry control point (ECP) at JBSA-BUL (i.e., the Proposed Action) because the installation's existing ECP, located on Northwest (NW) Military Highway, is supported by limited infrastructure and does not fully meet the requirements of Unified Facilities Criteria Security Engineering standards. The proposed ECP would have two identification check booths, a gatehouse, visitor control center, an overwatch building, passive and active vehicle barriers, utility infrastructure, and ancillary components. Following construction of the proposed ECP in 2019, the existing ECP would be vacated and demolished. Operation of the proposed ECP would not require additional personnel to be assigned to JBSA-BUL.

Two alternative locations for the proposed ECP as well as the No Action Alternative are analyzed in this EA. The NW Military Highway Alternative would site the proposed ECP on NW Military Highway approximately 0.5 mile north of the existing ECP. All traffic would continue to use NW Military Highway to access JBSA-BUL. The Camp Bullis Road Alternative would site the proposed ECP on Camp Bullis Road approximately 0.25 mile east of the existing road barricades. Camp Bullis Road would open to all traffic accessing JBSA-BUL, while NW Military Highway would close. The No Action Alternative would be the continuation of current practices in that the existing ECP on NW Military Highway would continue to operate. All traffic would continue to use NW Military Highway to access JBSA-BUL.

This EA analyzes the potential for environmental impacts associated with the Proposed Action and alternatives, including the No Action Alternative, and aids in determining whether a Finding of No Significant Impact can be prepared or an Environmental Impact Statement is required.

Draft

ENVIRONMENTAL ASSESSMENT

ADDRESSING A MODERN ENTRY CONTROL POINT

AT

JOINT BASE SAN ANTONIO-BULLIS, TEXAS

Prepared for:

U.S. Army Corps of Engineers, Tulsa District

Prepared by:

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Texas Registered Engineering Firm No: F754

AUGUST 2017

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1 Purpose of and Need for the Proposed Action

1.1 Introduction

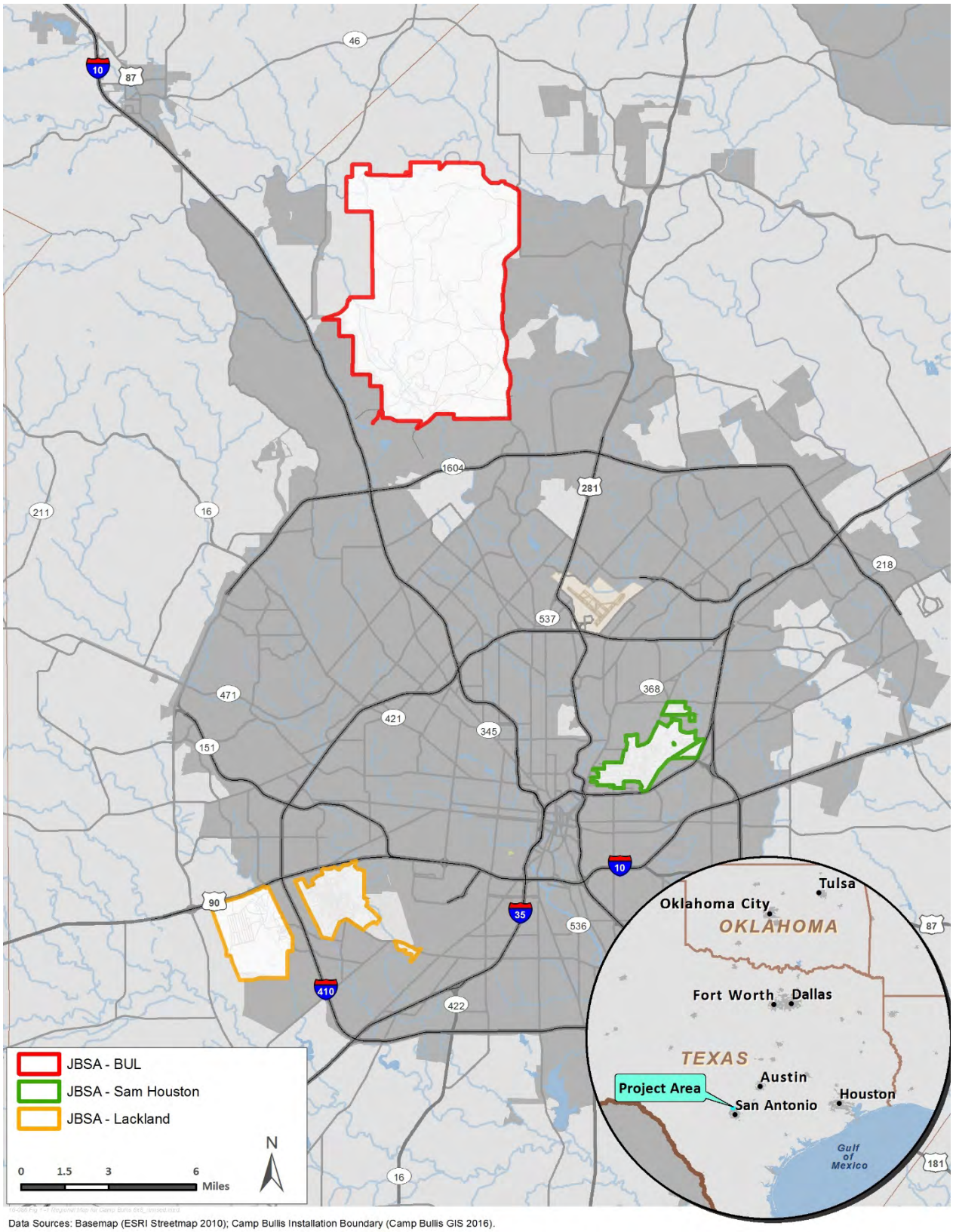
The U.S. Air Force (USAF) and 502 Air Base Wing (ABW) propose to construct and operate a modern entry control point (ECP) at Joint Base San Antonio (JBSA)-Bullis (BUL), Texas (i.e., the Proposed Action). This Environmental Assessment (EA) analyzes the potential for environmental and socioeconomic impacts from this Proposed Action and alternatives, including the No Action Alternative. This EA was prepared in accordance with the National Environmental Policy Act (NEPA); the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500–1508); and the USAF regulations for implementing NEPA (32 CFR § 989, as amended).

1.2 Location and Background

JBSA-BUL is in Bexar County, Texas, approximately 16 miles north of downtown San Antonio (see **Figure 1-1**). The installation occupies more than 28,000 acres northeast of the intersection of Interstate (I)-10 and Loop 1604. JBSA-BUL is one of four primary JBSA sites along with JBSA-Sam Houston, JBSA-Lackland, and JBSA-Randolph, and the installation is under the command of the USAF 502 ABW. The purpose of the installation is to provide training space for various military units including the U.S. Army, Army Reserve, Texas Army National Guard, and USAF. The installation is predominately used for medical, small arms, and vehicle maneuverability training exercises. Military personnel from the various JBSA sites as well as other regional military installations use the training facilities at JBSA-BUL (City of San Antonio 2009, TSHA 2010).

Access to military installations, such as JBSA-BUL, is limited to authorized personnel only. As such, ECPs are facilities that ensure only authorized personnel gain access to military installations by performing identification checks and issuing visitor passes. Incoming vehicles are also subject to inspection at ECPs. The 502 ABW operates one ECP at JBSA-BUL, which is located on Northwest (NW) Military Highway approximately 1.75 mile north of Loop 1604. All personnel accessing and exiting JBSA-BUL currently pass through this ECP. The existing ECP consists of a two-lane road with an approximately 32-square foot (ft^2) identification check booth covered by an approximately 5,200 ft^2 canopy and an approximately 330 ft^2 prefabricated office building. This ECP is supported by limited infrastructure and does not fully meet the requirements of Unified Facilities Criteria (UFC) Security Engineering standards.

The general region to the south of the JBSA-BUL ECP, such as along NW Military Highway and Loop 1604, has experienced robust development in recent years as new housing, schools, medical centers, and businesses have been constructed or are planned for the near future. Consequently, many of the roads and intersections in this region are congested during peak hours of travel. NW Military Highway currently provides the only means of ingress and egress for JBSA-BUL and is a two-lane, undivided road from Loop 1604 to JBSA-BUL. The increasing volume of non-JBSA-BUL traffic on NW Military Highway at Loop 1604 could lead to extended travel times between JBSA-BUL and other JBSA sites, mainly JBSA-Lackland and JBSA-Sam Houston. As a result, the 502 ABW is evaluating alternatives for the most appropriate location for an ECP at JBSA-BUL.



Data Sources: Basemap (ESRI Streetmap 2010); Camp Bullis Installation Boundary (Camp Bullis GIS 2016).

Figure 1-1. The Greater San Antonio Region and Nearby JBSA Sites

The 502 ABW maintains more than a dozen points along the perimeter of JBSA-BUL where emergency egress can occur. These points are normally closed to traffic, but each can be opened during an emergency to allow personnel to exit the installation. Most points connect with a public road that adjoins the installation such as Camp Bullis Road to the southwest, Blanco Road to the east, and Ralph Fair Road to the west. Camp Bullis Road provides the most efficient emergency egress as this two-lane, undivided road was formerly used to provide daily access to the JBSA-BUL cantonment area from I-10. The volume of non-JBSA-BUL traffic on Camp Bullis Road is stable because the rate of development in this general region has been slower than that experienced near NW Military Highway. Neither Blanco Road nor Ralph Fair Road provide direct connections to the JBSA-BUL cantonment area.

1.3 Purpose of the Proposed Action

The purpose of the Proposed Action is to provide JBSA-BUL with a modern ECP that meets the appropriate UFC Security Engineering standards; allows for efficient and satisfactory proofing, vetting, and processing of personnel and visitors requesting access to the installation; has modern privately owned vehicle (POV) and truck inspection capabilities; and is sited to best accommodate future military and non-military traffic demands.

1.4 Need for the Proposed Action

The Proposed Action is needed because the existing ECP at JBSA-BUL is supported by limited infrastructure and does not fully meet the requirements of UFC Security Engineering standards. The undersized, antiquated, and prefabricated facilities at the existing ECP create operational inefficiencies that do not allow for adequate operations. Additionally, the POV and truck inspection capabilities are substandard. JBSA-BUL's ECP needs to be sited in a location that provides efficient transportation between JBSA-BUL and other JBSA sites; the current NW Military Highway location may no longer satisfy this siting requirement because of increasing non-JBSA-BUL traffic volumes.

1.5 NEPA Compliance Requirements

NEPA is a federal law requiring the analysis of potential environmental impacts associated with proposed federal actions before the actions are taken. The intent of NEPA is to make decisions informed by potential environmental consequences and take actions to protect, restore, or enhance the environment. NEPA established the CEQ, which is responsible for ensuring federal agency compliance with NEPA. CEQ NEPA regulations specify that an EA be prepared to determine whether to prepare a Finding of No Significant Impact (FONSI) or an Environmental Impact Statement (EIS) is required. An EA can aid in an agency's compliance with NEPA when an EIS is unnecessary and facilitate preparation of an EIS when one is required.

CEQ regulations mandate all federal agencies to use a prescribed approach to environmental impact analysis. The approach includes an evaluation of the potential environmental consequences associated with a proposed action and considers alternative courses of action.

Because JBSA-BUL is under the command of USAF, USAF-propagated regulations are applicable for this Proposed Action. USAF NEPA regulations under 32 CFR § 989 provide

procedures for environmental impact analysis to comply with NEPA and CEQ regulations. Air Force Policy Directive 32-70, *Environmental Quality*, states USAF will comply with applicable federal, state, and local environmental laws and regulations, including NEPA. If significant impacts from a proposed action are predicted under NEPA, USAF would decide whether to conduct mitigation to reduce impacts below the level of significance, prepare an EIS, or abandon the proposed action. This EA would also be used to guide USAF in implementing the Proposed Action in a manner consistent with USAF standards for environmental stewardship should the Proposed Action be approved for implementation.

USAF regulations require that a Finding of No Practicable Alternative (FONPA) accompany a FONSI for actions that involve construction in a wetland or action in a floodplain. The FONPA provides a discussion for why no practicable alternatives exist for avoiding impacts on these resources. A FONPA is approved by the applicable USAF major command. A FONPA would be necessary for the Camp Bullis Road Alternative because a portion of that project area is in a floodplain (see **Section 3.9**).

1.6 Agency and Native American Tribal Coordination and Consultation

1.6.1 Interagency and Intergovernmental Coordination and Consultation

Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, as amended by EO 12416 with the same title, requires federal agencies to provide opportunities for consultation with officials of state and local governments that could be affected by a federal proposal. Through the interagency and intergovernmental coordination process, USAF notifies relevant federal, state, and local agencies of the Proposed Action and alternatives and provides them with sufficient time to make known their environmental concerns specific to the action. The process also provides USAF with the opportunity to cooperate with and consider state and local views in implementing the federal proposal.

The Description of the Proposed Action and Alternatives (i.e., **Sections 1** and **2** of this EA) was made available to the federal, state, and local government agencies listed in **Appendix A** for a 30-day comment period beginning on March 6, 2017, to develop the scope for this EA. A signed example copy of the USAF distribution letter and all comments received are provided in **Appendix A**. The comments received from the various agencies were considered during preparation of the Draft EA.

This Draft EA and a Draft FONSI for the NW Military Highway Alternative were made available to the federal, state, and local government agencies listed in **Appendix A** for a 30-day review period beginning on September 15, 2017. Signed example copies of the USAF distribution letters are provided in **Appendix A**. Government agency comments will be considered in the development of the Final EA and prior to a decision being made on whether or not to sign the FONSI for the NW Military Highway Alternative. Comments from the government agency review of this Draft EA and the Draft FONSI for the NW Military Highway Alternative will be included in **Appendix A** of the Final EA.

1.6.2 Government to Government Coordination and Consultation

EO 13175, *Consultation and Coordination with Indian Tribal Governments*, directs federal agencies to coordinate and consult with Native American tribal governments whose interests might be directly and substantially affected by activities on federally administered lands. Consistent with that EO, Department of Defense Instruction 4710.02, *Interactions with Federally-Recognized Tribes*, and Air Force Instruction (AFI) 90-2002, *Air Force Interaction with Federally-Recognized Tribes*, federally recognized tribes that are historically affiliated with the JBSA-BUL geographic region will be invited to consult on all proposed undertakings that potentially affect properties of cultural, historical, or religious significance to the tribes. The tribal consultation process is distinct from NEPA consultation or the interagency coordination process, and it requires separate notification of all relevant tribes. The timelines for tribal consultation are also distinct from those of other consultations. The Native American tribal governments that were coordinated with regarding the Proposed Action are listed in **Appendix A** along with all USAF correspondence and any comments that were received.

1.7 Public Involvement

NEPA requirements help ensure that environmental information is made available to the public during the decision-making process and prior to actions being taken. The premise of NEPA is that the quality of federal decisions will be enhanced if proponents provide information to the public and involve the public in the planning process.

A Notice for Early Public Review of the Proposed Action was published in the *San Antonio Express-News* on Sunday, March 12, 2017, because a portion of the Camp Bullis Road Alternative project area is within the 100-year floodplain. The notice, as it appeared in the newspaper, is provided in **Appendix A**. No public comments were received from the Notice for Early Public Review.

A notice of availability (NOA) was published in the *San Antonio Express-News* on Sunday, September 17, 2017, announcing this Draft EA and a Draft FONSI for the NW Military Highway Alternative were made available to the public for a 30-day review period. A copy of the NOA is provided in **Appendix A**. This Draft EA and the Draft FONSI for the NW Military Highway Alternative were made available in hardcopy format at the San Antonio Public Library, 600 Soledad Street, San Antonio, Texas, 78205, and in electronic format on the JBSA Environmental Information webpage at http://www.jbsa.mil/Information/Environmental/. The NOA was issued to solicit comments on the Proposed Action and involve the public in the decision-making process. Public comments received on this Draft EA and the Draft FONSI for the NW Military Highway Alternative will be considered in the development of the Final EA and prior to a decision being made on whether or not to sign the Draft FONSI for the NW Military Highway Alternative. Any comments received will be provided in **Appendix A** of the Final EA.

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2 Description of the Proposed Action and Alternatives

As discussed in **Section 1.5**, the NEPA process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action. This section describes the Proposed Action and alternatives, including the No Action Alternative.

2.1 Proposed Action

The Proposed Action is to construct and operate a modern ECP at JBSA-BUL that meets the appropriate UFC Security Engineering standards and is sited to accommodate future military and non-military traffic demands. The following subsections describe the construction, operational, and demolition components of the Proposed Action.

2.1.1 Construction of Proposed ECP

The proposed ECP would be comprised of six integrated components and several ancillary components. The six integrated components include an identification check area with two booths, a gatehouse, a visitor control center (VCC), an overwatch building, passive and active vehicle barriers, and utility infrastructure. These components are described in the following paragraphs. The ancillary components of the proposed ECP include fire protection, landscaping, inspection lanes, POV parking, exterior lighting designed to minimize light pollution, stormwater drainage, sidewalks, signage, and lightening protection (Arizpe 2016). **Figure 2-1** shows an overview of a conceptual ECP similar to the one proposed for JBSA-BUL. Because the design of the proposed ECP has not yet been determined, construction might differ from that shown. The proposed ECP would be constructed during 2019.

Identification Check Area with Booths. The identification check area would have two, separate, raised, single-story, pre-engineered, steel booths measuring approximately 32 ft^2 each. Each would be manned by a security forces staff member and would house the necessary automated systems to validate the identity of incoming personnel and visitors. Each booth would be equipped with 14-foot swinging gates to prevent vehicles from entering without permission or before being granted access. A median break would be included in the roadway design immediately after the identification check booths to allow for safe turnaround of failed visitor requests (Arizpe 2016).

Gatehouse. The gatehouse, which would measure approximately 576 ft^2, would be a secure command facility directly beyond the identification check booths in the median between incoming and outgoing traffic. The gatehouse would provide a staging area for security forces personnel waiting to conduct vehicle inspections and would provide a 180-degree view of the identification check booths and vehicle inspection areas. The gatehouse would house closed circuit television to monitor the entire ECP operation. A set of controls for active vehicle barriers (AVB) would be located inside the gatehouse. The gatehouse would include command and control functions, latrines, inside and outside storage, mechanical/electrical room, and a communications room. A 3,200 ft^2 canopy with approximately 17.5 feet of clearance would cover the identification check booths and the gatehouse (Arizpe 2016).

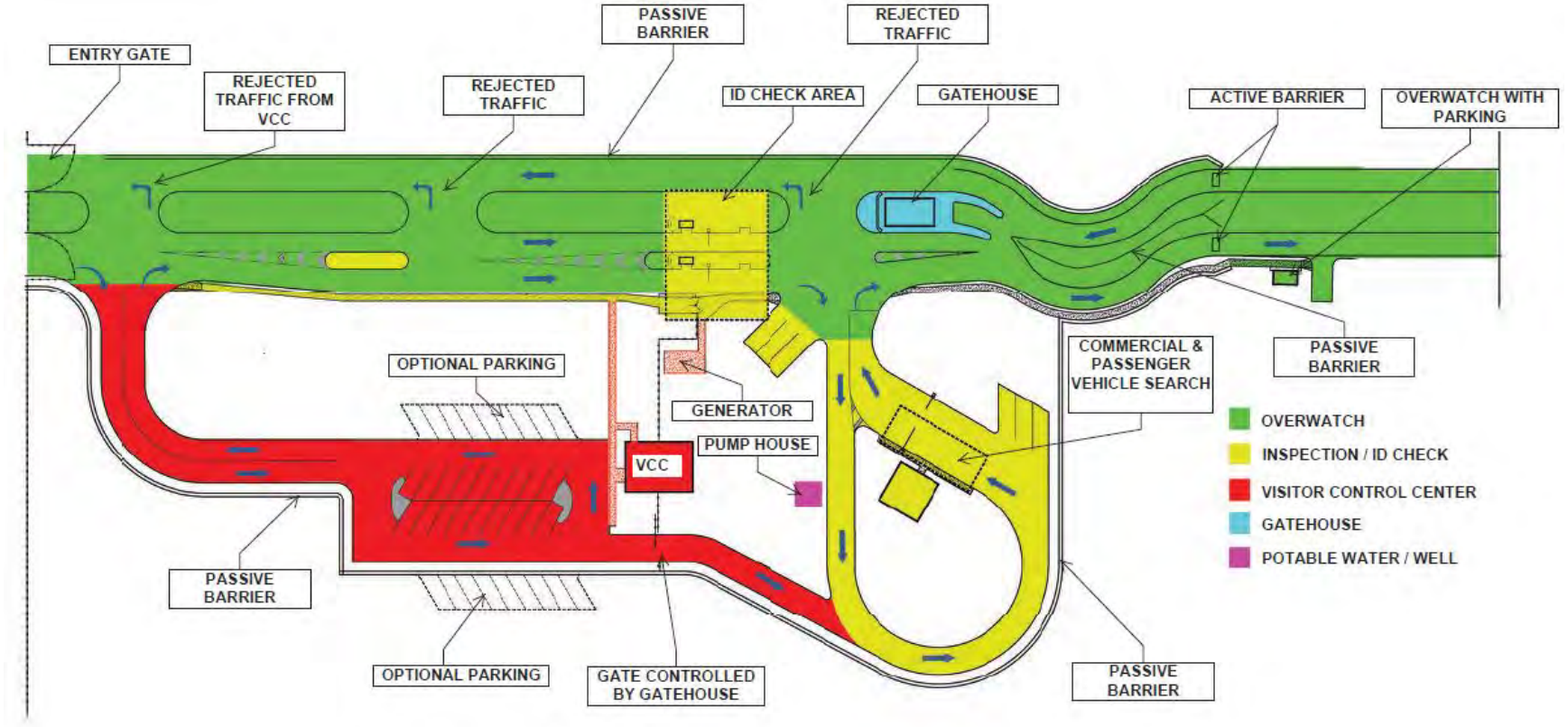


Figure 2-1. Overview of a Conceptual ECP

Permanent concrete block barriers on the front of the identification check booths and gatehouse would prevent vehicles from forcefully hitting these structures. A vehicle inspection lane would be constructed away from the main lanes of traffic to allow for POV inspections without impeding traffic flow. The POV inspection area would include a shelter area for drivers to use during inspections and would allow inspections to proceed unimpaired in inclement weather. Overhead cameras would monitor the inspection areas and provide video feeds to the gatehouse. A separate truck access road would be constructed for commercial vehicle inspection. The truck access road would be two, 12-foot lanes, which would allow for one lane to be used for initial truck inspection and the other lane to allow for a more detailed inspection of trucks, as necessary (Arizpe 2016).

Visitor Control Center. The VCC, which would measure approximately 1,200 ft^2, would issue credentials to individuals requesting access to the installation. It would be sized for approximately 12 to 20 visitors per hour. The interior of the VCC would include a waiting area, service counter, self-registering kiosks, administration office, break room, water cooler/fountain, communications room, mechanical room, and restrooms. The area immediately adjacent to the VCC would include POV and staff parking (i.e., approximately 10 spaces, including 2 handicapped-accessible spaces), sidewalks, lighting, and a possibly a flag pole. The VCC would be constructed with a 30-foot set back from all roads and parking lots (Arizpe 2016).

Overwatch Building. The overwatch building would be the final point of the ECP. It would measure approximately 36 ft^2 and be manned by one security forces staff member. Vehicles approaching the overwatch building would drive through a changing chicane that would reduce vehicle speed and require maximum vehicle control. Personnel at the overwatch building would be able to activate the AVB if a threat has improperly passed beyond the other ECP facilities. The overwatch building would be constructed from bullet resistant materials and would provide line-of-sight visibility of the entire ECP (Arizpe 2016).

Passive and Active Vehicle Barriers. Passive vehicle barriers include fencing, jersey barriers, and natural barriers (e.g., large rocks [i.e., 1 to 2 tons] and steep terrain). The ECP corridor (i.e., along the roadway perimeter from the installation boundary to the AVB) would be contained with heavy chain-link security fence that would measure 10 feet high with three-strand barbed wire outrigger along the top. The fence would be intertwined with high-tensile, galvanized steel, aircraft cables. Aircraft cables might also run down the roadway centerline to prevent unwanted crossovers. Large rocks might also be placed along the center of the medians and chicanes to close any gaps between fences or structures (Arizpe 2016).

The AVB would be the Ground Retractable Automobile Barrier 300 system, which is capable of stopping a heavy vehicle traveling at high speed. AVBs could be activated in the event that a vehicle attempts to gain unauthorized entry. AVB controls would include sensors systems for vehicle presence, over-speed, and wrong-way vehicles, which would provide information to security forces personnel to help decide when to deploy the barriers (Arizpe 2016).

Utility Infrastructure. Electricity as well as communications and data services would be provided from the nearest available source. Electric and data transmission lines would be extended between the various ECP components via underground corridors. A 300-kilovolt-ampere emergency generator would provide emergency electrical power in the event of an

outage. Potable water would be sourced from an onsite groundwater well in the absence of other sources. Wastewater would be disposed of in an onsite septic system (Arizpe 2016).

2.1.2 Operation of Proposed ECP

Similar to the existing ECP, the proposed ECP would operate 24 hours per day, 7 days per week, and 365 days per year. It would be the only ECP at JBSA-BUL. No changes to the number of vehicles requesting access to JBSA-BUL would result from the Proposed Action. All security forces personnel currently assigned to the existing ECP would transfer to the proposed ECP once construction is complete in 2019. As compared to the existing ECP, the added capabilities of the proposed ECP might require additional security forces personnel to be assigned to the proposed ECP during normal operations; however, it would not require additional personnel to be permanently assigned to JBSA-BUL. Functions at the VCC could be temporarily transferred to the gatehouse or identification check booths during non-duty hours or during periods of minimal visitors.

2.1.3 Demolition of Existing ECP

The existing ECP on NW Military Highway would be vacated and demolished upon completion of the proposed ECP. The facilities to be demolished would include the approximately 32 ft^2 identification check booth, the approximately 5,200 ft^2 canopy, the approximately 330 ft^2 prefabricated office building, and approximately 1,500 ft^2 of excess pavement on NW Military Highway. Existing bollards, fencing, barriers, signage, utilities, and other infrastructure would also be removed and deactivated, as necessary, during demolition.

2.2 Alternatives

Guidance for complying with NEPA requires an assessment of potentially effective and reasonably feasible alternatives for implementing the Proposed Action. Consideration of alternatives helps avoid unnecessary impacts and allows for an analysis of reasonable ways to achieve a purpose.

2.2.1 Alternative Evaluation Criteria

CEQ requires that all reasonable alternatives to an action be examined. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint using common sense rather than simply desirable from the standpoint of the applicant. To be considered reasonable, an alternative must meet the purpose of and need for the action, be feasible and able to be implemented, and be suitable for consideration by decision makers.

In evaluating alternatives for this Proposed Action, an alternative must meet the following selection standards to warrant evaluation in this EA:

A. Offer enough contiguous, constructible land to site all components of the ECP as described in **Section 2.1.1**.

B. Be located along an existing road that provides direct access to the JBSA-BUL cantonment area.

C. Provide direct access to a major regional thoroughfare (e.g., I-10, Loop 1604).

D. Avoid any appreciable increase in travel times between JBSA-BUL and other JBSA sites.

E. Be situated within a reasonable distance of JBSA-BUL-sourced utilities.

2.2.2 Alternatives Considered for this Proposed Action

Four alternative locations (see **Figure 2-2**) to site the proposed ECP were evaluated against the selection standards described in **Section 2.2.1**. The evaluation determined that only two of these alternatives met all of the selection standards (see **Table 2-1**) and should be analyzed in detail in this EA. These alternatives are the NW Military Highway Alternative and the Camp Bullis Road Alternative, which are described in **Sections 2.2.3.1** and **2.2.3.2**, respectively. The two alternatives that did not satisfy all of the selection standards are the Blanco Road Alternative and the Ralph Fair Road Alternative. The corresponding explanation for why these alternatives have been eliminated from further analysis in this EA is provided in **Sections 2.2.4.1** and **2.2.4.2**.

Table 2-1. Evaluation of Alternatives Based on Satisfaction of Selection Standards

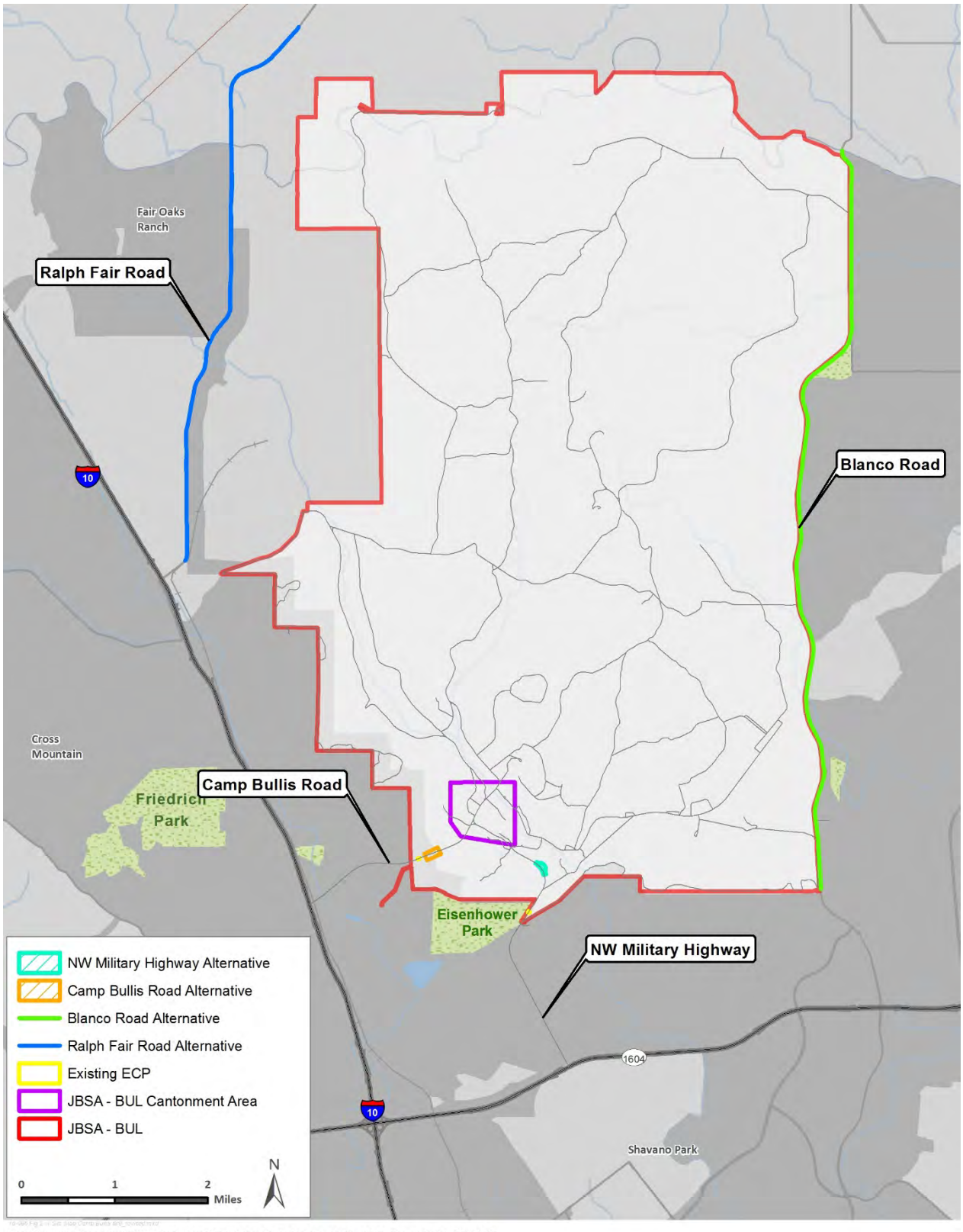
Alternatives	Selection Standards				
	A	B	C	D	E
	Enough Area for All ECP Components	Along an Existing Road with Access to JBSA-BUL Cantonment Area	Direct Access to a Major Regional Thoroughfare	Avoid Appreciable Increase in Travel Times Between JBSA-BUL and Other JBSA Sites	Within Reasonable Distance of JBSA-BUL-sourced Utilities
NW Military Highway	Yes	Yes	Yes	Yes	Yes
Camp Bullis Road	Yes	Yes	Yes	Yes	Yes
Blanco Road	Yes	No	Yes	No	No
Ralph Fair Road	Yes	No	Yes	No	No

2.2.3 Alternatives Carried Forward for Analysis

The following alternatives have been carried forward for analysis in this EA on the basis of the results of the evaluation against the selection standards, as presented in **Section 2.2.2**.

2.2.3.1 NW MILITARY HIGHWAY ALTERNATIVE

The NW Military Highway Alternative would site the proposed ECP on NW Military Highway approximately 0.5 mile north of the existing ECP and approximately 0.5 mile south of the JBSA-BUL cantonment area. This site, on JBSA-BUL, is currently undeveloped. It contains only sparse vegetation and a wire fence along the perimeter of NW Military Highway. Elevations on



Data Sources: Basemap (ESRI Streetmap 2010); Camp Bullis Installation Boundary (Camp Bullis GIS 2016).

Figure 2-2. Alternative Locations for the Proposed ECP

the site vary by approximately 30 feet, and there is a gradual downslope from NW Military Highway toward the east.

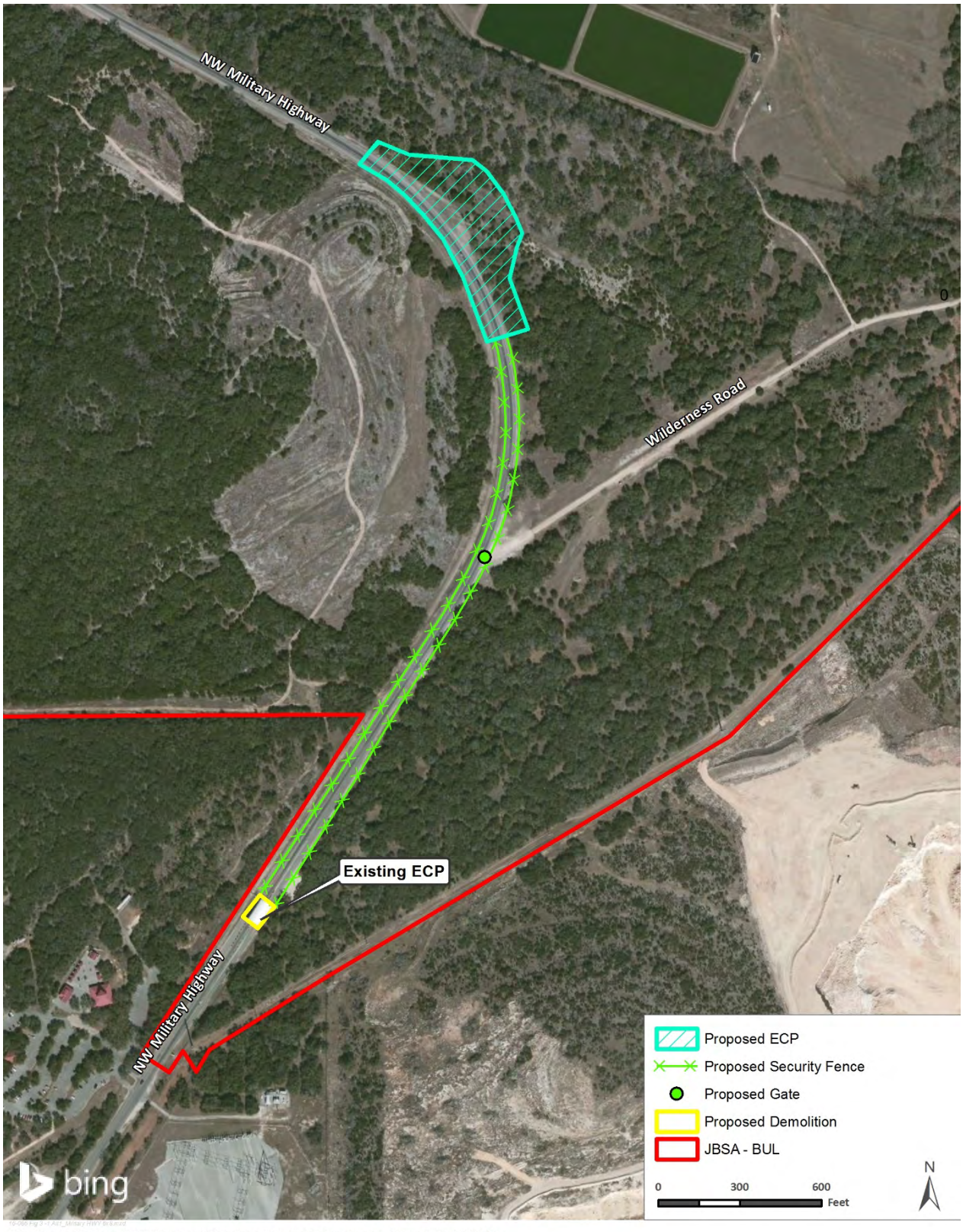
The proposed ECP would be constructed as described in **Section 2.1.1**, and demolition would include the existing ECP on NW Military Highway as described in **Section 2.1.3**. Fill material would be required to level the grade, and the existing wire fence along the perimeter of NW Military Highway would be replaced with approximately 4,650 linear feet of security fence along the perimeter of the ECP corridor. Because the proposed ECP would be constructed to the north of the intersection of NW Military Highway and Wilderness Road, a gate would be placed at this intersection to prevent unauthorized access to Wilderness Road.

The NW Military Highway Alternative meets all five selection standards presented in **Section 2.2.1**. The project area would be large enough to accommodate the six integrated components as well as the ancillary components of the proposed ECP. Additionally, NW Military Highway provides direct access between the JBSA-BUL cantonment area and Loop 1604. Traffic patterns would not change from current conditions as all traffic would continue to use NW Military Highway to enter and exit the installation. Camp Bullis Road would remain closed to traffic. As such, travel times between JBSA-BUL and other JBSA sites would not directly change from this alternative; however, they could continue to increase from the added non-JBSA-BUL traffic being caused by the development near the intersection of NW Military Highway and Loop 1604. While no utilities currently are available to this site, electricity would be extended by aboveground wire from the installation's wastewater treatment plant, which is approximately 0.25 mile to the northwest. An onsite groundwater well with a 5,000-gallon aboveground storage tank (AST) would be constructed to provide potable water. Wastewater service would be provided via an onsite septic system.

Figure 2-3 shows the NW Military Highway Alternative project area, which was developed from information provided in a 65 Percent Design Analysis Report (Arizpe 2016). The NW Military Highway Alternative project area, excluding the demolition and security fence footprints, measures approximately 4.2 acres of which approximately 2.5 acres are previously undisturbed woodlands and the remaining acreage is existing roadway and shoulder. Because the final design of the proposed ECP has not yet been determined, the final boundaries and dimensions of the project area might differ slightly. **Table 2-2** summarizes the major elements of the NW Military Highway Alterative and their corresponding dimensions. The NW Military Highway Alternative would result in an approximately 60,000 ft^2 net increase in impervious surface.

2.2.3.2 CAMP BULLIS ROAD ALTERNATIVE

The Camp Bullis Road Alternative would site the proposed ECP on Camp Bullis Road approximately 0.25 mile east of the existing road barricades and approximately 0.5 mile west of the JBSA-BUL cantonment area. This site, also on JBSA-BUL, is mostly undeveloped. It contains moderate vegetation, several unpaved military training trails, and a wire fence along the perimeter of Camp Bullis Road. The site is generally flat with a slight downslope from Camp Bullis Road to the south and southwest.



Data Sources: Basemap (ESRI Streetmap 2010); Camp Bullis Installation Boundary (Camp Bullis GIS 2016).

Figure 2-3. The NW Military Highway Alternative Project Area

Table 2-2. Major Elements of the NW Military Highway Alternative

Element	Area of Disturbance (ft^2)	Change in Impervious Surface (ft^2)
Construction		
Identification check booths	64 (Two at 32 ft^2 each)	+64
Gatehouse	576	+576
Canopy	3,200	+3,200
VCC	1,200	+1,200
Overwatch building	36	+36
New pavement for inspection lanes and driveways	60,000	+60,000
New pavement for POV parking	2,000	+2,000
Landscaping and interstitial space	116,000	0
Security fence and gate at Wilderness Road	4,650 linear feet	0
Demolition		
Existing identification check booth	32	-32
Existing canopy	5,200	-5,200
Existing prefabricated office building	330	-330
Excess pavement on NW Military Highway	1,500	-1,500

The proposed ECP would be constructed as described in **Section 2.1.1**, and demolition would include the existing ECP on NW Military Highway (described in **Section 2.1.3**) as well as the existing road barricades on Camp Bullis Road. New road barricades would be constructed on NW Military Highway in place of the existing ECP. The site of the proposed ECP would be leveled with fill material, and the steep terrain farther to the east along Camp Bullis Road (i.e., the rock cut for Camp Bullis Road) would be used as passive barriers where possible. The existing wire fence along the perimeter of Camp Bullis Road would be replaced with approximately 1,730 linear feet of security fence along the perimeter of the ECP corridor, and the unpaved military training trails would be rerouted as necessary.

The Camp Bullis Road Alternative meets all five selection standards presented in **Section 2.2.1**. The project area would be large enough to accommodate the six integrated components as well as the ancillary components of the proposed ECP. Additionally, Camp Bullis Road provides direct access between the JBSA-BUL cantonment area and I-10. While this alternative would change traffic patterns by opening Camp Bullis Road and closing NW Military Highway to traffic, travel times between JBSA-BUL and other JBSA sites would be slightly reduced (HDR 2017). Electrical service is already available to this site and would be accessed from the electrical substation immediately to the north of Camp Bullis Road. An onsite groundwater well with a 5,000-gallon AST could be constructed to provide potable water; however, the 502 ABW is planning a separate project to extend a water line along Camp Bullis Road. If this water line extension project was completed before the proposed ECP is constructed, potable water could be obtained from the water line. Wastewater service would be provided via an onsite septic system.

Figure 2-4 shows the portion of the Camp Bullis Road Alternative project area along Camp Bullis Road, which was developed from a drawing in a training management plan (U.S. Army 2016). The portion of the Camp Bullis Road Alternative project area along NW Military Highway (i.e., existing ECP demolition area) is shown on **Figure 2-3**. The Camp Bullis Road Alternative project area, excluding the demolition and security fence footprints, measures approximately 8.1 acres of which approximately 5.0 acres are previously undisturbed woodlands and the remaining acreage is existing roadway and shoulder. The 502 ABW has not yet completed a design for this alternative; therefore, the final boundaries and dimensions of the project area might differ slightly. **Table 2-3** summarizes the major elements of the Camp Bullis Road Alterative and their corresponding dimensions. The Camp Bullis Road Alternative would result in an approximately 60,000 ft^2 net increase in impervious surface.

2.2.3.3 NO ACTION ALTERNATIVE

The Environmental Impact Analysis Process (32 CFR § 989.8[d]) requires consideration of the No Action Alternative, which provides a baseline against which the Proposed Action and other potential action alternatives can be compared. In addition, CEQ NEPA guidance recommends inclusion of the No Action Alternative in an EA to assess any environmental consequences that may occur if the Proposed Action is not implemented. Therefore, the No Action Alternative is carried forward for detailed analysis in this EA even though it does not meet all of the selection standards listed in **Section 2.2.1**.

The No Action Alternative is the continuation of current practices in that the existing ECP on NW Military Highway would continue to operate and no construction or demolition would occur. The existing ECP would continue to be supported by limited infrastructure and would continue to not fully meet the requirements of UFC Security Engineering standards. The undersized, antiquated, and prefabricated facilities at the existing ECP would continue to create operational inefficiencies that do not allow for adequate operations, and the POV and truck inspection capabilities would remain substandard. All traffic would continue to use NW Military Highway to access JBSA-BUL, and Camp Bullis Road would remain closed. Travel times between JBSA-BUL and other JBSA sites would not directly change from the No Action Alternative; however, they could continue to increase from the added non-JBSA-BUL traffic being caused by the development near the intersection of NW Military Highway and Loop 1604.

2.2.4 Alternatives Eliminated from Further Consideration

The following alternatives were initially considered but have been eliminated from further consideration in this EA based on the results of the evaluation against the selection standards in **Section 2.2.2**. CEQ NEPA regulations recommend that alternatives eliminated from detailed study be presented along with a brief discussion explaining why they were eliminated (40 CFR 1502.14[a]).

2.2.4.1 BLANCO ROAD ALTERNATIVE

The Blanco Road Alternative would site the proposed ECP at an undetermined location along the approximately 9-mile stretch of Blanco Road that adjoins the eastern boundary of JBSA-BUL (see **Figure 2-2**). This alternative was determined not to be a reasonable alternative because it only meets two of the five selection standards presented in **Section 2.2.1**. It would offer enough contiguous, constructible land to site all components of the ECP as described in

Figure 2-4. The Camp Bullis Road Alternative Project Area

Table 2-3. Major Elements of the Camp Bullis Road Alternative

Element	Area of Disturbance (ft^2)	Change in Impervious Surface (ft^2)
Construction		
Identification check booths	64 (Two at 32 ft^2 each)	+64
Gatehouse	576	+576
Canopy	3,200	+3,200
VCC	1,200	+1,200
Overwatch building	36	+36
New pavement for inspection lanes and driveways	60,000	+60,000
New pavement for POV parking	2,000	+2,000
Landscaping and interstitial space	285,000	0
Security fence	1,730 linear feet	0
Barricades on NW Military Highway	650	0
Demolition		
Existing identification check booth	32	-32
Existing canopy	5,200	-5,200
Existing prefabricated office building	330	-330
Excess pavement on NW Military Highway	1,500	-1,500
Barricades on Camp Bullis Road	650	0

Section 2.1.1 and provide direct access to a major regional thoroughfare (i.e., Loop 1604). It would not, however, be located along an existing road that provides direct access to the JBSA-BUL cantonment area; therefore, no less than 3 miles of roads would need to be constructed across the installation to connect the cantonment area to Blanco Road. This alternative would also increase travel times between JBSA-BUL and other JBSA sites because it would increase the driving distance between the sites by approximately 5 miles. Lastly, no JBSA-BUL-sourced utilities are located in the vicinity of Blanco Road. As a result, extensive infrastructure improvements would be necessary to support the proposed ECP. For these reasons, this alternative was eliminated from further detailed analysis in this EA.

2.2.4.2 RALPH FAIR ROAD ALTERNATIVE

The Ralph Fair Road Alternative would site the proposed ECP at an undetermined location along the approximately 4-mile stretch of Ralph Fair Road near the western boundary of JBSA-BUL at Camp Stanley (see **Figure 2-2**). This alternative was determined not to be a reasonable alternative because it only meets two of the five selection standards presented in **Section 2.2.1**. It would offer enough contiguous, constructible land to site all components of the ECP as described in **Section 2.1.1** and provide direct access to a major regional thoroughfare (i.e., I-10). It would not, however, be located along an existing road that provides direct access to JBSA-BUL, much less the JBSA-BUL cantonment area; therefore, no less than 5 miles of roads would need to be constructed across the installation and other properties to connect the cantonment area to Ralph Fair Road. This alternative would also increase travel times between

JBSA-BUL and other JBSA sites because it would increase the driving distance between sites by approximately 6.5 miles. Lastly, no JBSA-BUL-sourced utilities are located in the vicinity of Ralph Fair Road. As a result, extensive infrastructure improvements would be necessary to support the proposed ECP. For these reasons, this alternative was eliminated from further detailed analysis in this EA.

2.3 Identification of the Preferred Alternative

The Preferred Alternative is the alternative that the 502 ABW believes best satisfies the purpose and need and would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. The 502 ABW has identified the NW Military Highway Alternative, which meets all of the selection standards, as the Preferred Alternative.

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3 Affected Environment and Environmental Consequences

This section presents a description of the environmental resources and baseline conditions that could be affected by the Proposed Action. In addition, this section presents an analysis of the potential environmental consequences of the Proposed Action and the No Action Alternative. Each alternative to the Proposed Action carried forward for analysis, as well as the No Action Alternative, was evaluated for their potential environmental consequences on the environmental resources in accordance with CEQ NEPA regulations at 40 CFR § 1508.8. The action alternatives evaluated in this EA include the following:

- NW Military Highway Alternative (described in **Section 2.2.3.1**)
- Camp Bullis Road Alternative (described in **Section 2.2.3.2**).

All environmental resources were initially considered in this EA. In compliance with NEPA, CEQ, and USAF Environmental Impact Analysis Process regulations and guidelines, the following discussion of the affected environment and environmental consequences focuses only on those environmental resources considered potentially subject to impacts or with potentially significant environmental issues. These environmental resources are air quality, biological resources, cultural resources, geological resources, hazardous materials and wastes, infrastructure and transportation, noise, safety, and water resources. The environmental resources not analyzed in detail in this EA because clearly insignificant or no impacts would occur are land use, socioeconomics and environmental justice, and visual and aesthetic resources. The following paragraphs explain why these environmental resources were dismissed from detailed analysis in this EA.

Land Use. The Proposed Action would have no impacts on land use. Under both alternatives, the proposed ECP would be sited near the cantonment area of JBSA-BUL where an ECP would be consistent with existing land uses. No appreciable reduction in training space would result from construction at either project area. All exterior lighting at the proposed ECP would comply with regional dark sky initiatives to minimize light pollution. No land use controls have been identified at either project area.

Socioeconomics and Environmental Justice. The Proposed Action would have insignificant impacts on socioeconomics and would not disproportionally impact environmental justice populations. No new personnel would be added to JBSA-BUL because of the Proposed Action. As such, there would be no change to the area population or demand for housing and public/social services. Construction and demolition would negligibly increase the regional demand for building materials and labor, but the regional availability of building materials and labor would not be noticeably affected because of the limited scope of these actions, and beneficial impacts on the local economy would occur from the sale and distribution of construction materials and employment of construction and demolition workers. Lastly, the region of impact (ROI) for the Proposed Action is mainly the southwestern portion of JBSA-BUL and the areas immediately surrounding the southern and western boundaries of the installation.

The ROI does not contain a minority, low income, or child population that would be disproportionately affected by the Proposed Action.

Visual and Aesthetic Resources. No impacts on visual and aesthetic resources would occur from the Proposed Action. The proposed ECP would have a relatively low profile and would appear similar to, although larger than, the existing ECP on NW Military Highway. Both alternatives would site the proposed ECP farther onto JBSA-BUL than the existing ECP. This improved siting would reduce the visibility of the ECP and associated traffic queue from off-installation locations.

3.1 Air Quality

3.1.1 Definition of the Resource

Air quality is defined by the concentration of various pollutants in the atmosphere at a given location. The six principal pollutants defining air quality, called "criteria pollutants," include carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide, ozone, suspended particulate matter (measured less than or equal to 10 microns in diameter [PM_{10}] and less than or equal to 2.5 microns in diameter [$PM_{2.5}$]), and lead. CO, SO_2, lead, and some particulates are emitted directly into the atmosphere from emissions sources. Ozone, nitrogen dioxide, and some particulates are formed through atmospheric chemical reactions that are influenced by weather, ultraviolet light, and other atmospheric processes. Volatile Organic Compounds (VOC) and nitrogen oxides (NO_x) emissions are used to represent ozone generation because they are precursors of ozone.

Under the Clean Air Act, the U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) (40 CFR § 50) for criteria pollutants. NAAQS are classified as primary or secondary. Primary standards protect against adverse health effects; secondary standards protect against welfare effects, such as damage to farm crops and vegetation and damage to buildings. Some pollutants have short-term and long-term standards. Short-term standards are designed to protect against acute, or short-term, health effects, while long-term standards were established to protect against chronic health effects.

Areas that are and have historically been in compliance with the NAAQS or have not been evaluated for NAAQS compliance are designated as attainment areas. Areas that violate a federal air quality standard are designated as nonattainment 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 USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emissions thresholds that trigger requirements for a conformity analysis are called *de minimis* levels. *De minimis* levels (in tons per year [tpy]) vary by pollutant and also depend on the severity of the nonattainment status for the air quality management area in question.

The Texas Commission on Environmental Quality (TCEQ) oversees programs for permitting the construction and operation of new or modified stationary source air emissions in Texas. TCEQ

air permitting is required for many industries and facilities that emit regulated pollutants, and these requirements include, but are not limited to, Title V permitting of major sources, New Source Review, Prevention of Significant Deterioration, New Source Performance Standards for selected categories of industrial sources, and the National Emission Standards for Hazardous Air Pollutants. Based on the size of the emission units and type of pollutants, TCEQ sets permit rules and standards for emissions sources.

Climate Change and Greenhouse Gases. Global climate change refers to long term fluctuations in temperature, precipitation, wind, sea level, and other elements of Earth's climate system. Ways in which the Earth's climate system may be influenced by changes in the concentration of various gases in the atmosphere have been discussed worldwide. Of particular interest, 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 because of 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.

3.1.2 Affected Environment

JBSA-BUL is located in Bexar County, Texas, which is within the Metropolitan San Antonio Intrastate Air Quality Control Region (AQCR) 217. All counties of the Metropolitan San Antonio Intrastate AQCR, including Bexar County, are designated by USEPA as unclassified/attainment for all criteria pollutants (USEPA 2017a).

JBSA-BUL is a true minor source of emissions. JBSA-BUL does not require a Title V permit because potential emissions from all sources are well below 100 tpy for each criteria pollutant. **Table 3-1** summarizes the potential air emissions for JBSA-BUL. Air emissions from stationary sources at the installation are produced primarily from abrasive blasting operations, external/internal combustion equipment, storage tanks and refueling operations, solvent use, welding operations, woodworking operations, small arms firing and the wastewater treatment plant (USAF 2016a).

Table 3-1. Potential Air Emissions from JBSA-BUL

	Installation Air Emissions (tpy)					
	CO	**NO_x**	**Particulate Matter**	**Lead**	**SO_2**	**VOC**
Potential to Emit	18.44	20.18	5.31	0.03	0.40	2.70

Source: USAF 2016a

There are no air emission sources within the NW Military Highway Alternative or the Camp Bullis Road Alternative project areas. The buildings at the existing ECP are assumed to use electricity for comfort heating; therefore, they do not generate air emissions.

Climate Change and Greenhouse Gases. Ongoing global climate change has the potential to increase average temperatures, create more intense heavy precipitation events, and increase the frequency of droughts in central Texas (Shafer et al. 2014). As a result, global climate change could alter the volume of water in nearby water bodies, such as Salado Creek, and

increase the severity of flooding during heavy precipitation events. These impacts could also adversely affect regional water availability for consumption, agricultural, and industrial purposes.

3.1.3 Environmental Consequences

Potential impacts on air quality would be considered significant if the Proposed Action were to exceed the General Conformity Rule *de minimis* thresholds. Because AQCR 217 is in attainment for the NAAQS and the General Conformity Rule doesn't apply, the 100 tpy *de minimis* threshold has been used as a surrogate to determine the level of impacts under NEPA. Impacts on air quality would also be significant if the Proposed Action increased the JBSA-BUL potential to emit above major source thresholds or required the installation to obtain a Title V permit from the TCEQ. Significant impacts on air quality would also occur if the Proposed Action meaningfully contributed to the potential effects of global climate change.

3.1.3.1 NW MILITARY HIGHWAY ALTERNATIVE

Short-term, minor, adverse impacts on air quality would occur from the emission of criteria pollutants and GHGs during construction and demolition. Air emissions from construction and demolition would be temporary and brief in duration. Although construction and demolition would likely not occur within the same time period, for the purposes of this air quality analysis, all construction and demolition is conservatively assumed to occur during 2019.

Criteria pollutant and GHG air emissions would be produced from the combustion of fuels in heavy equipment. Particulate matter air emissions, such as fugitive dust, would be produced from ground-disturbing activities and from the combustion of fuels in heavy equipment. Fugitive dust air emissions would be greatest during the initial site grading and excavation and vary day to day depending on the work phase, level of activity, and prevailing weather conditions. The quantity of uncontrolled fugitive dust emissions from a construction site is proportional to the area of land being worked and the level of activity. Construction and demolition would incorporate best management practices (BMPs) and environmental control measures (e.g., wetting the ground surface) to minimize fugitive particulate matter air emissions. Additionally, work vehicles are assumed to be well maintained and use diesel particulate filters to reduce particulate matter air emissions. Construction workers commuting daily to and from the job sites in their personal vehicles and heavy duty diesel vehicles hauling construction materials and debris to and from the job sites would also result in criteria pollutant and GHG air emissions.

Table 3-2 summarizes all criteria pollutant and GHG air emissions resulting from the NW Military Highway Alternative as well as applicable significance criteria. Construction and demolition criteria pollutant emissions would be below the *de minimis* threshold surrogate of 100 tpy of each pollutant; therefore, the level of impacts would not be significant. Detailed emissions calculations are provided in **Appendix B**.

Table 3-2. Estimated Air Emissions from the NW Military Highway Alternative

Emissions Source	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	GHGs (tpy)
Construction and Demolition Air Emissions							
Combustion	3.208	0.542	2.338	0.008	0.143	0.143	690.295
Fugitive Dust	NA	NA	NA	NA	7.747	0.775	NA
Haul Truck On-Road	0.173	0.017	0.062	<0.001	0.007	0.006	53.280
Construction Commuter	0.144	0.132	1.713	0.001	0.003	0.002	150.998
Total	***3.524***	***0.691***	***4.113***	***0.010***	***7.899***	***0.926***	***894.572***
Significance Criteria	100	100	100	100	100	100	NA
Operational Air Emissions							
Emergency Generator	3.764	0.307	0.811	0.248	0.265	0.265	139.991
New Potential to Emit for JBSA-BUL	***23.944***	***3.007***	***19.251***	***0.648***	***5.575***	***5.575***	***NA***
Significance Criteria	250	250	250	250	250	250	NA

Key: NA = Not Applicable

Notes: Lead emissions are not included as they are negligible for the types of emission sources under this Proposed Action. Total particulate matter emissions used for both PM_{10} and $PM_{2.5}$ operational emissions.

Long-term, negligible to minor, adverse and beneficial impacts on air quality would occur from changes to annual emissions of criteria pollutants and GHGs from operational activities. Operation of the proposed ECP could allow vehicles to be processed and inspected quicker than the existing ECP. This would result in a negligible reduction in annual air emissions from vehicles queuing to access JBSA-BUL and negligible beneficial impacts on air quality. New operational air emissions would be generated if the buildings of the proposed ECP are heated with propane- or liquid-fueled heating infrastructure. However, because the total increase in indoor building space is only approximately 2,000 ft^2 and propane- or liquid-fueled heating infrastructure is unlikely to be used to heat all of this space, the increase in air emissions from building heating would be negligible and a quantitative estimate of these potential heating emissions is unnecessary. An emergency generator would be installed at the proposed ECP that would generate air emissions during use. The emergency generator would operate only in emergency situations and for equipment testing and maintenance. Therefore, it is assumed to operate for 500 hours per year. Air emissions from the operation of this emergency generator are summarized in **Table 3-2**. The addition of this emergency generator's air emissions to the installation's potential to emit would not exceed the 250 tpy major source threshold or 100 tpy Title V permit threshold for any criteria pollutant; therefore, these impacts would not be significant (see **Table 3-2**).

The federal General Conformity Rule does not apply to the Proposed Action because AQCR 217 is unclassified/attainment for all criteria pollutants. Therefore, neither an applicability determination nor a conformity analysis is required. The proposed building heating equipment and emergency generator could necessitate the acquisition of state-level air quality construction permits or permits-by-rule from the TCEQ depending on their heat input capacity and power output.

Climate Change and Greenhouse Gases. The NW Military Highway Alternative would emit approximately 895 tons of carbon dioxide equivalent from construction and demolition during 2019 and approximately 140 tons of carbon dioxide equivalent from the emergency generator during the operational years (i.e., 2020 and thereafter). For comparison, 895 and 140 tons of carbon dioxide equivalent are approximately the respective GHG footprints of 43 and 7 single family houses with two cars per home (USEPA 2017b). As such, these limited annual emissions of GHG would not meaningfully contribute to the potential effects of global climate change (e.g., increases in atmospheric temperature, sea level, storm activity, accelerated coastal erosion, hydrological changes and flooding, and vegetation and wildlife changes).

Ongoing changes to regional climate patterns could increase average temperatures, create more intense precipitation events, and increase the frequency of droughts, which in turn could affect water availability for consumption, agricultural, and industrial purposes (Shafer et al. 2014). Even under severe drought conditions, or periods of increased precipitation, these impacts are unlikely to impair implementation of the Proposed Action or prevent the proposed ECP on NW Military Highway from fulfilling its mission.

3.1.3.2 CAMP BULLIS ROAD ALTERNATIVE

Impacts from construction and demolition as well as operational activities would be identical to those from the NW Military Highway Alternative and discussed in **Section 3.1.3.1. Table 3-3** summarizes all criteria pollutant and GHG air emissions resulting from the Camp Bullis Road Alternative as well as applicable significance criteria. Construction and demolition criteria pollutant emissions would be below the *de minimis* threshold surrogate of 100 tpy of each pollutant; therefore, the level of impacts would not be significant. The addition of the proposed emergency generator's air emissions to the installation's potential to emit would not exceed the 250 tpy major source threshold or 100 tpy Title V permit threshold for any criteria pollutant; therefore, these impacts would not be significant. Detailed emissions calculations are provided in **Appendix B**.

Table 3-3. Estimated Air Emissions from the Camp Bullis Road Alternative

Emissions Source	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	GHGs (tpy)
Construction and Demolition Air Emissions							
Combustion	3.149	0.532	2.298	0.008	0.140	0.140	677.103
Fugitive Dust	NA	NA	NA	NA	6.664	0.666	NA
Haul Truck On-Road	0.135	0.013	0.048	<0.001	0.005	0.005	41.707
Construction Commuter	0.144	0.132	1.713	0.001	0.003	0.002	150.998
Total	***3.428***	***0.678***	***4.060***	***0.009***	***6.812***	***0.814***	***869.807***
Significance Criteria	100	100	100	100	100	100	NA
Operational Air Emissions							
Emergency Generator	3.764	0.307	0.811	0.248	0.265	0.265	139.991
New Potential to Emit for JBSA-BUL	***23.944***	***3.007***	***19.251***	***0.648***	***5.575***	***5.575***	***NA***
Significance Criteria	250	250	250	250	250	250	NA

Key: NA = Not Applicable

Notes: Lead emissions are not included as they are negligible for the types of emission sources under this Proposed Action. Total particulate matter emissions used for both PM_{10} and $PM_{2.5}$ operational emissions.

Climate Change and Greenhouse Gases. Climate change and GHG impacts from the Camp Bullis Road Alternative would be nearly identical to those of the NW Military Highway Alternative, described in **Section 3.1.3.1**. Approximately 870 tons of carbon dioxide equivalent would be generated from construction and demolition during 2019; which would be equivalent to 42 single family houses with two cars per home (USEPA 2017b). As such, these limited annual emissions of GHGs would not meaningfully contribute to the potential effects of global climate change. Ongoing changes to regional climate patterns would not prevent the proposed ECP on Camp Bullis Road from fulfilling its mission.

3.1.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and air quality conditions would remain the same as described in **Section 3.1.2**. No new air emissions would be generated, and air emissions from existing sources would continue to be generated. No impacts on air quality would occur.

3.2 Biological Resources

3.2.1 Definition of the Resource

Biological resources include native or naturalized plants and animals and the habitats (e.g., wetlands, forests, grasslands) in which they exist. Protected and sensitive biological resources include federally listed (endangered or threatened) species, federally proposed species, and designated or proposed critical habitat; species of concern managed under conservation agreements or management plans; and state-listed species.

The Endangered Species Act (ESA) (16 United States Code [USC] § 1536) requires federal agencies, in consultation with the U.S. Fish and Wildlife Service (USFWS), to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The ESA also generally prohibits any action that causes a "take" of any listed species. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Not all take is prohibited. Where appropriate, incidental take permits can be provided that allow take of threatened or endangered species that is incidental to otherwise legal activities.

An "endangered species" is any species in danger of extinction throughout all or a significant portion of its range. A "threatened species" is any species likely to become an endangered species in the foreseeable future. Although candidate species receive no statutory protection under the ESA, these species are at risk and might warrant future protection under the ESA. The Integrated Natural Resources Management Plan Update for JBSA (USAF 2014) addresses candidate species occurring at JBSA-BUL. Federal species of concern are not protected by law; however, these species could become listed and are therefore given consideration when addressing impacts from a proposed action. Listed plants are not protected from take, although it is illegal to collect or maliciously harm them on federal land.

State-listed threatened and endangered wildlife species are protected under Chapters 67 and 68 of the Texas Parks and Wildlife Code and Sections 65.171 through 65.176 of Title 31 of the

Texas Administrative Code. Under these protections it is illegal to capture, trap, take, kill, possess, propagate, import, export, sell, or offer for sale, or ship any species of fish or wildlife listed as threatened or endangered. The Texas Parks and Wildlife Department (TPWD) maintains the list of state designated threatened and endangered species.

The Migratory Bird Treaty Act (MBTA) of 1918 is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits the intentional and unintentional taking, killing, or possessing of migratory birds unless permitted by regulation. EO 13186, *Responsibilities of Federal Agencies to Protect Birds*, provides a specific framework for the federal government's compliance with its MBTA obligations and aids in incorporating national planning for bird conservation into agency programs. A Memorandum of Understanding between Department of Defense (DoD) and USFWS promotes the conservation of migratory birds in compliance with EO 13186.

The Bald and Golden Eagle Protection Act provides protection to bald and golden eagles. This act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald and golden eagles, including their parts, nests, or eggs. The act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb."

3.2.2 Affected Environment

Vegetation. JBSA-BUL is situated along the edge of the Edwards Plateau of the Southwest Plateau and Plains Dry Steppe and Shrub Province. Both project areas are located within the Balcones Canyonlands subregion of the Edwards Plateau (U.S. Army 2007). The Edwards Plateau was uplifted during the Miocene epoch, separating central Texas from the coastal plain. As a result, the Balcones Canyonlands subregion is highly dissected through erosion and solution of springs, streams, and rivers moving above and below the surface. The Balcones Canyonlands supports many endemic plant species and has a higher representation of deciduous woodlands than anywhere else within the Edwards Plateau ecoregion (Griffith et al. 2004).

Both project areas are located in uplands adjacent to existing roads. Uplands at JBSA-BUL are dominated by live oak (*Quercus virginiana*) and Ashe juniper (*Juniperus ashei*) with occasional occurrence of Texas persimmon (*Diospyros texana*), hackberry (*Celtis* sp.), and agarita (*Mahonia trifoliolata*). Texas red oak (*Quercus buckleyi*), Texas black walnut (*Juglans microcarpa*), and escarpment blackcherry (*Prunus serotina* var. *eximia*) frequently occur in abundance at higher elevations, and steep slopes can include dense stands of redbud (*Cercis canadensis*), evergreen sumac (*Rhus virens),* mountain laurel (*Sophora secundiflora*), and Texas persimmon. Grasses and forbs are sparse within these uplands; however, little bluestem (*Schizachyrium scoparium*) and sideoats grama (*Bouteloua curtipendula*) are usually present (U.S. Army 2007).

Wildlife. Abundant and diverse populations of wildlife occur throughout the majority of the 28,000 acres of undeveloped woodlands and savannas at JBSA-BUL. Because of the proximity to existing roads, the developed cantonment area, and the southern boundary of JBSA-BUL, both project areas have a low to moderate value in relation to their ability to support wildlife relative to the majority of JBSA-BUL. The following paragraphs present wildlife species that are

known, or thought, to occur on JBSA-BUL, and therefore have the potential to occur in or near both project areas.

Approximately 57 species of mammals are known, or thought, to occur on JBSA-BUL. Intermediate to large mammals include the bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), mountain lion (*Felis concolor*), white-tailed deer (*Odocoileus virginianus*), axis deer (*Axis axis*), feral hog (*Sus scrofa*), and catalina goat (*Capra* sp.). The axis deer is an exotic species while the feral hog and Catalina goat are ranch escapees. Common small mammals include the fox squirrels (*Sciurus niger*), black-tailed jackrabbit (*Lepus californicus*), eastern cottontail (*Sylvilagus floridanus*), opossum (*Didelphis virginiana*), armadillo (*Dasypus novemcinctus*), ringtail cat (*Bassariscus astutus*), striped skunk (*Mephitis mephitis*), and eastern and western spotted skunks (*Spilogale putorius* and *S*. *gracilis*, respectively). Common rodents include the Mexican ground squirrel (*Spermophilus mexicanus*), six mouse species, and two rat species. Three bats are known to occur at JBSA-BUL. The cave myotis (*Myotis velifer*) and eastern pipistrelle (*Pipistrellus subflavus*) have been documented throughout the installation, including roosting in caves. The Mexican free-tailed bat (*Tadarida brasiliensis mexicana*) has been documented hunting; however, known caves at JBSA-BUL are not large enough to support Mexican free-tailed bats, which typically roost in large colonies (U.S. Army 2007).

Over 200 species of birds have been documented on JBSA-BUL. Some of the common birds include the northern mockingbird (*Mimus polyglottos*), northern cardinal (*Cardinalis cardinalis*), eastern phoebe *(Sayornis phoebe*), eastern bluebird (*Sialia sialis*), Carolina chickadee (*Poecile carolinensis*), black-crested titmouse (*Baeolophus atricristatus*), house finch (*Haemorphus mexicanus*), lesser goldfinch (*Spinus psaltria*), white-eyed vireo (*Vireo griseus*), killdeer (*Charadrius vosiferus*), green kingfisher (*Chloroceryle americana*), black-headed oriole (*Icterus graduacauda*), and several species of sparrows and warblers. Approximately 100 species are known to nest or have the potential to nest on JBSA-BUL, while the remaining species are mostly migrants (U.S. Army 2007). Common breeding/nesting birds include the northern cardinal, black-crested titmouse, yellow-billed cuckoo (*Coccyzus americanus*), painted bunting (*Passerina ciris*), western scrub-jay (*Aphelocoma californica*), Bewick's wren (*Thyomanes bewickii*), and mourning dove (*Zenaida asiatica*). Raptors that are known to nest on JBSA-BUL include the red-tailed hawk (*Buteo jamaicensis*), eastern screech owl (*Megascops asio*), and red-shouldered hawk (*Buteo lineatus*) (U.S. Army 2007 and USAF 2014). Bird species protected under the ESA and MBTA are further discussed in the Migratory Birds subsection.

Approximately 92 species of reptiles and amphibians have been reported in the vicinity of JBSA-BUL, including 6 species of salamanders, 19 species of toads and frogs, 7 species of turtles, 21 species of lizards, and 38 species of snakes (U.S. Army 2007).

The NW Military Highway Alternative and Camp Bullis Road Alternative project areas are both located in the Salado Creek watershed and drainage from these sites ultimately contributes to Salado Creek, which is characterized as an intermittent stream (TCEQ 2017). Fish populations are limited at JBSA-BUL because of the limited amount of perennial surface water. In total, 14 fish species have been documented at the installation with 11 species recorded in Cibolo Creek and 8 species occurring in Salado Creek. The eight species that occur in Salado Creek include

the black bullhead (*Ictalurus melas*), mosquitofish (*Gambusia affinis*), sailfin molly (*Poecilia latipinna*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), warmouth (*Lepomis gulosus*), Rio Grande perch (*Cichlasoma cyanoguttatum*), and the Mozambique tilapia (*Tilapia mossambica*) (U.S. Army 2007).

Studies conducted on JBSA-BUL have documented 111 caves and 1,494 karst features and collected representative invertebrate fauna from identified caves and surrounding areas, including the Texas cave diving beetle (*Haideoporus texanus*), Maculated manfreda skipper (*Stallingsia maculosus*), Mimic cave snail (*Phreatodrobia imitate*), Horseshoe liptooth (*Polygyra hippocrepis*), lycosids (i.e., wolf spiders), ctenids (i.e., wandering spiders), centipedes, crickets (*Ceuthophilus* spp.), beetles (*Rhadine* spp.), isopods (*Brackenridgia* spp.), silverfish (*Texoreddellia* spp.), springtails (*Pseudosinella* spp.), and harvestmen (e.g., daddy longlegs). USFWS lists eleven species of karst invertebrates as endangered in Bexar County (USFWS 2017a), three of which inhabit caves on JBSA-BUL. Twelve species of invertebrates have been identified as being endemic to JBSA-BUL. These endemic species include: three species of unnamed spiders (*Cicurina brunsi*, *Cicurina bullis*, and *Cicurina platypus*), one pseudoscorpion (*Tartarocreagris reyesi*), two arachnids (*Texella elliotti* and *Texella hilgerensis*), two millipede species (*Speodesmus falcatus* and *Speodesmus ivyi*), one species of dipluran (*Mixojapyx* sp.), and three species of ground beetles (*Rhadine bullis*, *Rhadine ivyi*, and *Rhadine sprousei*) (USAF 2014). No known karst features occur on the NW Military Highway Alternative project area; therefore, it is unlikely that karst fauna would occur at this area. Portions of the Camp Bullis Road Alternative project area are within a karst protection area (KPA) buffer; therefore, it is possible that karst fauna could occur in or near this area.

Federal Protected Species. USFWS identifies 26 species in Bexar County, Texas, that are federally listed under the ESA. This list includes 19 endangered species, 3 threatened species, and 4 candidate species (USFWS 2017a). Of these 26 federally listed species, five species are known to occur at JBSA-BUL: the black-capped vireo (*Vireo atricapilla*); golden-cheeked warbler (*Setophaga chrysoparia*); Madla's Cave meshweaver (*Cicurina madla*), a karst invertebrate found in local caves; and two beetles (*Rhadine exilis* and *Rhadine infernalis*), which are also karst invertebrates. These five species, their habitats, their occurrence at JBSA-BUL relative to the locations of the proposed alternatives, and JBSA-BUL conservation measures are further discussed in **Table 3-4** and the following paragraphs. The 21 federally listed species that do not have the potential to occur in or near the project areas are not further discussed in this EA.

In 2005, USFWS issued a programmatic Biological Opinion (BO) for the proposed implementation of the *Military Mission and Associated Land Management Practices and Endangered Species Management Plan for the U.S. Army's Camp Bullis in Bexar County, Texas* (2005 BO) (USFWS 2005). The 2005 BO addressed projects and activities with potential effects on the five federally endangered species occurring on the installation and their habitats. The 2005 BO included an Incidental Take Statement with required Reasonable and Prudent Measures and associated Terms and Conditions, and also provided conservation measures to avoid or offset potential adverse effects to these federally listed species. This programmatic BO expired on July 28, 2015 (USFWS 2005).

Table 3-4. Federally-Listed and State-Listed Species on JBSA-BUL

Common Name	Scientific Name	Designated Status		Habitat Preference/Occurrence at JBSA-BUL	Habitat Present at NW Military Highway Alternative Project Area	Habitat Present at Camp Bullis Road Alternative Project Area
		Federal	State			
Arachnids						
Madla's Cave meshweaver	*Cicurina madla*	E	--	Karst limestone caves and mesocaverns in north and northwestern Bexar County. Known resident on JBSA-BUL.	No	No
Birds						
Black-capped vireo	*Vireo atricapilla*	E	E	Nest in oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grass spaces with foliage reaching to ground level for nesting cover. Known migrant and previous resident on JBSA-BUL.	No	No
Golden-cheeked warbler	*Setophaga chrysoparia*	E	E	Nest in juniper-oak woodlands; dependent on Ashe juniper for long fine bark strips from mature trees for nest construction; presence of broad-leaved trees and shrubs. Known resident on JBSA-BUL.	No	Yes
Peregrine falcon	*Falco peregrinus*	DL	T	Migrant across state. Found in a variety of habitats during migration, including urban areas. Preferred stopover is landscape edges such as lake shores, coastlines, and barrier islands. Known migrant through JBSA-BUL.	Yes	Yes
Zone-tailed hawk	*Buteo albonotatus*	--	T	Arid open country, including open deciduous or pine-oak woodland often near watercourses, and wooded canyons and tree-lined rivers. Possible transient across JBSA-BUL.	Yes	Yes
Insects						
Beetle	*Rhadine exilis*	E	--	Karst limestone caves and mesocaverns in north and northwestern Bexar County. Known resident on JBSA-BUL.	No	No
Beetle	*Rhadine infernalis*	E	--	Karst limestone caves and mesocaverns in north and northwestern Bexar County. Known resident on JBSA-BUL.	No	Yes
Reptiles						
Texas horned lizard	*Phrynosoma cornutum*	--	T	Open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees. Known resident on JBSA-BUL.	Yes	Yes
Texas indigo snake	*Drymarchon melanurus erebennus*	--	T	South of the Guadalupe River and Balcones Escarpment in thornbush-chaparral woodlands, in particular dense riparian corridors. Known resident on JBSA-BUL.	Yes	Yes
Texas tortoise	*Gopherus berlandieri*	--	T	Prefer open brush with a grass understory, avoiding open grass and bare ground. Known resident on JBSA-BUL.	Yes	Yes

Key: T = threatened, E = endangered, DL = delisted
Sources: USAF 2014, TPWD 2017a, USFWS 2017a

In January 2015, JBSA initiated the programmatic *Informal Consultation for the Continuation of the Military Mission and Mission Sustainment Activities on Joint Base San Antonio – Camp Bullis in Relation to 5 Listed Species* (2015 Informal Consultation) (USAF 2015a). The intent of the 2015 Informal Consultation was to evaluate the effects of military operations and sustainment/enhancement activities on the five federally endangered species on the installation. In the 2015 Informal Consultation document, JBSA-BUL determined that the proposed activity may affect, but is not likely to adversely affect the five endangered species. JBSA-BUL also proposed conservation measures to avoid or minimize adverse effects to these federally listed species (USAF 2015a). The conservation measures for the black-capped vireo, golden-cheeked warbler, and karst species are discussed in detail in the subsequent paragraphs.

In addition, the 2015 Informal Consultation identified five potential transient federally listed species on JBSA-BUL and ten federally listed species known to occur in Bexar and Comal counties, but not known to occur on JBSA-BUL. Migratory bird and incidental federally listed species can occur on JBSA-BUL, but their presence is anticipated to be rare and transitory. The 2015 Informal Consultation determined the current military and non-military land use activities are expected to have no effect on these species. However, if any of these species are observed on JBSA-BUL, efforts would be made to ensure they are not affected (USAF 2015a). On March 22, 2016, USFWS concurred with the determinations and conservation measures set forth in the 2015 Informal Consultation (USFWS 2016).

Black-capped vireo. The preferred nesting habitat of the black-capped vireo is rangelands with scattered clumps of shrubs of irregular height and distribution separated by open grasslands. This type of vegetation occurs most frequently on rocky substrates with shallow soils, in rocky gullies, on edges of ravines, and on eroded slopes (TPWD 2017b, USFWS 1991).

JBSA-BUL historically contained approximately 153 acres of designated black-capped vireo habitat, which was mostly limited to the training areas where wildfires were more frequent (USAF 2015b). For safety and accessibility reasons, wildfires have been suppressed in these areas, leading to vegetation growth beyond the early stage of succession preferred by the black-capped vireo. It is suspected that the increase of Ashe juniper, which is typically a low breeding location preference for the species, as well as the location of JBSA-BUL southeast of the main migration corridor for the species contributes to the low numbers of black-capped vireos at JBSA-BUL (USAF 2014). Because of the successional advancement near and around the historically designated black-capped vireo habitat, all designated black-capped vireo habitat was removed from the habitat map in 2010 as a result of an informal meeting with USFWS (USAF 2015b). Currently, there is no designated black-capped vireo habitat at JBSA-BUL (USAF 2014).

Black-capped vireo surveys occur on an annual basis from April 10 to July 1 in all potential and historical black-capped vireo habitat. Upon observation, black-capped vireo movement is documented in order to determine possible territory size. These black-capped vireo territories are updated at the conclusion of each survey season (USAF 2014).

> **NW Military Highway**. The NW Military Highway Alternative project area contains some of the vegetational configuration utilized by the black-capped vireo; however, black-

capped vireos have not been detected in the area. The nearest documented sighting of a black-capped vireo occurred approximately 5 miles to the north of the NW Military Highway Alternative project area. The NW Military Highway Alternative project area does not occur within potential habitat or historic habitat for the black-capped vireo.

Camp Bullis Road. The Camp Bullis Road Alternative project area contains some of the vegetational configuration utilized by the black-capped vireo; however, the majority of the woodlands are dominated by a closed canopy of Ashe juniper and black-capped vireos have not been detected in the area. The nearest documented sighting of a black-capped vireo occurred approximately 5 miles to the north of the Camp Bullis Road Alternative project area. The Camp Bullis Road Alternative project area does not occur within potential habitat or historic habitat for the black-capped vireo.

Golden-cheeked warbler. The preferred nesting habitat of the golden-cheeked warbler is tall, closed canopy, dense, mature stands of Ashe juniper mixed with trees such as Texas red oak (*Quercus buckleyi*), shin oak (*Quercus sinuata*), live oak, Lacey oak (*Quercus laceyi*), post oak (*Quercus stellata*), Texas ash (*Fraxinus texensis*), cedar elm (*Ulmus crassifolia*), hackberry, bigtooth maple (*Acer grandidentatum*), sycamore (*Platanus occidentalis*), Texas black walnut (*Juglans microcarpa*), and escarpment cherry (*Prunus serotina* var. *eximia*). These woodlands typically grow in relatively moist areas such as steep-sided canyons, slopes, and adjacent uplands. Golden-cheeked warblers can also be found in drier upland juniper-oak woodlands over flat topography. The essential element for nesting habitat is that Ashe juniper trees have a shredding bark that the golden-cheeked warbler uses for nest construction (USFWS 2017b).

Golden-cheeked warbler surveys have occurred on an annual basis from March 15 to June 1 in designated habitat throughout JBSA-BUL since 1991. Golden-cheeked warbler designated habitat is habitat, based on vegetation criteria, that has not been occupied for the last three years, or has never been documented to be occupied. These annual surveys identify golden-cheeked warbler observations, incidental sightings, and territories. At the conclusion of each survey season, core habitat is mapped and updated for the golden-cheeked warbler. Core habitats are based on species detections in the last three years and are defined by a 10-acre circle around the bird detection location. Additionally, a 300-foot protection buffer is designated around all core habitats identified for the species. Golden-cheeked warbler territories are areas in which breeding pairs have been documented (USAF 2014). In accordance with the conservation measures in the 2015 consultation, JBSA-BUL would seek consultation with USFWS if new projects were to be proposed in designated golden-cheeked warbler habitat (USAF 2015a).

NW Military Highway. The NW Military Highway project area contains some of the woodland species utilized by the golden-cheeked warbler; however, the majority of the project area is open canopy, the project area does not contain designated habitat, the project area is not considered core habitat, and golden-cheeked warblers have not been detected in the area. Core habitat occurs to the east and west, and at its closest distance is approximately 800 feet to the northwest of the NW Military Highway Alternative project area. Additionally, the nearest known territory is approximately 4,000 feet to the east (see **Figure 3-1**).

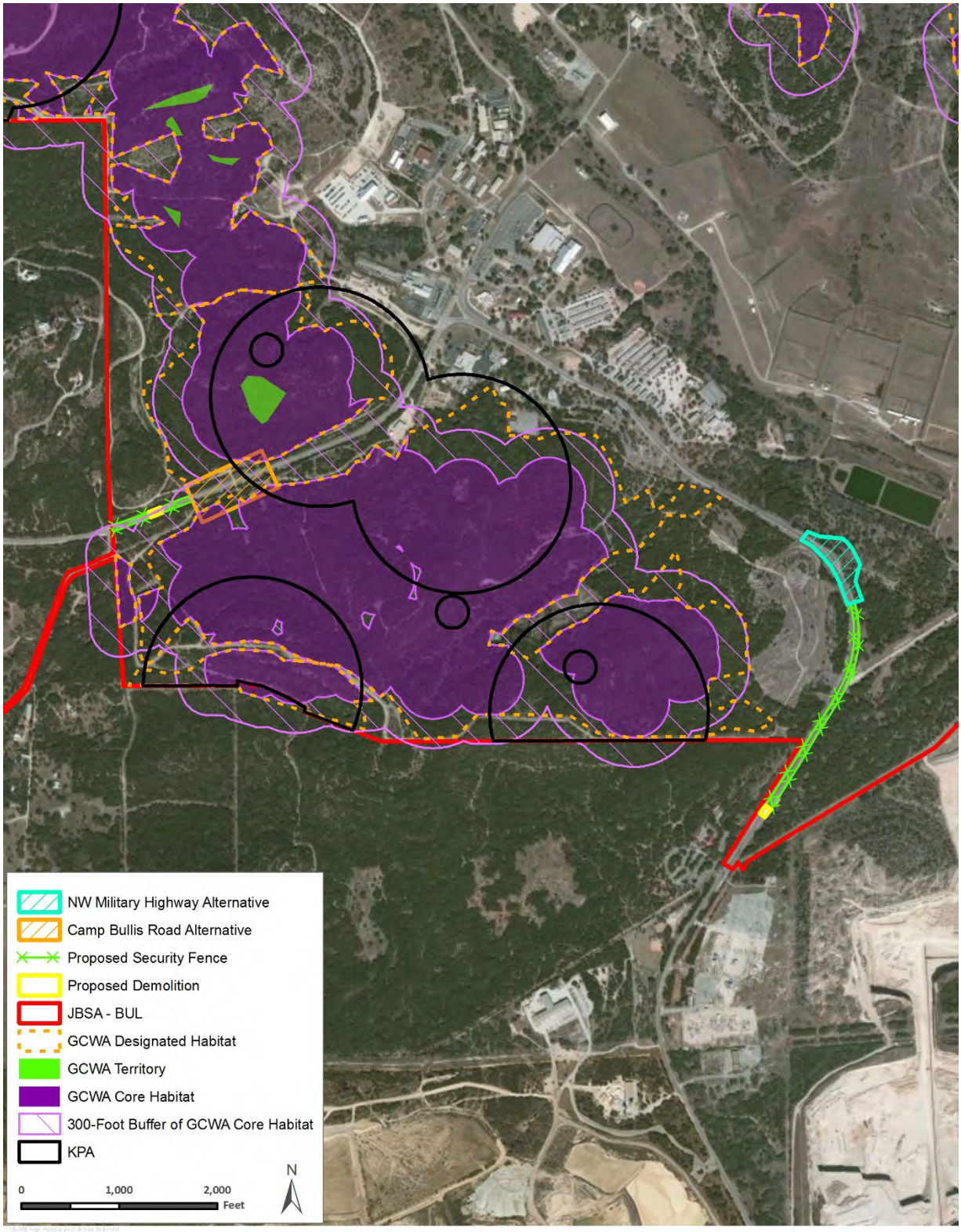
Camp Bullis Road. The Camp Bullis Road Alternative project area contains some of the woodland species utilized by the golden-cheeked warbler. Portions of the Camp Bullis Road Alternative project area are located within designated habitat and core habitat, while the remainder of the project area is immediately adjacent to designated and core habitat to the north and south. Additionally, a known territory occurs approximately 270 feet to the north of the Camp Bullis Road Alternative project area (see **Figure 3-1**).

Federally listed karst invertebrates. Madla's Cave meshweaver and the beetles, *Rhadine exilis* and *Rhadine infernalis,* are known residents at JBSA-BUL. All three species are troglobites, spending their entire lives underground within karst landforms of Bexar County. Physical factors in caves that influence these species include absence of sunlight, low nutrient flow, and a stable environment with uniform temperatures and high humidity (USFWS 2011). Madla's Cave meshweaver is a small, eyeless or essentially eyeless spider that is known to occur at 23 caves; one of which, Headquarters Cave, occurs on JBSA-BUL. *Rhadine exilis* and *Rhadine infernalis* are small, essentially eyeless ground beetles. *Rhadine exilis* has been documented in 24 caves on JBSA-BUL as well as several other caves in north and northwest Bexar County. *Rhadine infernalis* is known to occur in approximately 26 caves, six of which occur on JBSA-BUL (USAF 2015a).

Nearly all of JBSA-BUL has been surveyed for cave and karst features, with each of these subsequently surveyed for biological inhabitants. KPAs have been established around all of the caves that contain federally listed invertebrates and these caves are surveyed on an annual basis. The KPAs encompass a 90-acre buffer around cave entrances. Various activity restrictions and conservation measures are observed within the KPAs. Construction and maintenance conservation measures included in the 2015 Informal Consultation with USFWS state that new construction projects would avoid KPAs (USAF 2015a).

NW Military Highway. The NW Military Highway Alternative project area does not occur within a KPA; however, two KPAs occur approximately 1,700 feet from this project area, one to the northeast and one to the southwest (see **Figure 3-1**).

Camp Bullis Road. The Camp Bullis Road Alternative project area occurs within a KPA that is in place to protect a karst feature known to contain one federally-listed karst invertebrate: *Rhadine infernalis*. Approximately 2.3 acres of the northeastern portion of the project area falls within this KPA; however, approximately 1.3 of the 2.3 acres are disturbed (i.e., the existing Camp Bullis Road and existing tertiary roads). Three additional KPAs occur approximately 700 feet from the proposed area, one to the north, one to the east, and one to the south (see **Figure 3-1**).



Data Sources: Bing Maps Aerial; Camp Bullis GIS

Key: GCWA = Golden-cheeked warbler

Figure 3-1. Golden-cheeked Warbler Habitat and KPAs relative to the Proposed Alternatives

State Protected Species. TPWD lists 21 species in Bexar County that are state-listed as endangered or threatened species (TPWD 2017a). Of the 21 state-listed species, five have the potential to occur in or near the project areas: peregrine falcon (*Falco peregrinus*); zone-tailed hawk (*Buteo albonotatus*); Texas horned lizard (*Phrynosoma cornutum*); Texas indigo snake (*Drymarchon melanurus erebennus*); and Texas tortoise (*Gopherus berlandieri*). These five species, their habitats, and management recommendations are further discussed in **Table 3-4** and the paragraphs that follow. The 16 state-listed species that do not have the potential to occur in or near the project areas are not further discussed in this EA.

State-listed birds. The peregrine falcon is a known migrant through JBSA-BUL that utilizes a variety of habitats during migration. The preferred stopover habitat is landscape edges such as lake shores, coastlines, and barrier islands. The zone-tailed hawk is a possible transient across JBSA-BUL that occurs in arid open country, including open deciduous or pine-oak woodlands often near watercourses, and wooded canyons and tree-lined rivers. Potential stopover habitat is located on undeveloped areas of JBSA-BUL (USAF 2014). Potential stopover habitat for both species occurs at both project areas.

State-listed reptiles. The Texas horned lizard is found in arid and semiarid habitats in open areas with sparse plant cover, typically with loose sand and loamy soils (TPWD 2017c). The Texas indigo snake prefers dense riparian corridors, and requires moist microhabitats. The Texas tortoise prefers open brush with a grass understory but avoids open grass and bare ground (USAF 2014). All of these reptiles are known to occur on JBSA-BUL and potential habitat occurs at both the NW Military Highway Alternative and Camp Bullis Road Alternative project areas. As previously discussed, the vegetation at both project areas consists of upland woodlands, which is not the preferred habitat for any of these species. Additionally, because the proximity to existing roads, the developed cantonment area, and the developed southern boundary of JBSA-BUL, both project areas have low to moderate value in relation to their ability to support wildlife relative to the majority of JBSA-BUL and have low habitat value for wildlife because of their proximity to the developed cantonment area of the installation.

Migratory Birds. The majority of bird species found at JBSA-BUL are afforded regulatory protection under the federal MBTA. Over 200 migratory birds have been documented to occur at JBSA-BUL. USFWS lists 29 Birds of Conservation Concern, which are species, subspecies, and populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA in Bexar County, Texas (see **Table 3-5**) (USFWS 2017a). Of these 29 bird species, 13 species have been documented and are known to occur at JBSA-BUL (USAF 2014) and therefore have the potential to occur in or near the project areas as a stopover on their migratory route, during the breeding season, or could occur year-round.

3.2.3 Environmental Consequences

Demolition, construction, operation, and associated noise could potentially result in adverse impacts on biological resources. Impacts are evaluated by identifying the types and locations of potential ground-disturbing activities relative to important biological resources. To evaluate the impacts of noise, considerations were given to the number of individuals or critical species involved, type of stressors involved, and magnitude of the impacts.

Table 3-5. Migratory Birds of Conservation Concern in Bexar County, Texas

Common Name	Scientific Name	Seasonal Occurrence	Known to Occur on JBSA-BUL
Audobon's oriole	*Icterus graduacauda*	Year-round	Yes
Bald eagle	*Haliaeetus leucocephalus*	Year-round	No
Bell's vireo	*Vireo bellii*	Breeding	Yes
Burrowing owl	*Athene cunicularia*	Wintering	No
Cassin's sparrow	*Peucaea cassinii*	Year-round	Yes
Chestnut-collared longspur	*Calcarius ornatus*	Wintering	No
Curve-billed thrasher	*Toxostoma curvirostre*	Year-round	Yes
Dickcissel	*Spiza americana*	Breeding	Yes
Fox sparrow	*Passerella iliaca*	Wintering	No
Harris's hawk	*Parabuteo unicinctus*	Year-round	No
Harris's sparrow	*Zonotrichia querula*	Wintering	No
Hudsonian godwit	*Limosa haemastica*	Migrating	No
Lark bunting	*Calamospiza melanocorys*	Wintering	No
Le Conte's sparrow	*Ammodramus leconteii*	Wintering	Yes
Least bittern	*Ixobrychus exilis*	Breeding	No
Lesser yellowlegs	*Tringa flavipes*	Wintering	No
Lewis's woodpecker	*Melanerpes lewis*	Wintering	No
Little blue heron	*Egretta caerulea*	Breeding	Yes
Loggerhead shrike	*Lanius ludovicianus*	Year-round	Yes
Orchard oriole	*Icterus spurius*	Breeding	Yes
Painted bunting	*Passerina ciris*	Breeding	No
Peregrine falcon	*Falco peregrinus*	Wintering	Yes
Red-headed woodpecker	*Melanerpes erythrocephalus*	Wintering	No
Rufous-crowned sparrow	*Aimophila ruficeps*	Year-round	Yes
Scissor-tailed flycatcher	*Tyrannus forficatus*	Breeding	Yes
Short-eared owl	*Asio flammeus*	Wintering	No
Sprague's pipit	*Anthus spragueii*	Wintering	No
Summer tanager	*Piranga rubra*	Breeding	Yes
Verdin	*Auriparus flaviceps*	Year-round	No

Source: USFWS 2017a

Potential impacts on biological resources would be considered significant if a proposed action failed to comply with applicable federal laws and regulations such as the ESA, MBTA, and Bald and Golden Eagle Protection Act. Impacts associated with the Proposed Action also would be significant if any of the following occurred as a result of the impact:

- Take of a threatened or endangered species, critical habitat, migratory bird, or bald or golden eagle
- Change of legal status (e.g., reductions in population size or distribution of a species)

- Impingement on a buffer zone established in the Integrated Natural Resources Management Plan to protect a sensitive species.

3.2.3.1 NW MILITARY HIGHWAY ALTERNATIVE

Vegetation. Short- and long-term, minor, adverse impacts on vegetation would occur. Approximately 2.5 acres of previously undisturbed woodlands would be permanently impacted and converted to ECP infrastructure and maintained landscaping. The existing vegetation is locally common and the Proposed Action would only remove a small percentage of similar habitats available on the installation. Vegetation removal and earthwork during the construction phase could increase the establishment of nonnative and invasive species and erosion and sedimentation because of ground disturbance. BMPs would be implemented to minimize potential adverse impacts associated with the spread of nonnative vegetation.

Wildlife. Short- and long-term, minor, adverse impacts on wildlife could occur as a result of the construction and the modification of approximately 2.5 acres of potential habitat. The impacts would be minor because of the relatively small size and proximity to the existing NW Military Highway. Wildlife in the vicinity could be disturbed or displaced from noise, habitat alteration, and direct physical impact. During construction, demolition, and operations, mobile wildlife species that might use the project area would use similar adjacent habitats. Injury or mortality of small, less-mobile terrestrial species (e.g., reptiles, rodents, small mammals) could occur from direct physical impact (e.g., vehicular traffic, construction and demolition equipment); however, wildlife would generally avoid the project area and personnel would be instructed to avoid direct physical impacts, by allowing wildlife to leave the construction area, where possible. Furthermore, because of the proximity of the project area to NW Military Highway, wildlife in the area is likely habituated to vehicular traffic and associated noise. As a result, population-level impacts would not occur.

Short-term, minor adverse impacts on aquatic species could occur as a result of erosion leading to sedimentation in tributaries to Salado Creek. However, in order to minimize impacts on aquatic species erosion control sediment fencing would be installed on the downslope boundaries of ground disturbance in order to minimize sedimentation in Salado Creek and associated tributaries (see **Section 3.4.3.1** and **Section 3.9.3.1** for further information on erosion and sedimentation impacts).

Federal and State Protected Species

Black-capped vireo and Golden-cheeked warbler. The NW Military Highway Alternative is consistent with the conservation measures outlined in the 2015 Informal Consultation; therefore, this alternative would have no impact on the black-capped vireo and golden-cheeked warbler. The project area is not within designated habitat, core habitat, or known territories for the golden-cheeked warbler or potential habitat for the black-capped vireo. To avoid impacts on these species, all personnel would be informed of nearby environmentally sensitive area boundaries and would not be permitted to enter these areas. In the unlikely event that black-capped vireo or golden-cheeked warbler individuals entered the construction or demolition site, they would be allowed to move away on their own.

Federally listed karst invertebrates. The NW Military Highway Alternative is consistent with the conservation measures outlined in the 2015 Informal Consultation; therefore, this alternative would have no impact on the Madla's Cave meshweaver, *Rhadine exilis*, and *Rhadine infernalis*. Karst surveys have occurred on nearly all of JBSA-BUL and no known karst features occur in the NW Military Highway Alternative project area. In the unlikely event that a karst feature is discovered during vegetation clearing, grading, or other construction activities, the feature would be inspected by a qualified individual following the instructions provided by USFWS (2015) for determining the presence or absence of endangered karst fauna. If karst fauna are present, USFWS would be consulted.

State-listed birds. Short- and long-term, negligible, adverse impacts on state-listed migrant and transient birds could occur as a result of the construction and the modification of approximately 2.5 acres of potential stopover habitat. Two state-listed birds (i.e., peregrine falcon and zone-tailed hawk) have the potential to occur in or near the NW Military Highway Alternative project area as transients or migrants. However, because these species would only occur at JBSA-BUL as transients or migrants, if these mobile species were to occur in the project area, they would likely vacate the area during construction and not return once construction is complete. During the construction and demolition phase, the potential noise and direct physical impacts on state-listed migrant and transient birds would be similar to those discussed previously for wildlife. Steps to prevent direct impacts to state-listed migratory and transient birds include conducting all vegetation removal and earthwork outside of the migratory season (March 15 through September 15). Should vegetation be required during the migratory season, a nest survey would be conducted by qualified personnel and active nests would be avoided until all young have fledged and the nest is no longer occupied. Long-term impacts could occur as a result of the loss of habitat; however, the existing vegetation is locally common and the Proposed Action would only remove a small percentage of similar habitats available on the installation; therefore, impacts would be negligible.

State-listed reptiles. Short- and long-term, negligible to minor, adverse impacts on state-listed reptile species could occur as a result of the construction and the modification of approximately 2.5 acres of potential marginal habitat. Three state-listed reptile species (i.e., Texas horned lizard, Texas indigo snake, and the Texas tortoise) have the potential to occur at the NW Military Highway Alternative project area. However, because the project area is located adjacent to existing roads, close to the developed cantonment area, and near the developed southern boundary of JBSA-BUL, the likelihood of these state-listed species utilizing the area is low. During the construction and demolition phase, the potential noise and direct physical impacts on state-listed reptiles would be similar to those discussed previously for wildlife. Steps to prevent direct impacts to state-listed reptiles include conducting pre-construction surveys on the project area to confirm the absence of these species in order to minimize potential impacts. Should state-listed species be discovered during these surveys, JBSA-BUL would consult with TPWD prior to construction or ground-disturbing activities. Long-term impacts could occur as a result of the loss of habitat; however, as previously mentioned the existing vegetation is locally common and the Proposed Action would only remove a small percentage of similar habitats available on the installation; therefore, impacts would be negligible to minor.

Migratory Birds. Short- and long-term, minor, adverse impacts on migratory birds could occur as a result of the construction and the modification of approximately 2.5 acres of potential habitat. During the construction and demolition phase the potential noise and direct physical impacts on migratory birds would be similar to those discussed previously for wildlife. Steps to prevent direct impacts to migratory nesting birds include conducting all vegetation removal and earthwork outside of the migratory season (March 15 through September 15). Should vegetation removal need to occur during the migratory season, a nest survey would be conducted by qualified personnel and active nests would be avoided until all young have fledged and the nest is no longer occupied. The loss of approximately 2.5 acres of previously disturbed grasslands would result in the long-term, minor, adverse impacts on migratory birds. However, as discussed previously for vegetation, the existing habitat is locally common and the Proposed Action would only remove a small percentage of this habitat. Migratory birds that might use the project area would be able to use similar adjacent habitats. As a result, population-level impacts would not occur.

3.2.3.2 CAMP BULLIS ROAD ALTERNATIVE

Impacts on vegetation, wildlife, black-capped vireo, state-listed birds, state-listed reptiles, and migratory birds would be similar to those described for the NW Military Highway Alternative in **Section 3.2.3.1**. The only appreciable difference in impacts on these biological resources would be a slightly larger (i.e., approximately 5 acres total) area of previously undisturbed woodlands would be permanently converted to ECP infrastructure and maintained landscaping. Impacts on resident the golden-cheeked warbler and federally-listed karst invertebrates would be greater because of the project area occurring within environmentally sensitive areas.

Short- and long-term, moderate, adverse impacts on resident federally-listed bird species and resident federally-listed karst invertebrates would occur. The Camp Bullis Road Alternative would result in alteration of core habitat for the golden-cheeked warbler and noise exposure at its nearby known territories. Approximately 0.7 of the 5 acres of previously undisturbed woodlands that would be permanently converted to ECP infrastructure and maintained landscaping is considered core habitat for the golden-cheeked warbler. The remaining acreage is immediately adjacent to golden-cheeked warbler core habitat. Additionally, the northern corner of the Camp Bullis Road Alternative project area is approximately 270 feet from a known golden-cheeked warbler territory. Therefore, in accordance with the conservation measures in the 2015 Informal Consultation with USFWS, implementation of this alternative would require JBSA-BUL to consult with USFWS. Consultation with USFWS would ensure impacts on golden-cheeked warbler would remain less than significant.

The Camp Bullis Road Alternative would result in alteration of approximately 1 acre of previously undisturbed habitat within a KPA. The KPA provides a buffer for a karst feature that is known to be inhabited by the federally-listed *Rhadine infernalis*. Vegetation removal and ground-disturbing activities within KPAs have the potential to directly and indirectly impact this federally-listed karst fauna. The 2015 Informal Consultation with USFWS states that new construction projects would avoid KPAs on JBSA-BUL. Therefore, implementation of this alternative would require consultation with USFWS because this alternative would entail new

construction within a KPA. Consultation with USFWS would ensure impacts on the federally-listed *Rhadine infernalis* would remain less than significant.

3.2.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and biological resources conditions would remain the same as described in **Section 3.2.2**. No impacts on vegetation, wildlife, protected species, or migratory birds would occur.

3.3 Cultural Resources

3.3.1 Definition of the Resource

Cultural resources is an umbrella term for many heritage-related resources defined in several federal laws and EOs including the National Historic Preservation Act (NHPA) (1966), the Archeological and Historic Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990).

The NHPA focuses on cultural resources such as prehistoric and historic sites, buildings and structures, districts, or other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reason. Such resources might provide insight into the cultural practices of previous civilizations or they might retain cultural and religious significance to modern groups. Resources found significant under criteria established in the NHPA are considered eligible for listing in the National Register of Historic Places (NRHP). These are termed “historic properties” and are protected under the NHPA. Under Section 106 of the NHPA, federal agencies must take into account the effect of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Under this process, the federal agency evaluates the NRHP eligibility of resources within the proposed undertaking’s area of potential effect and assesses the possible effects of the proposed undertaking on historic properties in consultation with the State Historical Preservation Officer and other parties.

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

3.3.2 Affected Environment

The area of potential effects (APE) for the NW Military Highway Alternative is the maximum disturbance area of all proposed activities associated with the alternative. This includes the area of disturbance from construction of the proposed ECP on NW Military Highway and demolition of the installation's existing ECP (see **Figure 2-3**), which was constructed after 2001.

There are no known historic properties located within the APE for this alternative. The APE has been surveyed for archaeological potential, and one archaeological site (i.e., 41BX1010) is located on the east side of NW Military Highway within the APE. This archaeological site has been determined not eligible for listing in the NRHP and, therefore, is not a historic property. Site 41BX0036, also previously determined not eligible for listing in the NRHP, is located approximately 900 feet northwest of the APE. No architectural resources; resources of traditional, religious, or cultural significance; or historic districts are within the APE (Kalina 2017).

The APE for the Camp Bullis Road Alternative is the maximum disturbance area of all proposed activities associated with the alternative. This includes the area of disturbance from construction of the proposed ECP on Camp Bullis Road (see **Figure 2-4**) and demolition of the installation's existing ECP on NW Military Highway (see **Figure 2-3**).

There are no known historic properties located within the APE for this alternative. The APE has been surveyed for archaeological potential, and no archaeological sites are within the APE. Two archaeological sites (i.e., 41BX0396 and 41BX1437) are located approximately 900 feet south of the Camp Bullis Road APE. Both of these archaeological sites were previously determined not eligible for listing in the NRHP and, therefore, are not considered historic resources. No architectural resources; resources of traditional, religious, or cultural significance; or historic districts are within the APE (Kalina 2017).

3.3.3 Environmental Consequences

Adverse effects on cultural resources can include physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; or introducing visual or audible elements that are out of character with the property or that alter its setting. Additionally, neglecting the resource to the extent that it deteriorates or is destroyed or the sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance would constitute adverse effects.

3.3.3.1 NW MILITARY HIGHWAY ALTERNATIVE

No impacts on cultural resources would occur as a result of the NW Military Highway Alternative because there are no known historic properties located within the APE.

Ground-disturbing activities associated with the NW Military Highway Alternative would have the potential to impact previously undocumented cultural resources such as buried archaeological sites. Should undocumented archaeological deposits or unexpected discoveries of Native American graves, lost historic cemeteries, or human remains be discovered during any construction activity, the activity would be immediately halted and JBSA-BUL would follow the

provisions for unanticipated discoveries specified in the installation's Integrated Cultural Resources Management Plan. Additional care also would be taken while working within the boundaries of archaeological site 41BX1010.

3.3.3.2 CAMP BULLIS ROAD ALTERNATIVE

No impacts on cultural resources would occur as a result of the Camp Bullis Road Alternative because there are no known historic properties located within the APE.

Ground-disturbing activities associated with the Camp Bullis Road Alternative would have the potential to impact previously undocumented cultural resources such as buried archaeological sites, Native American graves, lost historic cemeteries, or human remains. **Section 3.3.3.1** outlines the actions that would be taken in the event of such discovery.

3.3.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and cultural resources conditions would remain the same as described in **Section 3.3.2**. No impacts on historic properties would occur.

3.4 Geological Resources

3.4.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of geology, topography, soils, and, where applicable, geologic hazards.

Geology. Geology is the study of the Earth's physical components and provides information on the structure and arrangement of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition.

Topography. Topography pertains to the general shape and arrangement of a land surface, including its height and the position of its natural features and man-made alterations of landforms.

Soils. Soils are a matrix of mineral and organic matter overlying bedrock or other parent material. Soils are typically described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

Farmland. Farmland is protected under the Farmland Protection Policy Act of 1981. Farmland includes prime and unique farmland and farmland of statewide and local importance. The intent of the Farmland Protection Policy Act is to minimize the extent that federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses.

Geologic Hazards. Geologic hazards are natural geologic events that can endanger human lives and threaten property. Examples of geologic hazards in Texas include karst topography, including sinkholes, and earthquakes.

3.4.2 Affected Environment

Geology. JBSA-BUL is located in Bexar County, which overlaps three physiographic provinces of Texas: the Edwards Plateau in the northern portion of the county, the Blackland Prairie in the central portion, and the Interior Coastal Plains physiographic province to the south. Most of JBSA-BUL, including the project areas, are located on the Edwards Plateau, which primarily contains geologic formations of Cretaceous, Tertiary, and Quaternary age. The plateau is an uplift area that is mostly underlain by limestone beds that dip slightly toward the southeast. Much of the Edwards Plateau is underlain by a thick crust of metamorphosed igneous and sedimentary rocks of the continental craton. The plateau is drained by the Cibolo and Balcones creeks and by the headwaters of southeastward-flowing Culebra, Leon, and Salado creeks. See **Section 3.9.2** for additional information on surface waters. The Edwards Plateau is bound by the Balcones fault zone toward the east and southeast. The Balcones fault zone is characterized by a series of parallel northeast-trending faults that are described as normal, high-angle faults with the downward side to the southeast (Arnow 1963, Ferring 2007).

Topography. Topography at the NW Military Highway Alternative project area is highest in its western portion at approximately 1,100 feet above mean sea level (MSL) and slopes downward toward the east with its lowest elevation at approximately 1,070 feet above MSL. The existing ECP on NW Military Highway sits at approximately 1,090 feet above MSL (USGS 2016).

Topography at the Camp Bullis Road Alternative project area is relatively flat with a gently downward slope toward the south and southwest. This project area sits at approximately 1,150 feet above MSL (USGS 2016).

Soils. Approximately 97.6 percent of the NW Military Highway Alternative project area as well as all of the existing ECP are underline by soils of the Eckrant cobbly clay, 1 to 8 percent slopes. The typical profile of this soil type is cobbly clay in the top 4 inches, very cobbly clay in the 4 and 11 inches range, and below that is bedrock. The natural drainage class is well drained, and it has a medium runoff class. The depth to the water table is more than 80 inches. There is infrequent ponding or flooding. The remaining soils (2.4 percent) at the NW Military Highway project area are located to the west of NW Military Highway and are of the Eckrant-Rock outcrop association, 8 to 30 percent slopes (NRCS 2017).

The soil type at the Camp Bullis Road Alternative project area is Brackett gravelly clay loam, 12 to 20 percent slopes. The typical profile for this soil type is gravelly clay loam in the top 12 inches on top of bedrock. This soil type is well drained, and it is more than 80 inches to the water table. There is infrequent ponding or flooding (NRCS 2017).

None of the soils that occur within the project areas of either alternative are considered farmland according to the Natural Resources Conservation Service (NRCS 2017).

Geologic Hazards. Bexar County and central Texas are subject to geologic hazards including karst topography, sinkholes, and earthquakes. Karst features and sinkholes are common in central Texas and can appear suddenly and may result in property damage or casualty (AACG 2012).

The U.S. Geological Survey identified central Texas as having one of the lowest hazards from earthquakes with a peak acceleration of 0.02 percent gravity. As a result, central Texas is unlikely to experience earthquake hazards (USGS 2014).

3.4.3 Environmental Consequences

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

Impacts on geological resources would be significant if they would substantially alter the lithology (i.e., the character of a rock formation), stratigraphy (i.e., the layering of sedimentary rocks), and geological structures that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or substantially change the soil composition, structure, or function within the environment.

3.4.3.1 NW MILITARY HIGHWAY ALTERNATIVE

Geology. Short-term, negligible, adverse impacts on geology would occur. Although disturbance of surficial bedrock and other geological features could occur, the proposed construction and demolition would not be substantial or deep enough to alter lithology, stratigraphy, or the geological structures that control the distribution of aquifers and confining beds.

Topography. Long-term, negligible, adverse impacts on topography would occur. The project area slopes downward toward the east from NW Military Highway; therefore, minor grading would be required to level the grade to support construction. Minor grading would occur at the site of the existing ECP following demolition to restore natural topography.

Soils. Short- and long-term, minor, adverse impacts on soils would occur. Construction of the proposed ECP would primarily occur in one soil type, Eckrant cobbly clay, 1 to 8 percent slopes. Site preparation and earthmoving associated with construction would excavate soils and expose rock materials, temporarily removing vegetation in some areas and potentially exposing soils to erosion. Soil productivity, which is the capacity of the soil to produce vegetative biomass, would decline in disturbed areas and be eliminated in areas within the footprint of roadways or structures. Impacts would be minimized by restricting construction traffic to specific areas of travel where possible. In general, accelerated soil erosion would be minimized by designing facilities while considering any soil limitations, employing construction and stabilization techniques appropriate for the soil and climate, and implementing temporary and permanent erosion control measures. BMPs include installing silt fencing and sediment traps, applying water to disturbed soil, and revegetating disturbed areas as soon as possible after the

disturbance, as appropriate. Additionally, because the total disturbance area for the NW Military Highway Alternative is greater than one acre, a General Permit to Discharge under the Texas Pollutant Discharge Elimination System would be obtained (see **Section 3.9.3.1** for additional information on this permit). Therefore, impacts on soils would be minor and localized to the construction area.

Soils (i.e., Eckrant cobbly clay, 1 to 8 percent slopes) could be exposed to erosion during demolition of the existing ECP; however, impacts would be negligible because only surficial soils would be disturbed. Erosion and sediment controls, as described above, would also be implemented during demolition. Upon completion of demolition, the area of the existing ECP would be allowed to return to a natural state, which would improve its ability to produce biomass.

Long-term, minor, adverse impacts on soils would occur from an approximately 60,000 ft^2 net increase of impervious surfaces. This increase in impervious surface would reduce the amount of area for stormwater to infiltrate soil and increase stormwater runoff. See **Section 3.9.3** for additional information regarding stormwater runoff impacts from the Proposed Action.

Geologic Hazards. No impacts from geological hazards would occur. Unexpected karst features and sinkholes are unlikely to be discovered during construction because geotechnical and siting analysis during future stages of project design would be expected to identify and account for any immediate subsurface hazards that could be encountered. No impacts would occur from earthquakes because the likelihood of an earthquake occurring that could endanger property and lead to casualty is very low in central Texas.

3.4.3.2 CAMP BULLIS ROAD ALTERNATIVE

Impacts on geology, topography, and geologic hazards would be identical to those from the NW Military Highway Alternative and discussed in **Section 3.4.3.1** because of comparable site conditions. Impacts on soils would be similar but slightly greater than the NW Military Highway Alternative because of a potentially larger disturbance area for the proposed ECP footprint (i.e., approximately 8.1 acres). Similar BMPs as the NW Military Highway Alternative would be followed during construction of the proposed ECP and a General Permit to Discharge under the Texas Pollutant Discharge Elimination System would be obtained to ensure impacts on soils would be minor and localized to the construction area. See **Section 3.9.3.2** for additional information on this permit.

Impacts from demolition of the existing ECP on NW Military Highway would be identical to those described under the NW Military Highway Alternative. Impacts from demolition of the existing barricades on Camp Bullis Road would have no impacts on geological resources. These barricades are comprised of plastic and chain-link fence, and their demolition would not require any substantial ground disturbance or alterations to the existing topography.

3.4.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and geological resources conditions would remain the same as described in **Section 3.4.2**. No impacts on geology, topography, soils, and geological hazards would occur.

3.5 Hazardous Materials and Wastes

3.5.1 Definition of the Resource

Hazardous Materials, Hazardous Wastes, and Petroleum Products. Hazardous materials are defined by 49 CFR § 171.8 as hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR § 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR § 173. Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) at 42 USC § 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."

Petroleum products include crude oil or any derivative thereof, such as gasoline, diesel, or propane. They are considered hazardous materials because they present health hazards to users in the event of incidental releases or extended exposure to their vapors.

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

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

Asbestos was used in building materials because of its high tensile strength, flexibility, and resistance to heat, chemicals, and electricity (OSHA 2002). Asbestos is commonly found in buildings constructed prior to 1980 in roofing materials, joint compound, wallboard, thermal system insulation, and boiler gaskets. The federal government banned the use of most LBP in 1978; therefore, all buildings constructed prior to 1978 are assumed to contain LBP. PCBs are man-made organic chemicals that were widely used in construction materials and electrical products prior to 1979 because of their non-flammability, chemical stability, high boiling point, and electrical insulating properties (USEPA 2017c).

Environmental Contamination. Environmental contamination sites are also considered during the evaluation of hazardous materials and wastes. The Environmental Restoration Program (ERP) is a DoD program that identifies, characterizes, and remediates environmental contamination from past activities at DoD installations. Two ERP programs are active on JBSA-BUL: the Installation Restoration Program (IRP) and the Military Munitions Response Program

(MMRP) (USACE and AFCEE 2010). IRP sites potentially require or have required environmental cleanup or intensive investigations. MMRP sites address nonoperational military ranges and other sites that are suspected or known to contain discarded military munitions (i.e., munitions and explosives of concern) or munitions constituents (i.e., munitions debris). Unexploded ordnance, as defined in 10 USC § 101 (e)(5), is a category of munitions and explosives of concern that has been primed, fused, armed, or otherwise prepared for action; has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and remains unexploded either by malfunction, design, or any other cause (BLM 2006). TCEQ is the primary regulatory agency with authority for approving all cleanup actions at JBSA-BUL (AFCEC 2016).

Radon. Radon is a naturally occurring odorless and colorless radioactive gas found in soils and rocks that can lead to the development of lung cancer. Radon tends to accumulate in enclosed spaces, usually those that are below ground and poorly ventilated (e.g., basements). USEPA established a guidance radon level of 4 picocuries per liter (pCi/L) in indoor air for residences, and radon levels above this amount are considered a health risk to occupants (USEPA 2016).

3.5.2 Affected Environment

Hazardous Materials, Hazardous Wastes, and Petroleum Products. JBSA-BUL handles hazardous materials in accordance with AFI 32-7086, *Hazardous Materials Management*. Hazardous wastes are handled in accordance with AFI 32-7042, *Waste Management,* and the JBSA *Hazardous Waste Management Plan*. All hazardous waste management activities must be coordinated through and approved by the JBSA-BUL 502 Civil Engineer Squadron Installation Management Flight, Environmental Management Section (UFGS undated). JBSA-BUL follows the hazardous materials and wastes management guidelines in Unified Facilities Guide Specifications (UFGS) 01-35-35, *Environmental Protection* (UFGS undated), which replaced JBSA-BUL's *Hazardous Materials Management Plan* (Diaz 2017). In addition, JBSA-BUL's Spill Prevention Control and Countermeasures (SPCC) Plan identifies specific procedures and responsibilities for responding to hazardous material and petroleum product spills. The 502 Civil Engineer Squadron Installation Management Flight, Environmental Management Section maintains the SPCC Plan, manages the hazardous waste personnel, and coordinates spill responders/contractors (USAF 2016b).

Activities on JBSA-BUL that require the use of hazardous materials and petroleum products include vehicle operation and maintenance (general and tactical), infrastructure and equipment maintenance, pesticide applications, demolition, and construction. Hazardous wastes are generated from similar activities. JBSA-BUL is permitted under RCRA as a small quantity hazardous waste generator (USEPA ID No. TX4210020133) (USEPA 2017d). Various fuels and wastes are stored in ASTs and underground storage tanks installation-wide (USAF 2016b).

No hazardous materials, petroleum products, or hazardous wastes are stored at the existing ECP, NW Military Highway Alternative project area, or Camp Bullis Road Alternative project area. Activities requiring the use of hazardous materials and petroleum products at the existing ECP include minimal infrastructure and equipment maintenance and pesticide application, as needed.

Special Hazards. Asbestos, LBP, and PCBs are regulated by USEPA. USAF manages asbestos in accordance with AFI 32-1052, *Facility Asbestos Management*. PCBs are regulated in accordance with the Toxic Substances Control Act of 1976. USAF manages PCBs in accordance with AFI 32-7042, *Waste Management*.

The existing ECP was constructed after 2001; therefore, it is not expected to contain ACMs, LBP, or PCBs. ACMs, LBP, and PCBs are not present within the NW Military Highway Alternative or Camp Bullis Road Alternative project areas because these areas do not contain structures. Federal policy prohibits the use of ACMs for new construction when asbestos free materials exist, and federal law prohibits LBP and PCBs in new construction. Therefore, special hazards will not be discussed further.

Environmental Contamination. In accordance with AFI 32-7020, *Environmental Restoration Policy*, all ERP sites on JBSA-BUL are managed in accordance with RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act. There are six IRP sites and four MMRP sites on JBSA-BUL. Five of the IRP sites and two of the MMRP sites require no further action and do not warrant further discussion in this EA. The active IRP site, Site 08/Landfill 8, is more than 3 miles away from the project areas. The two active MMRP sites are the Stokes Mortar and 75mm Munitions Sites. The Stokes Mortar MMRP Site is a 148.4-acre area approximately 0.7 mile north of the NW Military Highway Alternative project area, 0.8 mile northeast of the Camp Bullis Road Alternative project area, and 1.1 miles north of the existing ECP. The 75mm Munitions MMRP Site is an 8.9-acre area approximately 1 mile northwest of the NW Military Highway Alternative project area, 0.3 mile northeast of the Camp Bullis Road Alternative project area, and 1.1 miles northwest of the existing ECP (USACE and AFCEE 2010, AFCEC 2016).

Radon. Bexar County is within Radon Zone 3, which has predicted indoor radon screening levels of less than 2 pCi/L (USEPA 2016). Because of the low probability of exceeding USEPA's radon guidance level of 4 pCi/L, radon is not discussed further.

3.5.3 Environmental Consequences

Impacts on hazardous materials and wastes would be considered significant if a proposed action would result in noncompliance with applicable federal or state regulations, or increase the amounts generated or procured beyond current JBSA-BUL waste management procedures, permits, and capacities. Impacts on contaminated sites would be considered significant if a proposed action would disturb or create contaminated sites resulting in negative effects on human health or the environment, or if a proposed action would make it substantially more difficult or costly to remediate existing contaminated sites.

3.5.3.1 NW MILITARY HIGHWAY ALTERNATIVE

Short-term, minor, adverse impacts from hazardous materials and wastes would occur during construction of the proposed ECP and demolition of the existing ECP. Adverse impacts would occur from the use of hazardous materials and petroleum products and the generation of hazardous wastes. Hazardous materials that could be used include paints, welding gases, solvents, preservatives, and sealants. Additionally, hydraulic fluids and petroleum products, such as diesel and gasoline, would be used in construction vehicles and equipment.

Construction and demolition would generate negligible quantities of hazardous wastes, and these quantities would not exceed the capacities of the existing permitted hazardous waste disposal streams. Contractors would be responsible for the disposal of hazardous wastes in accordance with federal and state laws.

All hazardous materials, petroleum products, and hazardous wastes used or generated during construction and demolition would be contained and stored appropriately (e.g., secondary containment, inspections, spill kits) in accordance with UFGS 01-35-35, the JBSA Hazardous Waste Management Plan, the JBSA-BUL SPCC, and other applicable regulations to minimize the potential for releases. Construction and other contractors with temporary operations at JBSA-BUL would be required to develop and implement their own SPCC Plans if oil storage capacity were to exceed SPCC thresholds (USAF 2016b). All construction and demolition equipment would be maintained according to the manufacturer's specifications. Implementation of the NW Military Highway Alternative would have no impacts on IRP or MMRP sites.

Long-term, negligible, adverse impacts from hazardous materials and wastes would result from the operation of the proposed ECP. The operation of the proposed ECP would not require any new or increased quantities of hazardous materials or wastes beyond those currently used for minimal maintenance and pesticide application at the existing ECP. However, an emergency generator with 24 hours of diesel fuel storage capacity would be located at the proposed ECP. The diesel fuel would be stored in a double-walled AST and the generator would be maintained according to the manufacturer's specifications (Arizpe 2016). All hazardous materials and wastes would be stored and managed in accordance with applicable federal, state, and local regulations; USAF policies and procedures; and UFGS 01-35-35. In the event of a leak or spill, all procedures outlined in the SPCC Plan would be followed. Any pesticides would be applied by certified personnel in accordance with the manufacturer's recommendations.

3.5.3.2 CAMP BULLIS ROAD ALTERNATIVE

Impacts from hazardous materials and wastes associated with the Camp Bullis Road Alternative would be similar to those discussed for the NW Military Highway Alternative because of similar levels of proposed construction, demolition, and operation and similar types of equipment. **Section 3.5.3.1** describes these impacts in detail.

3.5.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and hazardous materials and wastes conditions would remain the same as described in **Section 3.5.2**. No impacts on hazardous materials and wastes would occur.

3.6 Infrastructure and Transportation

3.6.1 Definition of the Resource

Infrastructure. Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly man-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as "urban" or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to the economic growth of an area. The

infrastructure components to be discussed in this section include electrical supply, communications, water supply, wastewater disposal, liquid fuel supply, stormwater drainage, and solid waste management.

Transportation. Transportation refers to roadway networks consisting of streets, highways, and intersections; the operation and flow of vehicular traffic within those networks; and traffic safety. Street and highway operation are primarily regulated by the Federal Highway Administration and implemented by the Texas Department of Transportation (TxDOT). Local street operations and maintenance are managed by the City of San Antonio.

3.6.2 Affected Environment

Infrastructure. The installation's existing electrical supply, communications, water supply, wastewater disposal, and liquid fuel supply infrastructure adequately supports JBSA-BUL operations. Electricity and communications services to the existing ECP are aboveground and provided by off-installation sources. No electrical or communications infrastructure is within the NW Military Highway Alternative project area, and the closest connection to such infrastructure is at the installation's wastewater treatment plant approximately 0.25 mile northwest of this project area. Electrical and possibly communications infrastructure is present within the Camp Bullis Road Alternative project area, and the closest electrical connection is a substation immediately north of Camp Bullis Road. There is no water supply or wastewater disposal infrastructure at the existing ECP and NW Military Highway Alternative and Camp Bullis Road Alternative project areas, and there are no nearby connections to such infrastructure. Natural gas infrastructure does not exist on JBSA-BUL. While propane is used for comfort heating at most buildings on installation, there are currently no buildings at the existing ECP and NW Military Highway Alternative and Camp Bullis Road Alternative project areas that require propane- or liquid-fueled comfort heating.

The existing stormwater drainage infrastructure of JBSA-BUL is comprised of paved and unpaved ditches that transport stormwater to receiving waters. Most roadways are crowned so that runoff flows toward the shoulders. Stormwater runoff west of NW Military Highway is conveyed through a drainage ditch that runs along the western shoulder of the highway. A culvert beneath NW Military Highway connects this drainage ditch to a natural drainage channel to the east of the project area (Arizpe 2016). There is limited manmade stormwater drainage infrastructure currently at the existing ECP or Camp Bullis Road Alternative project area.

There are no landfills on JBSA-BUL. Solid waste is collected by a private, licensed contractor and transported to a private, off-installation landfill.

Transportation. The ROI for transportation is the local roadway network external to JBSA-BUL, with focus on those streets and highways that would be impacted by traffic resulting from the Proposed Action. These roadways include I-10, Loop 1604, NW Military Highway, and Camp Bullis Road.

The *City of San Antonio Thoroughfare Plan* (CSATP) classifies I-10 and Loop 1604 as freeways in the vicinity of JBSA-BUL. These two freeways intersect southwest of JBSA-BUL. I-10 is a four-lane freeway with one-way, three-lane frontage roads to the west of JBSA-BUL (see

Figures 2-1 and **2-2**). According to TxDOT traffic counts, the 2015 traffic volume on I-10 was approximately 89,175 vehicles per day (vpd) north of Stonewall Parkway. Loop 1604 is a four-lane freeway with one-way, two-lane frontage roads to the south of JBSA-BUL (see **Figures 2-1** and **2-2**). According to TxDOT traffic counts, the 2015 traffic volume on Loop 1604 was 129,500 vpd east of I-10 (HDR 2017).

The CSATP classifies NW Military Highway as a Primary Arterial Type A roadway in the vicinity of JBSA-BUL. NW Military Highway is a four-lane, undivided roadway south of Loop 1604 and a two-lane, undivided roadway north of Loop 1604. The existing ECP is located on NW Military Highway approximately 1.75 mile north of Loop 1604 (see **Figure 2-2**). According to TxDOT traffic counts, the 2015 traffic volume on NW Military Highway was approximately 15,892 vpd south of Loop 1604 and 7,224 vpd north of Loop 1604 (HDR 2017).

The CSATP classifies Camp Bullis Road (see **Figure 2-2**) as a Secondary Arterial Type A roadway in the vicinity of JBSA-BUL. Camp Bullis Road is a two-lane, undivided road east of I-10 and a four-lane, divided road west of I-10. Camp Bullis Road currently serves as an emergency egress for JBSA-BUL. According to TxDOT saturation counts, the 2010 traffic volume on Camp Bullis Road was approximately 2,750 vpd east of I-10 (HDR 2017).

The San Antonio Unified Development Code requires that a traffic impact assessment (TIA) be prepared for proposed developments within the City of San Antonio that generate greater than 75 vehicular trips during peak commuting hours when roadways are most congested (City of San Antonio 2006). To meet this requirement and support development of this EA, a TIA was prepared and is provided in **Appendix C**. Both the City of San Antonio (Transportation and Capital Improvements Office) and TxDOT (San Antonio District Office) will be given the opportunity to review and comment on this TIA as part of the interagency and intergovernmental coordination and consultation process for the Draft EA.

Level of Service at Intersections and Interchanges. In order to establish a baseline for potential transportation impacts, two time periods (i.e., AM and PM) and 2016 travel conditions were evaluated for the ROI. Intersections and interchanges in the vicinity of JBSA-BUL are considered the locations of principal concern because they are the locations of highest traffic conflict and delay. Level of service (LOS) is an ordinal measure of vehicle carrying capacity and is the standard used to evaluate traffic conditions at intersections and interchanges. It reflects driver perceptions of traffic flow and congestion, and takes into consideration speed, travel time, freedom to maneuver, safety, driving comfort, and convenience. The six LOS flow condition values for signalized intersections and interchanges are listed in **Table 3-6**. The City of San Antonio considers overall LOS A through C to be acceptable, while an overall LOS of D through F is unacceptable (City of San Antonio 2006).

The overall (i.e., for the intersection as a whole) LOS was identified for three intersections and interchanges within the ROI. These intersections and LOS measurements are presented in **Table 3-7** (HDR 2017).

Table 3-6. LOS Measurement and Ordinal Descriptions for Signalized Intersections

Level of Service	Control Delay Per Vehicle (seconds)	Description
A	< 10	Good progression and short cycle lengths
B	> 10 and < 20	Good progression or short cycle lengths, more vehicle stops
C	> 20 and < 35	Fair progression and/or longer cycle lengths, some cycle failures
D	> 35 and < 55	Congestion becomes noticeable, high volume to capacity ratio
E	> 55 and < 80	Limit of acceptable delay, poor progression, long cycles, and/or high volume
F	> 80	Unacceptable to drivers, volume greater than capacity

Source: TRB 2010

Table 3-7. Existing Overall LOS for Intersections in the ROI

Intersection/Interchange	2016 Existing LOS	
	AM	PM
Loop 1604 and NW Military Highway Interchange (signalized)	F	F
I-10 and Camp Bullis Road Interchange (signalized)	C	C
Camp Bullis Road and West Tejas Trail (unsignalized)	A	A

Source: HDR 2017

For unsignalized intersections (i.e., intersections without traffic light signalization) the overall intersection LOS can be misleading because it takes into account the very minimal delay for the uncontrolled approaches. Therefore, the highest approach LOS is used for the entire intersection. For the Camp Bullis Road and West Tejas Trail intersection (i.e., the only major unsignalized intersection in the ROI for transportation), the southbound approach of West Tejas Trail is the approach with the highest LOS. This LOS is also LOS A for the AM and PM periods (HDR 2017).

Traffic between JBSA Sites. A substantial share of JBSA-BUL traffic originates from JBSA-Sam Houston and JBSA-Lackland. Buses transporting troops between the sites arrive between 5:30 and 9:00 a.m. and depart between 1:30 and 4:00 p.m. Transportation of troops from JBSA sites to JBSA-BUL is a greater concern during the AM peak period, as bus arrival times coincide with the AM peak for background traffic, whereas the afternoon bus departures fall outside of the PM peak period.

The shortest routes from JBSA-Lackland and JBSA-Sam Houston are assumed to be used for troop transport operations. The shortest route from JBSA-Lackland to JBSA-BUL includes I-410 and I-10. The shortest route from JBSA-Sam Houston to JBSA-BUL includes I-35 and I-10. **Figure 4-15** in **Appendix C** shows troop transportation routes from both JBSA-Lackland and JBSA-Sam Houston to JBSA-BUL (HDR 2017).

The following observations were made based on the typical travel times between JSBA-BUL and other JBSA sites as described in **Tables 4-5** and **4-6** in **Appendix C**:

- Travel time deterioration is greatest on the route between JBSA-Lackland and JBSA-BUL during the AM peak period.
- During the AM peak period, entering JBSA-BUL through Camp Bullis Road would reduce travel times by as much as five minutes compared to entering through NW Military Highway.
- Traffic congestion is heavier during the AM peak period on Loop 1604 from I-10 to NW Military Highway than on I-10 from Loop 1604 to Camp Bullis Road (HDR 2017).

3.6.3 Environmental Consequences

Impacts on infrastructure are evaluated for their potential to disrupt or improve existing infrastructure service levels and create additional needs for utilities. An impact could be significant if a proposed action resulted in any of the following:

- Exceeded capacity of a utility
- A long-term interruption of the utility.

Impact analysis for transportation considers changes to roadway and intersection LOS, travel patterns and accessibility (i.e., ease of drivers to reach desired destination), and traffic safety. An impact could be significant if a proposed action resulted in any of the following:

- Substantial decline in LOS conditions (e.g., if a proposed action resulted in a change from LOS A to LOS E or F).
- Reduced traffic safety leading to increased risk of vehicular accidents
- Substantial and permanent changes to roadway accessibility.

3.6.3.1 NW MILITARY HIGHWAY ALTERNATIVE

Infrastructure. Short-term, negligible, adverse impacts on utility infrastructure would occur from construction and demolition. Electricity and communications services would be extended aboveground to the proposed ECP from the installation's wastewater treatment plant. Services would then be distributed to the proposed ECP components through underground utility conduits. Electrical and communications infrastructure at the existing ECP would be removed as part of demolition. An onsite groundwater well and septic system would be constructed to support the proposed ECP. Temporary impacts would result from a slight increase electricity, water, and wastewater demand during construction and demolition; however, this increase in demand would be within JBSA-BUL's utility infrastructure capacity.

Long-term, negligible, beneficial impacts would occur from the replacement of older, inefficient utilities and structures. Operation of the proposed ECP would not appreciably increase the long-term demand for electricity, communications, water, and wastewater services because the increases in the demand for these utilities would be mostly offset by the elimination of utility demand from no longer operating the existing ECP. If the buildings of the proposed ECP are heated using propane- or liquid-fueled heating infrastructure, there would be an extremely negligible increase in the regional demand for these fuels. Operation of the proposed emergency generator would also result in an extremely negligible increase in the regional

demand for liquid fuel (i.e., diesel). Sustainability features would be incorporated into the proposed construction to further limit the increased demand on energy and water resources.

No adverse impacts on stormwater drainage infrastructure would occur. The existing drainage ditches and channels near the project area would remain in place. The culvert beneath NW Military Highway would be relocated as necessary. Additional stormwater management infrastructure would be constructed to account for the approximately 60,000 ft^2 net increase in impervious surface from the Proposed Action. The primary transport of stormwater across the project area would continue to be sheet flow; therefore, the ECP design would minimize the use of curbs and gutters in the medians to promote surface flow. Stormwater drainage criteria would follow the TxDOT 10-year storm design practice (Arizpe 2016). Additional information on potential stormwater impacts under the Proposed Action is provided in **Section 3.9.3.1**.

Short-term, negligible, adverse impacts would occur from a temporary increase in solid waste produced during construction and demolition. Solid waste would be disposed of by contractors in accordance with relevant federal, state, and local regulations. Construction and demolition materials would be recycled or reused to the maximum extent possible. Solid waste generated during construction and demolition would not be expected to exceed the capacity of private, off-installation landfills. No additional volumes of solid waste would be generated from the operation of the proposed ECP as compared to those currently generated from the operation of the existing ECP.

***Transportation*.** Short-term, minor, adverse impacts on transportation would occur during construction and demolition. Construction and demolition would require the delivery of materials and removal of debris. Trucks associated with these activities, along with construction crews commuting daily, would access the project area via the existing ECP, resulting in short-term, minor, adverse impacts on local transportation patterns in the vicinity of the installation, particularly on NW Military Highway and Loop 1604. Construction traffic would slightly exacerbate existing congestion at the Loop 1604 and NW Military Highway interchange; however, such traffic would be a negligible percentage of the existing traffic at this interchange. Potential congestion impacts could be minimized by scheduling truck deliveries during off-peak hours. Additionally, many of the heavy construction vehicles would be driven to the project area and retained on the installation for the duration of the construction. Traffic impacts associated with construction would only occur for the duration of those activities; therefore, potential increases to baseline LOS values from construction traffic would be temporary. NW Military Highway would remain open during construction and demolition, and access to the installation would continue to be processed at the existing ECP until construction is complete.

No new long-term impacts on transportation would occur from the operation of the proposed ECP on NW Military Highway. Traffic patterns would not change from current conditions because all traffic, including that between JBSA sites, would continue to use NW Military Highway to enter and exit JBSA-BUL. Camp Bullis Road would remain closed to installation traffic. The number of personnel requesting access to JBSA-BUL would not change. Additionally, the number of and time periods for personnel traveling from other JBSA sites to JBSA-BUL would remain the same as described in **Section 3.6.2.** The overall intersection LOS values for forecasted 2018 conditions (i.e., conditions after the proposed ECP is operational on

NW Military Highway and accounting for background traffic growth from 2016 to 2018) are provided in **Table 3-8**.

Table 3-8. 2018 Forecasted Overall Intersection LOS under the NW Military Highway Alternative

Intersection	Existing Conditions 2016 Overall Intersection LOS		2018 Forecasted NW Military Highway Alternative	
	AM	PM	AM	PM
Loop 1604 and NW Military Highway Interchange (signalized)	F	F	E	E
I-10 and Camp Bullis Road Interchange (signalized)	C	C	C	D
Camp Bullis Road and West Tejas Trail Intersection (unsignalized)	A	A	A	A

Source: HDR 2017

As shown in **Table 3-8**, AM and PM overall LOS would slightly improve (i.e., from LOS F to LOS E) at the Loop 1604 and NW Military interchange between 2016 and 2018. This improvement in traffic conditions would result from TxDOT and non-JBSA proposed intersection improvement projects rather than consequences of the NW Military Highway Alternative. These proposed improvements are being implemented because background traffic growth has resulted in unacceptable traffic conditions at this interchange, and they are unrelated to the Proposed Action and are not being implemented to address JBSA actions. These proposed improvements are as follows:

- Install a 365-foot right-turn deceleration lane with a 100-foot taper for the southbound approach of NW Military Highway at Loop 1604 westbound Frontage Road.
- Extend the southbound auxiliary through lane at this same intersection by 465 feet.
- Optimize signal timing at this intersection (HDR 2017).

Table 3-8 also shows a forecasted decline in overall PM LOS (i.e., from LOS C to LOS D) at the I-10 and Camp Bullis Road interchange. Because the NW Military Highway Alternative would not change traffic volumes at this interchange, this forecasted decline is a result of projected background traffic growth between 2016 and 2018 rather than a direct impact from the NW Military Highway Alternative (HDR 2017).

For the intersection of Camp Bullis Road and West Tejas Trail, the overall LOS would remain the same at LOS A for the AM and PM periods (see **Table 3-8**). However, the highest approach (i.e., southbound West Tejas Trail) would decline from LOS A to LOS B for the AM period. This forecasted decline is also a result of projected background traffic growth between 2016 and 2018 rather than a direct impact from the NW Military Highway Alternative because this alternative would not change traffic volumes at this intersection (HDR 2017).

Therefore, under the NW Military Highway Alternative, long-term transportation conditions would generally remain the same as described in **Section 3.6.2**. Long-term LOS values would not directly change at any intersection or interchange from the NW Military Highway Alternative. No intersection improvements would be necessary for this alternative. Travel times between JBSA-BUL and other JSBA sites would not change. No impacts on traffic safety would occur. **Appendix C** contains additional details on transportation impacts from this alternative.

3.6.3.2 CAMP BULLIS ROAD ALTERNATIVE

Infrastructure. Impacts on infrastructure would be similar to those described for the NW Military Highway Alternative in **Section 3.6.3.1**. Electrical and communications services would be extended from the nearest source, which for electricity is the existing substation immediately north of Camp Bullis Road. Additionally, if construction of a water line between JBSA-BUL and the off-installation water supply network is completed before the proposed ECP is constructed, potable water for the proposed ECP would be obtained from this water line rather than from an onsite groundwater well. Therefore, no significant short- or long-term impacts on utility infrastructure, stormwater drainage, and solid waste management would occur under the Camp Bullis Road Alternative.

***Transportation*.** Similar short-term, minor, adverse impacts on transportation would occur during construction and demolition as those described for the NW Military Highway Alternative in **Section 3.6.3.1**; however, Camp Bullis Road and I-10 would be impacted to a greater degree under this alternative because construction traffic would use these roads to access the project area. Construction traffic would slightly exacerbate existing congestion at the I-10 and Camp Bullis Road interchange; however, such traffic would be a negligible percentage of the existing traffic at this interchange. Measures to minimize potential impacts from construction traffic are discussed for the NW Military Highway Alternative in **Section 3.6.3.1** and would similarly be implemented under this alternative. Access to JBSA-BUL would not be impacted during construction and demolition because Camp Bullis Road currently serves only as an emergency egress. The existing ECP on NW Military Highway would remain operational until construction is complete.

Long-term, moderate, adverse impacts on transportation would occur from the operation of the proposed ECP on Camp Bullis Road. While the number of personnel requesting access to JBSA-BUL would not change, traffic patterns would change as Camp Bullis Road would open to all traffic accessing JBSA-BUL and NW Military Highway would close. The overall intersection LOS values for forecasted 2018 conditions (i.e., conditions after the proposed ECP is operational on Camp Bullis Road and accounting for background traffic growth from 2016 to 2018) are provided in **Table 3-9**.

The AM and PM overall LOS improvement (i.e., from LOS F to LOS E) at the Loop 1604 and NW Military Highway interchange (shown in **Table 3-9**) would be a result of the TxDOT and non-JBSA proposed interchange improvement projects discussed in **Section 3.6.3.1**. In addition, the relocation of all JBSA-BUL traffic from NW Military Highway to Camp Bullis Road would reduce the delay at the Loop 1604 and NW Military Highway interchange, but it would not be enough to further improve the overall LOS for this interchange (HDR 2017).

Table 3-9. 2018 Forecasted Overall Intersection LOS under the Camp Bullis Road Alternative

Intersection	Existing Conditions 2016 Overall Intersection LOS		2018 Forecasted Camp Bullis Road Alternative (No Improvements)*		2018 Forecasted Camp Bullis Road Alternative (With Improvements)**	
	AM	PM	AM	PM	AM	PM
Loop 1604 and NW Military Highway Interchange (signalized)	F	F	E	E	E	E
I-10 and Camp Bullis Road Interchange (signalized)	C	C	D	E	C	D
Camp Bullis Road and West Tejas Trail Intersection (unsignalized)	A	A	A	A	A	A

Source: HDR 2017

* Assumes USAF makes no improvements to the I-10 and Camp Bullis Road interchange.

** Assumes USAF makes the improvements identified in **Table 3-10** for the I-10 and Camp Bullis Road interchange.

As shown in **Table 3-9**, the relocation of all JBSA-BUL traffic from NW Military Highway to Camp Bullis Road and the projected increase in background traffic between 2016 and 2018 would reduce the AM and PM overall LOS (i.e., from LOS C to LOS D and from LOS C to LOS E, respectively) at the I-10 and Camp Bullis Road interchange. These changes to traffic conditions would be permanent, and the delay could be noticeable to drivers using the interchange. However, as noted in **Section 3.6.3.1**, the projected background traffic growth from 2016 to 2018 accounts for the forecasted decline in overall PM LOS from LOS C to LOS D at this interchange. Therefore, the Camp Bullis Road Alternative would directly result in an overall LOS reduction of only one value for both the AM and PM periods, which would not be a substantial decline in LOS conditions. Nevertheless, the City of San Antonio considers overall intersection LOS A through C to be acceptable and LOS D through F unacceptable (City of San Antonio 2006), and the Camp Bullis Road Alternative would directly reduce the overall intersection LOS for the I-10 and Camp Bullis Road interchange from acceptable to unacceptable for both the AM and PM periods. As a result, intersection improvements would be necessary to prevent the Camp Bullis Road Alternative from resulting in unacceptable traffic conditions. **Table 3-10** identifies intersection improvements that would avoid unacceptable traffic conditions if implemented. As shown in **Table 3-9**, with these improvements, the forecasted overall AM LOS would remain the same as existing conditions (i.e., LOS C) rather than decline to LOS D and the forecasted overall PM LOS would decline only to LOS D rather than LOS E. And, as stated in **Section 3.6.3.1** and earlier in this paragraph, the reduction of the PM period to LOS D would result from the projected background traffic growth from 2016 to 2018 rather than direct impacts of the Camp Bullis Road Alternative. Therefore, implementation of the intersection improvements would ensure the I-10 and Camp Bullis Road interchange would not decline into the unacceptable category from the Camp Bullis Road Alternative (HDR 2017).

Table 3-10. Roadway and Intersection Improvements for the Camp Bullis Road Alternative

Location	Action	Responsibility
I-10 and Camp Bullis Road Interchange	Optimize signal timing at this intersection	USAF, City of San Antonio
	Install right-turn lane for the westbound approach of Camp Bullis Road at the I-10 westbound Frontage Road.	USAF

Source: HDR 2017

The overall LOS for the Camp Bullis Road and West Tejas Trail intersection would remain the same as existing conditions (see **Table 3-9**). However, the highest approach (i.e., southbound West Tejas Trail) would decline from LOS A to LOS B for the AM and PM periods. As noted in **Section 3.6.3.1**, the forecasted decline for the AM period would be a result of projected background traffic growth between 2016 and 2018 rather than a direct impact from the Camp Bullis Road Alternative. The forecasted decline for the PM period would be a direct result of the Camp Bullis Road Alterative but would not result in significant impacts because the LOS would decline by only one value, and this intersection would not fall into the unacceptable category as defined by the City of San Antonio (HDR 2017).

As noted in **Section 3.6.2**, traffic originating from JBSA-Lackland and JBSA-Sam Houston and entering JBSA-BUL during the AM peak period would experience a reduction in travel time by as much as five minutes when entering through Camp Bullis Road as compared to NW Military Highway. As a result, implementation of the Camp Bullis Road Alternative would provide slightly more efficient transit operations between JBSA-BUL and other JBSA sites (HDR 2017). **Tables 4-5** and **4-6** in **Appendix C** provide detail on typical travel times between JBSA-BUL and other JSBA sites at various times of the day. The number of and time periods for personnel traveling from other JBSA sites to JBSA-BUL would remain the same as described in **Section 3.6.2**.

No impacts on traffic safety would occur. **Appendix C** contains additional details on transportation impacts from this alternative.

3.6.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and infrastructure and transportation conditions would remain the same as described in **Section 3.6.2**. Non-JBSA-BUL development would continue to occur in the surrounding area, which would continue to deteriorate traffic conditions as described in **Section 3.6.3.1**. The overall intersection LOS values for forecasted 2018 conditions (i.e., conditions under the No Action Alternative and accounting for background traffic growth from 2016 to 2018) would be identical to those provided in **Table 3-8**. No new impacts on infrastructure or transportation would occur.

3.7 Noise

3.7.1 Definition of the Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or

continuous, steady or impulsive, and can involve any number of sources and frequencies. It can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. Affected receptors are specific (e.g., schools, churches, hospitals) or broad (e.g., nature preserves, designated districts) areas in which occasional or persistent sensitivity to noise above ambient levels exists.

Sound Metrics. Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighing," measured in A-weighted decibels (dBA), approximates a frequency response expressing the perception of sound by humans. Sounds encountered in daily life and their dBA levels are provided in **Table 3-11**.

Table 3-11. Common Sounds and Their Levels

Outdoor	Sound Level dBA	Indoor
Motorcycle	100	Subway train
Tractor	90	Garbage disposal
Noisy restaurant	85	Blender
Downtown (large city)	80	Vacuum cleaner
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: Harris 1998

Ambient Sound Levels. Ambient sound is defined as the all-encompassing sound associated with a given environment, being usually a composite of sounds from many sources, near and far. Noise level is dependent upon the surrounding environment (e.g., nearby airports, heavy traffic, open space) and the density of individuals. The noise level in a normal suburban area is approximately 55 dBA, which increases to 60 dBA for an urban residential area, and to 80 dBA in the downtown section of a city (USEPA 1974). Most people are exposed to sound levels of 50 to 55 dBA or higher on a daily basis.

Construction Sound Levels. Building construction and demolition can cause an increase in sound that is well above the ambient level. A variety of sounds are emitted from loaders, trucks, pavers, and other work equipment. **Table 3-12** presents a list of construction and demolition equipment that could be used to support the Proposed Action and their corresponding noise levels. Construction and demolition equipment usually exceeds the ambient sound levels by 20 to 25 dBA in an urban environment, and up to 30 to 35 dBA in a quiet suburban area.

Table 3-12. Noise Level Ranges of Typical Construction and Demolition Equipment

Equipment	Noise Levels in dBA at 50 feet
Trucks	82–95
Cranes (moveable)	75–88
Cranes (derrick)	86–89
Saws	72–82
Pneumatic Impact Equipment	83–88
Jackhammer	81–98
Pumps	68–72
Generators	71–83
Compressors	75–87
Concrete Mixers	75–88
Concrete Pumps	81–85
Front Loader	73–86
Back Hoe	73–95
Tractor	77–98
Scraper/Grader	80–93
Paver	85–88

Source: USEPA 1971

Note: Equipment equipped with noise control devices (e.g., mufflers) and use of sound barriers are expected to result in lower noise levels than shown in this table. The presence of dense trees, buildings, and hilly terrain would be expected to increase effectiveness of noise attenuation with distance from the generating source(s) (USDA 2008).

Sound Attenuation. In an area without trees or buildings, noise generally attenuates by 6 dBA with each doubling of distance to a receptor from a point source such as concrete mixers or generators, or by 3 dBA with each doubling of distance from a line source, such as construction-related truck traffic. Any additional reduction in noise is referred to as "excess attenuation" and is typically associated with the presence of trees, hills, or buildings. Specifically, early research showed that excess attenuation within a forest was 6 dB per 100 feet of forested land (Herrington and Brock 1977). More recent analysis showed that noise could be reduced by more than 20 dB per 100 feet of forest, but the actual levels of reduction would depend upon tree species, tree and canopy density, trunk diameters, and soil composition (USACE 2004, USDA 2008, Maleki and Hosseini 2011). Additionally, presence of hilly terrain, or buildings with height of at least 12 feet, could reduce noise levels by almost twice that achieved by relatively flat forest land (USDA 2008).

Federal Regulations. The federal government established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. According to the U.S. Army, Federal Aviation Administration, and U.S. Department of Housing and Urban Development criteria, residential units and other noise-sensitive land uses are "clearly unacceptable" in areas where noise exposure exceeds 75 dBA, "normally unacceptable" in regions exposed to noise between 65 and 75 dBA, and "normally acceptable" in areas exposed to noise of 65 dBA or less. For outdoor activities, USEPA recommends 55 dBA as

the sound level below which there is no reason to suspect that the general population would be at risk from any of the effects of noise (USEPA 1974).

State Regulations. The State of Texas issues general nuisance regulations that restrict noise generating activities to weekdays and business hours. Noise regulations are more specifically driven by city authorities. San Antonio Code of Ordinance Chapter 21, Article III, Division 1, Sections 21-52, *Noise Nuisance Enumeration,* restricts noise generation to daylight hours, during weekdays, and prohibits noise generation that exceeds 80 dB at or across any real property boundary. Several exceptions to these restrictions include activities generating sound to alert of an emergency, sound produced by moving vehicles in a public right-of-way, sound produced by any governmental body in the performance of a governmental function, stadium events, election campaigns, or sound produced by heating, ventilation, or air conditioning units on residential properties.

3.7.2 Affected Environment

Noise Environment. The ambient sound environment on JBSA-BUL is comprised of noise from fixed-wing (e.g., C-130) and rotary-wing (i.e., helicopter) aircraft operations, live-fire weapons training ranges, and explosives training ranges. Approach and landing for fixed-wing aircraft is positioned on the northern end of the installation while helicopter flight routes follow the perimeter of the installation. Fixed- and rotary-wing aircraft primarily generate noise at the drop zones and helicopter landing sites located along the southern boundary of JBSA-BUL. Twenty live-fire ranges on the installation support weapons training on small and large caliber weapons, grenades, and explosive demolitions. The small and large caliber weapons training range is located in the southern portion of JBSA-BUL and covers approximately 6,000 acres. In these areas, nuisance level noise (e.g., greater than 75 dB) from weapons training activities may be experienced up to approximately 490 feet beyond the southern boundary of the installation. Noise vibrations generated from aircraft operations, activities on the firing ranges, and explosions associated with ordnance disposal are also experienced on the installation. Ground-based vibration on the installation is generally associated with noise generated during weapons, grenade, and demolitions training operations (City of San Antonio 2009).

The existing ECP for JBSA-BUL is located on NW Military Highway just north of the southern boundary of the installation. Because JBSA-BUL operates only one ECP, all noise from traffic entering and exiting the installation is generated along NW Military Highway between Loop 1604 and the intersection with Camp Bullis Road. Camp Bullis Road is closed to traffic accessing the installation; therefore, no noise from JBSA-BUL traffic is generated on Camp Bullis Road between I-10 and the installation boundary. There is virtually no vehicular traffic on Camp Bullis Road between the installation boundary and NW Military Highway; therefore, very limited vehicular noise is generated on this stretch of Camp Bullis Road. In general, the southwest corner of the installation, where the Proposed Action would occur, is dominated by noise from vehicular traffic, industrial activities, aircraft operations, and military training.

Noise-Sensitive Receptors (NSRs). No NSRs are located on JBSA-BUL. Eisenhower Park is the nearest NSR to the NW Military Highway Alternative project area. This park was formerly part of the installation, but was relinquished back to the State of Texas for use as a public

recreational area. It is located along the southern border of JBSA-BUL between Old Camp Bullis Road and NW Military Highway and encompasses approximately 320 forested acres. Jogging trails and picnicking areas are provided for public enjoyment. The eastern border of the park runs parallel to NW Military Highway and is located immediately west of the existing ECP, approximately 1,500 feet (0.3 mile) southwest of the NW Military Highway Alternative project area, and approximately 1,800 feet (0.3 mile) south of the Camp Bullis Road Alternative project area. The area between Eisenhower Park and the NW Military Highway Alternative project area is lightly forested with few topographic features, while the area between Eisenhower Park and the Camp Bullis Road Alternative project area is heavily forested with intervening topography.

Other nearby NSRs include the Texas Military Institute—The Episcopal School of Texas (TMI) and off-installation residential housing. TMI is located approximately 4,000 feet (0.75 mile) and 10,500 feet (2.0 miles) south of the Camp Bullis Road Alternative and NW Military Highway Alternative project areas, respectively. Only a few residences are interspersed in the forested land south and west of the installation, with the nearest home located approximately 850 feet (0.2 mile) west of the Camp Bullis Road Alternative project area and 5,500 feet (1.0 mile) southeast of the NW Military Highway Alternative project area. The terrain between the project areas and these NSRs is mostly forested with intervening topography.

3.7.3 Environmental Consequences

An analysis of the potential effects associated with noise typically evaluates potential changes to the existing acoustical environment that would result from implementation of a proposed action. Potential changes in the acoustical environment can be beneficial (i.e., they reduce the number of sensitive receptors exposed to unacceptable noise levels or reduce the ambient sound level), negligible (i.e., the total number of sensitive receptors to unacceptable noise levels is essentially unchanged), or adverse (i.e., they result in increased sound exposure to unacceptable noise levels or ultimately increase the ambient sound level). Effects would be considered significant if noise levels were to be unacceptable to multiple sound receptors or violate noise regulations.

The main issues concerning noise effects on humans are physiological effects (e.g., hearing loss and non-auditory effects), behavioral effects (e.g., speech or sleep interference and performance effects), and subjective effects such as annoyance. This noise analysis considers potential effects on the identified NSRs located near the Proposed Action. The major sources of noise, their contribution to the overall noise environment, and maximum sound level were estimated for comparison to local noise-control standards.

3.7.3.1 NW MILITARY HIGHWAY ALTERNATIVE

On-installation Noise Impacts. Short-term, minor, adverse impacts on the JBSA-BUL ambient noise environment would occur from operation of construction equipment as well as the increase in construction vehicle traffic noise along NW Military Highway. Impacts would be temporary and last only for the duration of construction and demolition. Mufflers on construction vehicles and temporarily placed noise dampening barriers (e.g., sound screens) could be used to reduce adverse noise impacts immediately proximal to the construction and demolition sites. Noise levels from construction and demolition would vary depending on the types of equipment

being used on a given day, the topography of the area where the project would occur, the distance of the receptor from the generating source, and the presence of trees or buildings. Because JBSA-BUL is an active military installation that supports aircraft, live-fire weapons, and explosives training, the temporary increases in construction noise would be a fraction of the noise generated routinely on the installation. Additionally, all construction and demolition would occur proximate to NW Military Highway where noise from vehicular traffic is common.

No long-term impacts on the ambient noise environment of JBSA-BUL would occur from operation of the proposed ECP. Operational functions at the proposed ECP would not be appreciably louder than operational functions at the existing ECP. The NW Military Highway Alternative would not change the long-term volume of traffic entering and exiting the installation or the location where traffic enters and exits the installation; therefore, noise associated with everyday installation traffic would not change.

Off-installation Noise Impacts. Short-term, negligible to minor, adverse noise impacts on areas beyond the installation's boundaries would occur from sound propagation from the construction and demolition sites. Because construction usually involves simultaneous use of several pieces of equipment (e.g., saws and haul trucks), additive construction noise during the busiest day was estimated to determine the total effect of noise at a given distance. Because construction of multiple facilities and roadway redevelopment would occur concurrently, construction and jackhammer noise levels were estimated using distances measured from the project area to each of the identified NSRs. **Table 3-13** summarizes the estimated noise levels at the NSRs. Although conservative construction noise levels could sometimes exceed 75 dBA at the NSRs, these noise levels would only occur intermittently during the day and would not result in significant impacts. This analysis conservatively assumes all construction processes occur concurrently and does not consider use of noise dampening equipment (e.g., mufflers) or the presence of forested land, intervening topography, and buildings that would attenuate noise from the generating source. Noise would be experienced at Eisenhower Park from the demolition of the existing ECP, which is located immediately adjacent. The small and prefabricated facilities of the existing ECP would be demolished quickly; therefore, the duration of demolition noise impacts on Eisenhower Park would be limited.

Noise from construction vehicle traffic would also adversely affect off-installation areas. Because all traffic would continue to access JBSA-BUL via NW Military Highway, noise impacts from construction vehicle traffic would mainly be experienced on populations adjacent to NW Military Highway between the installation and Loop 1604. Construction vehicle traffic would include tractor-trailers transporting supplies and heavy equipment and dump trucks transporting debris. These vehicles would only be traveling to and from the construction and demolition sites using established roadways. These vehicles might drive by NSRs (e.g., Eisenhower Park) and other residences; however, this increased construction and demolition traffic would be temporary and only occur during the period of construction and demolition. Construction traffic would be a fraction of the existing traffic, and would likely cause negligible increases in noise levels on noise-sensitive populations. Construction vehicle noise would be expected to occur during daytime, normal working hours (i.e., between 7 a.m. and 5 p.m.), and peak levels would be expected at the beginning and end of each work day. Examples of peak noise levels of heavy trucks are provided in **Table 3-12**.

Table 3-13. Predicted Construction Noise Levels at NSRs

NSR	Distance from |Nearest Source to NSR (feet)	Estimated Cumulative Construction dB range at NSR[1]	Estimated dB Range for Jackhammer Noise at NSR[2]
NW Military Highway Alternative			
Eisenhower Park	1,500	67–79	51–68
Nearest Residence	5,500	56–68	40–57
TMI	10,500	51–62	35–52
Camp Bullis Road Alternative			
Nearest Residence	850	72–84	56–73
Eisenhower Park	1,800	66–78	50–67
TMI	4,000	59–71	43–60

Notes:
1 – Cumulative noise levels were estimated using the SengpielAudio (2017) calculator that employs Occupational Safety and Health Administration's (OSHA) logarithmic equation for combining noise levels (OSHA 2013). USEPA (1971) published noise levels for construction equipment and processes were used to determine a representative cumulative noise level range for an accurate and conservative analysis. The estimated cumulative noise level range for simultaneous operation of all construction vehicle and equipment at the project area used in the equation was 97 to 109 dB.
2 – Estimated using USEPA (1971) established dB range for jackhammer activities at the source (i.e., 81 to 98 dB).

Long-term, minor, beneficial noise impacts beyond the installation's boundaries would occur from operation of the proposed ECP on NW Military Highway. While operational functions at the proposed ECP would not be appreciably louder than operational functions at the existing ECP, the proposed ECP would be located approximately 0.3 mile to the north of the existing ECP and correspondingly farther from the installation boundary and Eisenhower Park. Therefore, compared to existing conditions, off-installation populations would be slightly less likely to experience operational noise from the installation's ECP because noise would be expected to attenuate over this distance.

3.7.3.2 CAMP BULLIS ROAD ALTERNATIVE

On-installation Noise Impacts. Similar short-term, minor, adverse impacts on the ambient noise environment of JBSA-BUL would occur from construction and demolition as would occur under the NW Military Highway Alternative. These impacts would result from the operation of construction equipment as well as the increase in construction vehicle traffic noise along Camp Bullis Road. Construction noise would be a fraction of the noise generated routinely on the installation and would occur in a portion of the installation where noise is common. The use of construction equipment and the increase in construction traffic would be temporary and last only for the duration of construction.

No long-term net impacts on the ambient noise environment of JBSA-BUL would occur from the operation of the proposed ECP. Operational functions at the proposed ECP would not be appreciably louder than operational functions at the existing ECP. However, noise from the operation of the ECP and noise from everyday traffic entering and exiting the installation would cease at NW Military Highway and relocate to Camp Bullis Road. As a result, the local noise

environment in proximity to NW Military Highway would become slightly quieter, while the local noise environment in proximity to Camp Bullis Road would become slightly louder.

Off-installation Noise Impacts. Short-term, minor to moderate, adverse noise impacts on areas beyond the installation's boundaries would occur from sound propagation from the construction and demolition sites. The Camp Bullis Road Alternative project area is approximately 850 feet from the nearest NSR whereas the NW Military Highway Alterative project area is approximately 1,500 feet from the nearest NSR. As such, the nearest NSR would be exposed to slightly greater levels of construction noise than the nearest NSR under the NW Military Highway Alternative (see **Table 3-13**). Although conservative construction noise levels could sometimes exceed 80 dBA at the NSRs, these noise levels would only occur intermittently during the day and would not result in significant impacts. Impacts on NSRs from demolition noise at the existing ECP would be identical to those for the NW Military Highway Alternative.

Noise from construction vehicle traffic would also adversely impact off-installation areas, mainly populations adjacent to Camp Bullis Road between the installation and I-10. This increased construction traffic would be temporary and only occur during the period of construction.

Installation traffic would continue to use NW Military Highway to enter and exit JBSA-BUL during the construction period, but once the proposed ECP is functional, all installation traffic would use Camp Bullis Road. As such, long-term, minor to moderate, adverse noise impacts from everyday installation traffic would be experienced by receptors adjacent to Camp Bullis Road between the installation and I-10. These receptors include several residences and TMI. However, the shift of installation traffic from NW Military Highway to Camp Bullis Road would also result in long-term, minor to moderate, beneficial noise impacts from the elimination of everyday vehicle traffic on NW Military Highway between the installation and Loop 1604. These receptors include the residences adjacent to NW Military Highway and Eisenhower Park. Both Camp Bullis Road and NW Military Highway already carry a considerable amount of non-JBSA-BUL traffic; therefore, the changes in vehicle traffic noise on these roads would be slightly perceptible.

3.7.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and noise conditions would remain the same as described in **Section 3.7.2**. No impacts on the ambient noise environment of JBSA-BUL or the nearby NSRs would occur.

3.8 Safety

3.8.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. Potentially unsafe situations or environments exist when a hazard is exposed to a potentially susceptible population. The degree of exposure depends on the proximity of the hazard to the population. This section addresses the well-being, safety, and health of members of the public, contractors, and USAF personnel during aspects of the Proposed Action.

3.8.2 Affected Environment

Safety is largely a matter of adherence to regulatory requirements imposed for the benefit of people and implementation of operational practices that reduce risks of illness, injury, death, and property damage. The health and safety of onsite military and civilian workers are safeguarded by numerous DoD and USAF regulations designed to comply with standards issued by OSHA and USEPA. These standards specify the amount and type of training required for workers, the use of personal protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors. All personnel working on the installation are required to follow these regulations to ensure the safety of themselves and others.

UFC 4-022-01, *Security Engineering: Entry Control Facilities/Access Control Points*, presents a unified approach to the design of entry control facilities and includes the overall layout, organization, infrastructure, and facilities of an ECP. As noted in **Section 1.2**, JBSA-BUL's existing ECP is supported by limited infrastructure and does not fully meet the requirements of this UFC. As such, the existing ECP creates operational inefficiencies that slightly increase safety hazards to installation personnel.

3.8.3 Environmental Consequences

Any increase in safety hazards would be considered an adverse impact on safety. An impact would be considered significant if a proposed action met one or more of the following criteria:

- Substantially increase risks associated with the safety of construction and demolition personnel, contractors, military personnel, or the local community.
- Hinder the ability to respond to an emergency.
- Introduce a new health or safety risk for which the installation is not prepared or does not have adequate management and response plans in place.

3.8.3.1 NW MILITARY HIGHWAY ALTERNATIVE

Short-term, minor, adverse and long-term, minor, beneficial impacts on safety would occur during construction and demolition. Construction and demolition pose an inherent risk of accidents to workers, but this level of risk would be managed by adherence to established OSHA, USEPA, DoD, and USAF safety regulations. Construction and demolition contractors would establish and maintain health and safety programs for their workers. Construction workers would be required to wear personal protective equipment such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Work areas would be fenced and appropriately marked with signs to prevent trespassing.

Long-term, minor, beneficial impacts on safety would occur once the proposed ECP is functional. The proposed ECP would comply with UFC 4-022-01 and eliminate the safety hazards currently experienced by installation personnel at the existing ECP. Operations at the proposed ECP would provide all individuals on JBSA-BUL with improved safety from threats.

3.8.3.2 CAMP BULLIS ROAD ALTERNATIVE

Impacts on safety associated with the Camp Bullis Road Alternative would be similar to those discussed for the NW Military Highway Alternative because of similar levels of proposed construction, demolition, and operation and similar types of equipment. **Section 3.8.3.1** describes these impacts in detail.

3.8.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and safety conditions would remain the same as described in **Section 3.8.2**. No new impacts on safety would occur; however, the operational inefficiencies would remain and installation personnel would continue to be exposed to the associated safety hazards.

3.9 Water Resources

3.9.1 Definition of the Resource

Water resources include groundwater, surface water, wetlands, and floodplains, and their relationship to the Proposed Action. It also considers water quality programs that are enforced as part of water resources protection regulations. Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes.

Groundwater. Groundwater is water that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater originates from precipitation and is an essential resource often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate.

Surface Water. Surface water includes natural, modified, and constructed water confinement and conveyance features above groundwater that may have a defined channel and discernable water flows, as well as associated flora, fauna, and habitats. These features are generally classified as streams, springs, wetlands, natural and artificial impoundments (e.g., ponds, lakes), and constructed drainage canals and ditches.

Stormwater is an important component of surface water systems because of its potential to introduce sediments and other contaminants that could degrade lakes, rivers, and streams. Stormwater flows, which can be exacerbated by high proportions of impervious surfaces associated with buildings, roads, and parking lots, are important to the management of surface water. Stormwater management systems provide the benefit of reducing sediments and other contaminants that would otherwise flow directly into surface waters.

The Clean Water Act (CWA) (33 USC §1251 et. seq., as amended) establishes federal limits, through the National Pollutant Discharge Elimination System (NPDES), on the amounts of specific pollutants that are discharged to surface waters to restore and maintain the chemical, physical, and biological integrity of the water. In Texas, the NPDES is administered by TCEQ under the Texas Pollution Discharge Elimination System. All NPDES stormwater permits issued by USEPA or states must incorporate requirements established in the Final Rule for the CWA

that went into effect starting in 2010. All new construction sites are required to meet the non-numeric effluent limitations and to design, install, and maintain effective erosion and sedimentation controls. In addition, construction sites that disturb 1 or more acres of land are required to obtain an NPDES general permit for construction.

Section 438 of the Energy Independence and Security Act (EISA) (42 USC § 17094) establishes stormwater design requirements for federal construction projects that disturb a footprint greater than 5,000 ft^2. Additional guidance is provided in the USEPA *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*. DoD UFC 3-210-10, *Low Impact Development*, presents criteria for compliance with Section 438 of the EISA.

Water quality standards at the installation are also regulated by USEPA under the Safe Drinking Water Act (42 USC § 201, 300 et seq.) and the CWA. Section 303(d) of the CWA requires states to identify and develop a list of impaired water bodies where technology based and other required controls have not provided attainment of water quality standards. Section 305(b) of the CWA requires states to assess and report the quality of their water bodies. The State of Texas Water Quality Standards are codified in Title 30, Chapter 307 of the Texas Administrative Code under the authority of the CWA and the Texas Water Code. The state has combined their Section 303(d) and 305(b) lists into one report referred to as the Integrated Report. The Integrated Report identifies those water bodies that are impaired and do not meet designated uses, and it establishes total maximum daily loads for the pollutants of concern.

Wetlands. Wetlands are an important natural system and habitat because of the diverse biologic and hydrologic functions they perform. These functions include water quality improvement, groundwater recharge and discharge, pollution mitigation, nutrient cycling, wildlife habitat provision, and erosion protection.

Wetlands are protected as a subset of the waters of the United States under Section 404 of the CWA. The term “waters of the United States” has a broad meaning under the CWA and incorporates deepwater aquatic habitats and special aquatic habitats (including wetlands). The U.S. Army Corps of Engineers defines wetlands as “those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (33 CFR § 328).

EO 11990, *Protection of Wetlands*, requires that federal agencies provide leadership and take actions to minimize or avoid the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland.

Floodplains. Floodplains are areas of low-level ground along rivers, stream channels, large wetlands, or coastal waters. Such lands might be subject to periodic or infrequent inundation because of rain or melting snow. Floodplain ecosystem functions include natural moderation of

floods, flood storage and conveyance, groundwater recharge, and nutrient cycling. Floodplains also help to maintain water quality and are often home to a diverse array of plants and animals. In their natural vegetated state, floodplains slow the rate at which the incoming overland flow reaches the main water body.

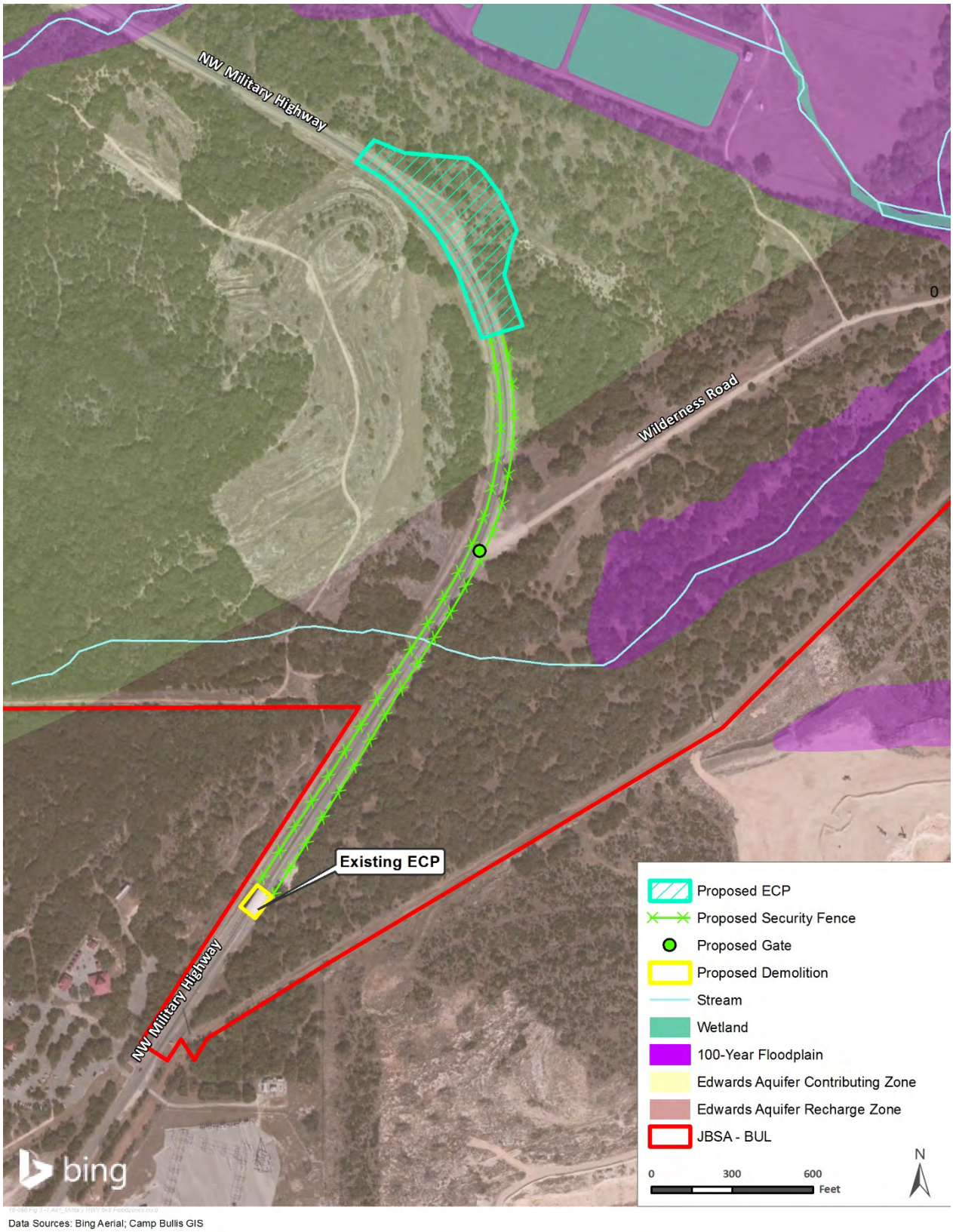
Flooding potential is evaluated by the Federal Emergency Management Agency (FEMA), which defines 100-year floodplains as areas having a 1 percent chance of inundation by a flood event in a given year, and 500-year floodplains as areas having a 0.2 percent chance of inundation in a given year. EO 11988, *Floodplain Management*, requires federal agencies to determine whether a proposed action would occur within a floodplain and directs federal agencies to avoid floodplains to the maximum extent possible wherever there is a practicable alternative.

3.9.2 Affected Environment

Groundwater. Two aquifers underlie JBSA-BUL: the Edwards Aquifer (shallow) and the Trinity Aquifer (deep). The Edwards Aquifer is approximately 160 miles in length, varies in width from 5 to 40 miles, and varies in thickness from approximately 300 to 700 feet. Approximately 24,000 acres of JBSA-BUL fall within the Edwards Aquifer Contributing Zone, which is the area or watershed where runoff from precipitation flows to the Edwards Aquifer Recharge Zone. The remaining 4,000 acres of JBSA-BUL, mostly along the northern, southern, and southeastern boundaries of the installation, are within the Edwards Aquifer Recharge Zone. The majority of recharge to the Edwards Aquifer occurs in the recharge zone where rivers and creeks cross the highly faulted and fractured Edwards limestone outcrop, which allows large quantities of water to flow into the aquifer. Excess water that does not recharge into the aquifer flows down the stream channels during flood events and periods of high rainfall (USAF 2014).

TCEQ regulates construction activities in the Edwards Aquifer contributing and recharge zones by requiring the development and implementation of an Edwards Aquifer Protection Plan (EAPP) prior to ground disturbance. The existing ECP is located within the Edwards Aquifer Recharge Zone. The majority of the NW Military Highway Alternative project area is located within the Edwards Aquifer Contributing Zone; however, approximately 1,200 feet of proposed security fence along NW Military Highway is within the Edwards Aquifer Recharge Zone (see **Figure 3-2**). Because portions of the NW Military Highway Alternative occur on the Edwards Aquifer Recharge Zone and this alternative would include activities regulated by the TCEQ, a Water Pollution Abatement Plan (WPAP) and associated EAPP documents would be required to be submitted to TCEQ prior to ground-disturbing activities. The WPAP and associated EAPP documents provide additional information on the location and infrastructure associated with the project and outlines BMPs that would be implemented and maintained both during and after construction activities.

The Camp Bullis Road Alternative project area is entirely within in the Edwards Aquifer Contributing Zone. Because the Camp Bullis Road Alternative would occur in the Edwards Aquifer Contributing Zone and could affect at least 5 acres, the EAPP required for this alternative is an Edwards Aquifer Contributing Zone Plan (CZP). The CZP provides additional information on the location and infrastructure associated with the project and outlines BMPs that would be implemented and maintained both during and after construction activities.



Data Sources: Bing Aerial; Camp Bullis GIS

Figure 3-2. Water Resources at the NW Military Highway Alternative

The Trinity Aquifer extends from central Texas north to the Red River Valley, covering all or parts of 20 Texas counties. The Trinity Aquifer is made up of several smaller aquifers contained within the Trinity Group, which is divided into three water-bearing units based on hydraulic continuity. The upper, middle, and lower Trinity Aquifer all occur under JBSA-BUL. Saturated thickness of the Trinity Aquifer in central Texas is approximately 1,900 feet (TWDB 2017). The Trinity Aquifer is the primary source for potable water at JBSA-BUL (USAF 2014).

Surface Water. JBSA-BUL is in the San Antonio River basin, which drains approximately 4,180 square miles and contributes to the Guadalupe River that ultimately drains into the San Antonio Bay on the Gulf of Mexico (TCEQ 2017). Surface water at JBSA-BUL consists of six intermittent creeks, five of which have headwaters within JBSA-BUL. Conveyance of water within these creeks is limited to stormwater during flood events and periods of high rainfall (USAF 2014).

No surface water features are within the NW Military Highway Alternative or Camp Bullis Road Alternative project areas. The nearest major surface water feature to the NW Military Highway Alternative project area is Salado Creek, which is approximately 1,200 feet to the northeast. There is also an unnamed tributary to Salado Creek that extends beneath NW Military Highway approximately 1,000 feet to the south of the proposed ECP (**Figure 3-2**). The nearest surface water feature to the Camp Bullis Road Alternative project area is an unnamed creek, which occurs approximately 100 feet to the south (**Figure 3-3**).

Wetlands. Wetlands at JBSA-BUL were surveyed and mapped in spring 2016. These surveys identified 84 wetlands on the installation, including lacustrine, palustrine, and riverine wetlands, totaling approximately 83 acres. There are no wetlands at either the NW Military Highway Alternative or the Camp Bullis Road Alternative project areas (**Figures 3-2** and **3-3**). The nearest documented wetland to the NW Military Highway Alternative project area is a riverine wetland along Salado Creek located approximately 1,000 feet to the northeast. The nearest documented wetland to the Camp Bullis Road Alternative project area is a riverine wetland adjacent to an unnamed creek located approximately 4,000 feet to the northeast (AFCEC and JBSA 2016).

Floodplains. According to FEMA, the NW Military Highway Alternative project area is located outside of the 100-year floodplain. The nearest location of the 100-year floodplain to the NW Military Highway Alterative is Salado Creek located approximately 400 feet to the north (see **Figure 3-2**). Approximately one acre in the southwest corner of the Camp Bullis Road Alternative project area is within the 100-year floodplain of an unnamed creek (see **Figure 3-3**). FEMA has not delineated the 500-year floodplain in the vicinity of the Proposed Action (FEMA 2010).

3.9.3 Environmental Consequences

A proposed action could have significant impacts on water resources if it were to substantially affect water quality, reduce water availability, or reduce supply to existing users; endanger public health or safety by creating or worsening flood hazard conditions; threaten or damage unique hydrologic characteristics; overdraft groundwater basins; exceed the safe annual yield of water supply sources; or violate applicable laws or regulations that protect water resources.

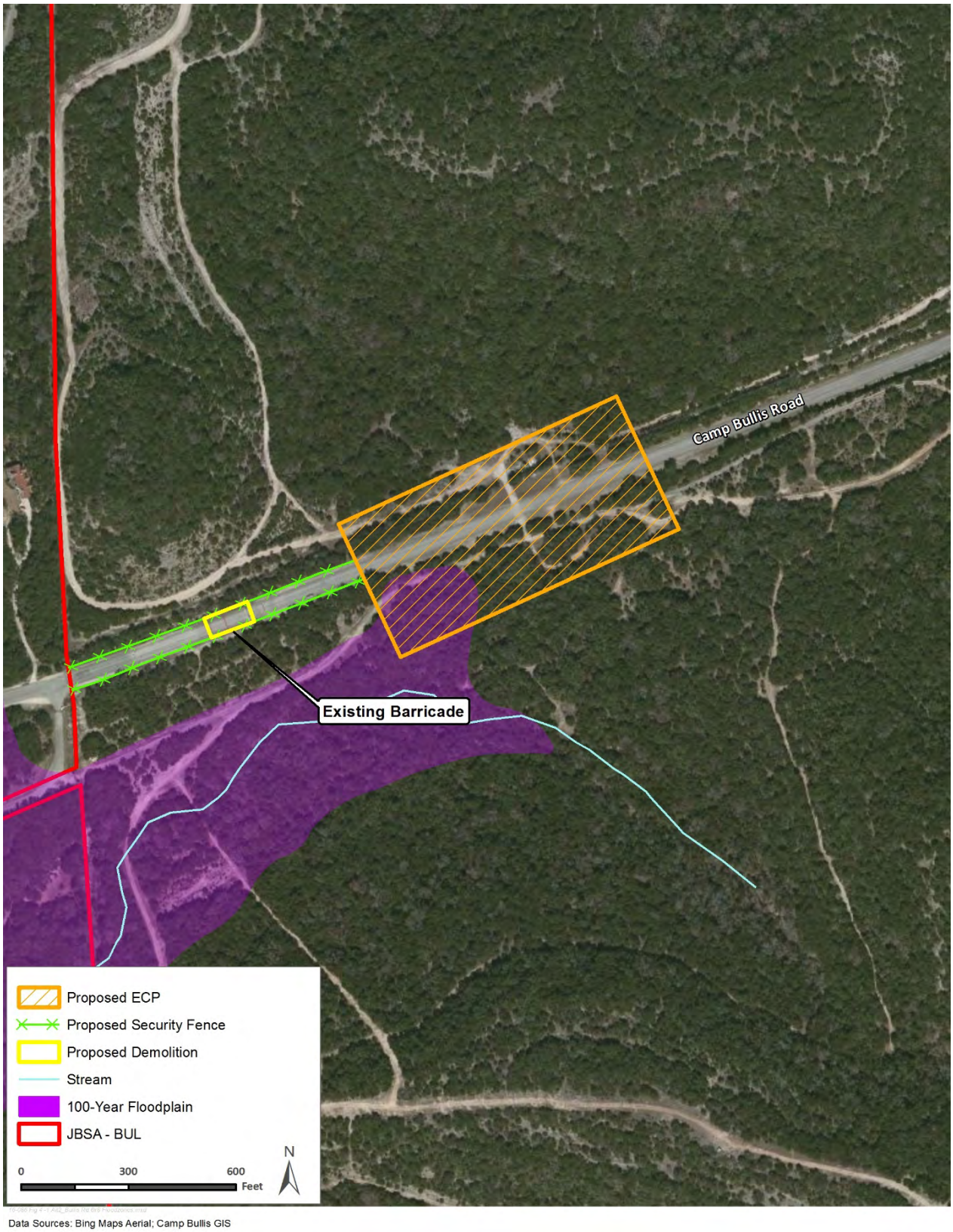


Figure 3-3. Water Resources at the Camp Bullis Road Alternative

3.9.3.1 NW MILITARY HIGHWAY ALTERNATIVE

Groundwater and Surface Water. Short- and long-term, minor, adverse impacts on groundwater and surface water resources would occur. The NW Military Highway Alternative would result in the construction of a new groundwater well that would draw potable water from the Trinity Aquifer and would cause temporary, minor, adverse impacts on the aquifer. Long-term impacts on the aquifer would also be minor because the Proposed Action would not result in the permanent addition of personnel assigned to JBSA-BUL or the construction of facilities with large demands for potable water. Therefore, the NW Military Highway Alternative would not appreciably increase groundwater demands from the Trinity Aquifer. Construction of the proposed groundwater well and associated 5,000-gallon water AST would be coordinated with and approved by the TCEQ. Construction of the proposed onsite septic system also would be coordinated with and approved by the TCEQ. The proposed septic system would be sited within the Edwards Aquifer Contributing Zone; therefore, USAF would comply with the requirements of Title 30 of Texas Administrative Code § 213.6(c).

On-site surface water is limited to stormwater runoff. The hydrologic characteristics of localized runoff would be altered as a result of the increase in impervious surface (i.e., approximately 60,000 ft^2) and the addition of fill to level the grade of the proposed ECP site. However, construction would comply with DoD UFC 3-210-10 and Section 438 of the EISA because the footprint of disturbance would be greater than 5,000 ft^2. Low Impact Development standards and techniques for stormwater management require that predevelopment hydrology is maintained to prevent any net increase in stormwater runoff.

Construction and demolition would have the potential to impact groundwater and surface water quality. JBSA-BUL would manage impacts on groundwater and surface water quality through the implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would include erosion and sediment controls, interim and permanent stabilization controls, and a description of any structural controls that would divert flow away from exposed soils. Silt fences, vegetation buffers, or equivalent sediment controls would be implemented on downslope project boundaries. In addition to the SWPPP, a general discharge permit (NPDES Permit TXR150000) would be developed and submitted to TCEQ and implemented during construction and demolition because ground disturbance would be greater than 1 acre. This permit includes the schedule of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants (e.g., BMPs for construction and demolition site runoff, spills or leaks, waste disposal, drainage from raw material storage areas). Furthermore, because the NW Military Alternative project area occurs within the Edwards Aquifer Contributing and Recharge zones, a WPAP and associated EAPP documents would be prepared and submitted to TCEQ prior to ground disturbance. The WPAP and associated EAPP documents would outline BMPs that would be implemented and maintained both during and after construction and demolition. The BMPs from the NPDES, SWPPP, WPAP, and associated EAPP documents would prevent surface water runoff from causing soil erosion and siltation in streams, creeks, and groundwater features. Therefore, through implementation of these BMPs, short- and long-term adverse impacts on groundwater and surface water resources would be minor.

Wetlands. No direct impacts on wetlands would occur. No identified wetlands or waters of the United States are within the NW Military Highway Alternative project area. Wetlands located downslope of the project area could be slightly impacted by the increase in impervious surface; however, these impacts on wetlands would be minimized by implementation of Low Impact Development techniques and following UFC 3-210-10 and Section 438 of the EISA. The NW Military Highway Alternative would comply with EO 11990.

Floodplains. No direct impacts on the 100-year floodplain would occur. NW Military Highway Alternative project area is not within a 100-year floodplain. Floodplains located downslope of the project area could be indirectly impacted by the increase in impervious surface; however, indirect impacts on floodplains would be minimized by implementation of Low Impact Development techniques and following UFC 3-210-10 and Section 438 of the EISA. The NW Military Highway Alternative would comply with EO 11988, and USAF would coordinate with the Floodplain Administrator of Bexar County for any permit requirements.

3.9.3.2 CAMP BULLIS ROAD ALTERNATIVE

Impacts on groundwater, surface water, and wetlands would be largely similar to those described for the NW Military Highway Alternative and discussed in **Section 3.9.3.1**. The Camp Bullis Road Alternative would also result in an increase in impervious surface of approximately 60,000 ft^2, and the potential for increased stormwater runoff from this new impervious surface would also be minimized by implementation of Low Impact Development techniques and following UFC 3-210-10 and Section 438 of the EISA to ensure predevelopment hydrology is maintained to prevent any net increase in stormwater runoff. The Camp Bullis Road Alternative would also require development of a SWPPP, general discharge permit, and CZP because of potential similar impacts on groundwater and surface water quality. The BMPs contained in these documents would be implemented to prevent surface water runoff from causing soil erosion and siltation in streams, creeks, and groundwater features. No impacts on the Trinity Aquifer would occur if a separate project to extend a water line along Camp Bullis Road were to occur before the proposed ECP is constructed. Under this scenario, potable water for the ECP would be obtained from this water line rather an onsite groundwater well.

Short- and long-term, minor, adverse impacts on the 100-year floodplain would occur because approximately one acre in the southwest corner of the Camp Bullis Road Alternative project area is within the 100-year floodplain. Direct impacts from construction within the 100-year floodplain are unavoidable. However, these adverse impacts would be minimized by siting habitable structures outside of the 100-year floodplain, where practicable. Floodplains located downslope of the project area could be indirectly impacted by the increase in impervious surface; however, indirect impacts on floodplains would be minimized by implementation of Low Impact Development techniques and following UFC 3-210-10 and Section 438 of the EISA. The Camp Bullis Road Alternative would comply with EO 11988 and EO 11990, and USAF would coordinate with the Floodplain Administrator of Bexar County for any permit requirements.

3.9.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and water resources conditions would remain the same as described in **Section 3.9.2**. No impacts on groundwater, surface water, wetlands, or floodplains would occur.

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4 Cumulative Impacts

Federal regulations implementing NEPA (40 CFR §§ 1500–1508) require that the cumulative impacts of a proposed action be assessed. CEQ regulations implementing the procedural provisions of NEPA define cumulative impacts as follows (40 CFR § 1508.7):

> "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 be additive (i.e., the net adverse cumulative impacts are strengthened by the sum of individual impacts), countervailing (i.e., the net adverse cumulative impacts are less because of the interaction between beneficial and adverse individual impacts), or synergistic (i.e., the net adverse cumulative impacts are greater than the sum of the individual impacts). Cumulative impacts could result from individually minor, but collectively significant, actions that take place over time. Accordingly, a cumulative impacts analysis identifies and defines the scope of other actions and their interrelationship with a proposed action if there is an overlap in space and time.

Cumulative impacts may occur when there is a relationship between a proposed action and other actions expected to occur in a similar location (i.e., overlapping geographic location) or during a similar time period (i.e., coincidental or sequential timing of events). This relationship may or may not be obvious. The impacts may then be incremental and may result in cumulative impacts. Actions overlapping with or in close proximity to a proposed action can reasonably be expected to have more potential for cumulative impacts on "shared resources" than actions that may be geographically separated. Similarly, actions that coincide in the same timeframe tend to offer a higher potential for cumulative impacts.

This section discusses the potential for cumulative impacts caused by implementation of the Proposed Action (i.e., NW Military Highway Alternative and Camp Bullis Road Alternative) when combined with other past, present, and reasonably foreseeable actions.

4.1 Projects Considered for Potential Cumulative Impacts

Past Actions. Past actions are those actions, and their associated impacts, that occurred within the geographical extent of cumulative impacts that have shaped the current environmental conditions of the project areas and surrounding areas. The relevant past actions associated with the impacts of the Proposed Action include continued use of JBSA-BUL for military training and ongoing development occurring throughout the northern portion of Bexar County. CEQ regulations do not require the identification of the individual impacts of all past actions to determine the present impacts of past actions. The impacts of past actions are now part of the existing environment and are included in the affected environment described in **Sections 3.1** through **3.9**. However, recent past actions with ongoing impacts germane to this

cumulative impacts analysis are discussed with present and reasonably foreseeable future actions.

Present and Reasonably Foreseeable Future Actions. Projects considered for cumulative impacts with the Proposed Action include the construction and operation of new facilities and infrastructure at JBSA-BUL, continued private sector development throughout northern Bexar County, and off-installation road improvements. A brief discussion of these types of projects is as follows:

Construction and operation of new facilities and infrastructure at JBSA-BUL. The 502 ABW proposes to construct and operate various new facilities and infrastructure at JBSA-BUL. Examples of such projects include constructing a new dining facility, Defense Logistics Agency fuel dispensing facility, tactical equipment maintenance facility, and vehicle wash facility; performing renovations to numerous existing buildings elsewhere on JBSA-BUL; repairing and repaving numerous roads including Camp Bullis Road, Wilderness Trail, and others; replacing the low water crossing on Camp Bullis Road; and constructing a water line along Camp Bullis Road (USAF 2017). Each of these projects is anticipated to occur during future years, and none of these projects would require permanent additional personnel at JBSA-BUL.

Continued private sector development. Numerous commercial, industrial, and residential development projects are proposed throughout northern Bexar County over the coming years. Examples of present and reasonably foreseeable projects near JBSA-BUL include the construction of Cornerstone Christian School on the east side of NW Military Highway between JBSA-BUL and Loop 1604, Emerus Baptist Emergency Hospital at the northwest corner of Loop 1604 and NW Military Highway, and North Rim Auto Mall at the southeast corner of I-10 and Camp Bullis Road (HDR 2017). These projects would increase the population of northern Bexar County and increase traffic on roadways adjacent to JBSA-BUL.

Off-installation road improvements. TxDOT has identified several road improvement projects in the vicinity of JBSA-BUL. These projects include the following:

- *I-10 Expansion.* TxDOT has begun construction on the expansion of I-10 from a four- to eight-lane expressway between La Cantera and Ralph Fair roads southwest of JBSA-BUL. This project would add two new general purpose lanes and two new high-occupancy vehicle lanes to accommodate growing traffic needs in the area. The project began in the summer of 2017 and will take up to 4 years to complete.
- *Loop 1604 Expansion.* TxDOT plans to add four new managed lanes to Loop 1604 from State Highway 16 to US Highway 281 south of JBSA-BUL. Construction is expected to begin in 2020. A turnaround is proposed for Loop 1604 at NW Military Highway and is tentatively scheduled for 2027.
- *NW Military Highway Improvements.* Traffic signal improvements, lane reconfigurations and extensions, and installation of safety lighting are proposed to begin in September 2018 at the interchange of NW Military Highway and Loop 1604 (see **Section 3.6.3.1** for more information on these improvements). A two-way left turn lane, bike lanes, and sidewalks would be constructed on NW Military Highway from south of Loop 1604 to

Huebner Road. Construction of this project is expected to begin in November 2019. Finally, NW Military Highway would be expanded from two to four lanes with raised medians or center turn lanes, bike lanes, and sidewalks from 1 mile north of Loop 1604 to Loop 1604. Construction of this project is expected to begin in November 2020 (HDR 2017).

4.2 Cumulative Impacts on Resources

The following analysis examines the cumulative impacts on the environment that would result from the incremental impacts of the Proposed Action in addition to other past, present, and reasonably foreseeable future actions. This analysis assesses the potential for an overlap of impacts with respect to project schedules or affected areas. This section presents a qualitative analysis of the cumulative impacts. Cumulative impacts for alternatives analyzed are considered identical unless otherwise stated.

Air Quality. Short- and long-term, negligible to minor, adverse cumulative impacts on air quality would occur from the activities associated with the Proposed Action when combined with the cumulative projects. Criteria pollutants and GHG emissions during project construction and operations would occur. Air emissions from the Proposed Action would be below the *de minimis* threshold surrogate of 100 tpy of each pollutant. Based on the relative size of the projects, criteria pollutant emissions generated from the cumulative projects would also not be expected to exceed criteria thresholds. The limited annual emission of GHGs from the Proposed Action and cumulative projects would not meaningfully contribute to the potential effects of global climate change. Therefore, no significant cumulative impacts on air quality would occur.

Biological Resources. Short- and long-term, minor, adverse cumulative impacts would occur on vegetation, wildlife, state-listed protected species, migratory birds, and the associated habitats from construction, demolition, and operations associated with the Proposed Action when combined with cumulative projects. Construction would result in the permanent removal of existing vegetation; however, the Proposed Action and cumulative projects would be expected to remove only a small percentage of similar habitats in the region. Construction would also result in temporary noise that would cause short-term, cumulative impacts on wildlife, including state-listed protected species and migratory birds; however, wildlife are likely habituated to noise because of the projects' proximity to existing roads. Long-term cumulative impacts on wildlife would occur from the permanent loss of habitat; however, wildlife would be able to use adjacent habitat that is readily available. Additionally, injury or mortality of small, less-mobile terrestrial species (e.g., reptiles, rodents, small mammals) could occur from direct physical impact (e.g., vehicular traffic, construction and demolition equipment), particularly because of the expansion of roadways; although wildlife in the area are likely habituated to vehicular traffic. As a result, population-level impacts would not occur. Cumulative impacts on these biological resources would be slightly greater under the Camp Bullis Road Alternative as compared to the NW Military Highway Alternative because of the slightly greater loss of previously undisturbed woodlands.

No impacts on federally listed species would occur from the NW Military Highway Alternative, but the Camp Bullis Road Alternative would require consultation with USFWS to ensure impacts

on resident federally listed bird species and karst invertebrates would remain less than significant. The cumulative projects could have similar USFWS consultation requirements depending on the siting of facilities.

Cultural Resources. No impacts on cultural resources would occur as a result of the Proposed Action because there are no known historic properties located within the APEs. Ground-disturbing activities associated with Proposed Action and cumulative projects would have the potential to impact undocumented cultural resources such as buried archaeological sites, potentially resulting in short-term, negligible, adverse cumulative impacts. Should undocumented archaeological deposits, Native American graves, lost historic cemeteries, or human remains be discovered during any activity, the activity would be immediately halted and consultation with the appropriate preservation officer would occur. If the unexpected discovery were to occur on JBSA-BUL, the installation would follow the provisions for unanticipated discoveries specified in the Integrated Cultural Resources Management Plan.

Geological Resources. Short- and long-term, minor, adverse cumulative impacts on geological resources would occur from ground-disturbing activities associated with the Proposed Action when combined with cumulative projects. Site preparation and earthmoving associated with construction and demolition would excavate soils and expose rock materials, temporarily removing vegetation in some areas and potentially exposing soils to erosion. Soil productivity would decline in disturbed areas and be eliminated in areas within the footprint of roadways or structures. An increase in impervious surfaces would reduce the amount of area for stormwater to infiltrate soil and increase stormwater runoff. In general, accelerated soil erosion would be minimized by designing facilities while considering any soil limitations, employing construction and stabilization techniques appropriate for the soil and climate, and implementing temporary and permanent erosion control measures. BMPs could include installing silt fencing and sediment traps, applying water to disturbed soil, and revegetating disturbed areas as soon as possible after the disturbance, as appropriate. Therefore, impacts on soils would be minor and localized to the construction areas. Cumulative impacts on geological resources would be slightly greater under the Camp Bullis Road Alternative as compared to the NW Military Highway Alternative because of the slightly larger disturbance area.

Hazardous Materials and Wastes. Short-term, minor, adverse cumulative impacts from the use of hazardous materials and the generation of hazardous wastes would occur during construction associated with the Proposed Action when combined with cumulative projects. All hazardous materials, petroleum products, and hazardous wastes supporting construction would be contained and stored appropriately in accordance with the applicable regulations (e.g., JBSA Hazardous Waste Management Plan, state and local requirements) to minimize the potential for releases. The Proposed Action, when combined with cumulative projects, is not expected to have any impact on existing environmental contamination sites. Therefore, no significant cumulative adverse impacts from hazardous materials and wastes would occur.

Infrastructure and Transportation. Short-term, negligible, adverse cumulative impacts on infrastructure would occur from potential disruptions to utility services and increases in solid

waste generation during construction and demolition associated with the Proposed Action when combined with the cumulative projects. Long-term, negligible, beneficial cumulative impacts on infrastructure would occur from the replacement of older, inefficient utilities and buildings.

Short-term, minor, adverse cumulative impacts on transportation would occur from the temporary increase in construction and demolition traffic from the Proposed Action when combined with the cumulative projects. No new long-term cumulative impacts on transportation would occur from the NW Military Highway Alternative. However, long-term, minor to moderate, adverse cumulative impacts on transportation would occur from permanent changes to traffic patterns from the Camp Bullis Road Alternative when combined with the cumulative projects. The interchange of I-10 and Camp Bullis Road has the most potential for long-term, adverse cumulative impacts because all JBSA-BUL traffic would be routed through this interchange under the Camp Bullis Road Alternative. The cumulative road improvement projects, such as the I-10 and Loop 1604 expansion and the NW Military Highway improvements, would improve traffic conditions in the ROI and lessen the adverse cumulative impacts on transportation.

Noise. Short-term, minor, adverse cumulative impacts on the ambient noise environment would occur from construction associated with the Proposed Action when combined with cumulative projects. Noise from construction equipment and traffic would be temporary and last only for the duration of construction. Additionally, because JBSA-BUL is an active military installation that supports aircraft, live-fire weapons, and explosives training, the temporary increases in construction noise would be a fraction of the noise experienced routinely on and near the installation.

Noise generated from the cumulative projects would be additive to the noise generated from the Proposed Action as well as the existing noise environment. This cumulative noise has the potential to periodically annoy nearby residents and NSRs, resulting in minor cumulative impacts. The added noise levels would not violate applicable federal, state, or local noise regulations or create appreciable areas of incompatible land use off-installation; therefore, the Proposed Action and the cumulative projects would not be expected to result in significant cumulative impacts on noise.

Safety. Short-term, minor, adverse cumulative impacts on safety would occur during construction associated with the Proposed Action when combined with cumulative projects. Construction poses an inherent risk of accidents to workers, but this level of risk would be managed by adherence to established OSHA, USEPA, DoD, and USAF safety regulations, as applicable. Construction contractors would establish and maintain health and safety programs for their workers. Construction workers would be required to wear personal protective equipment such as ear protection, steel-toed boots, hard hats, gloves, and other appropriate safety gear. Work areas would be fenced and appropriately marked with signs to prevent trespassing.

Long-term, minor, beneficial cumulative impacts on safety would occur from the use of the proposed ECP and cumulative projects. The cumulative projects, such as the proposed tactical equipment maintenance facility, would comply with the latest UFCs; therefore, personnel currently working in outdated facilities would no longer be exposed to the inadequacies and

associated safety hazards of the existing structures. Personnel would continue to follow all appropriate OSHA, USEPA, DoD, and USAF safety regulations for a safe working environment. Additionally, improved traffic flow on the regional highways from the cumulative projects would create a safer environment by reducing the potential for automobile accidents. Therefore, no significant cumulative adverse impacts on safety would occur.

Water Resources. Short- and long-term, minor, adverse cumulative impacts on water resources would occur from the Proposed Action when combined with the cumulative projects. The cumulative increase in impervious surfaces from the Proposed Action and cumulative projects would be considered a minor contribution in the context of the whole watershed, but could be noticeable on a more localized level. Increased impervious surfaces could result in a reduction of groundwater recharge rates and an increase in stormwater runoff volumes. BMPs, including erosion and stormwater controls, would be implemented to reduce the potential for erosion and the volume of stormwater. Furthermore, the Proposed Action and cumulative projects would occur within the Edwards Aquifer contributing and recharge zones; therefore, depending on the amount of ground disturbance, each project could require EAPP documentation to be prepared and submitted to TCEQ. The EAPP would outline BMPs that would be implemented and maintained both during and after construction. Therefore, no significant cumulative adverse impacts on water resources would occur. Cumulative impacts on water resources would be slightly greater under the Camp Bullis Road Alternative as compared to the NW Military Highway Alternative because of the slightly larger disturbance area and the need to construct within one acre of the 100-year floodplain.

4.3 Irreversible and Irretrievable Commitment of Resources

NEPA requires the identification of any irreversible and irretrievable commitment of resources that would be involved in the implementation of the Proposed Action. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the impacts that the uses of these resources could have on future generations. Irreversible impacts primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the Proposed Action (e.g., extinction of a threatened or endangered species, disturbance of a cultural site).

Construction associated with the Proposed Action would require consumption of materials typically associated with exterior and interior construction (e.g., concrete, wiring, piping, insulation, windows). Recycled materials would be used to the extent practicable, and the amount of these materials used would not significantly decrease the availability of the resources. Small amounts of nonrenewable resources would be used; however, these amounts would not be appreciable and would not affect the availability of these resources. The Proposed Action would also require consumption of fuels, including some that would be nonrenewable resources (e.g., petroleum-based fuel products for vehicles and equipment and an emergency generator).

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A

Agency and Native American Tribal Coordination and Consultation and Public Involvement Materials

Scoping Distribution List and Correspondence

The Description of the Proposed Action and Alternatives (i.e., **Sections 1** and **2** of this EA) was made available to the federal, state, and local government agencies and Native American tribes listed below for a 30-day comment period to develop the scope for this EA. The comment period for the government agencies began on March 6, 2017, and the comment period for the Native American tribes began on March 29, 2017. Signed examples of both distribution letters and all comments received are on the following pages.

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Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Local Agencies

Tiffany Harris
Community Relations Coordinator
Alamo Area Council of Governments
8700 Tesoro Drive, Suite 700
San Antonio, TX 78217

John E. Cantu
Environmental Manager
Municipal Plaza Building
114 W. Commerce, 2nd Floor
P.O. Box 839966
San Antonio, TX 78283-3966

Diane Bartlett, P.E.
Floodplain Administrator
Bexar County Infrastructure Department
233 North Pecos Street, Suite 420
San Antonio, TX 78207

Patrice Melancon
Manager, Watershed Engineering Department
San Antonio River Authority
100 East Guenther Street
San Antonio, TX 78204

Native American Tribes

Mr. William Nelson Sr., Chairman
Comanche Nation
HC-32, Box 1720
584 NW Bingo Road
Lawton, OK 73502

Mr. Danny H. Breuninger, Sr., President
Mescalero Apache Tribe of the Mescalero Reservation
P.O. Box 227
Mescalero, NM 88340

Terri Parton, President
Wichita and Affiliated Tribes
P.O. Box 729
Andarko, OK 73005

Mr. Russell Martin, President
Tonkawa Tribe of Indians of Oklahoma
1 Rush Buffalo Road
Tonkawa, OK 74653-4449

Example Scoping Letter sent to Federal, State and Local Government Agencies

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

1 March 2017

Mr. Edward L. Roberson, P.E.
Chief, Installation Management Flight
502 CES/CEI
1555 Gott Street
JBSA Lackland TX 78236-5645

Diane Bartlett, P.E.
Floodplain Administrator
Bexar County Infrastructure Department
233 North Pecos Street, Suite 420
San Antonio, TX 78207

Dear Ms. Bartlett

Joint Base San Antonio (JBSA) has initiated the development of an environmental assessment (EA) to evaluate the potential environmental impacts from replacing the Entry Control Point (ECP) located at JBSA-Bullis (JBSA-BUL) along NW Military Highway. This project would support the construction of a new ECP.

The purpose of this Proposed Action is to provide JBSA-BUL with a modern ECP that meets the appropriate Unified Facility Criteria (UFC) Security Engineering standards and allows for efficient and satisfactory proofing, vetting, and processing of personnel and visitors requesting access to JBSA-BUL. The proposed ECP would be sited to best accommodate future military and non-military traffic demands. The Proposed Action is needed because the existing ECP at JBSA-BUL is supported by limited infrastructure and does not fully meet the requirements of UFC Security Engineering standards. The attached Description of the Proposed Action and Alternatives (DOPAA) includes two alternatives: the Camp Bullis Road Alternative and the NW Military Highway Alternative.

In accordance with Executive Order 12372, *Intergovernmental Review of Federal Programs*, we request your participation and comments on this Proposed Action. Your comments will help develop the breadth and depth of our environmental review in the forthcoming EA. The U.S. Air Force anticipates publishing the Draft EA during early summer 2017 and the Final EA by fall 2017. The Draft EA will be distributed to your office when completed.

Please provide your written questions or comments on the attached DOPAA at your earliest convenience but no later than 30 days from receipt of this document. Address all questions and comments to Mr. Jock Flores, 502 CES/CEIE, 1555 Gott St, JBSA Lackland TX 78236-5645. Comments are encouraged to be sent by email to jock.flores@us.af.mil.

For questions, please email or call Mr. Flores at (210) 671-3944.

Sincerely

Digitally signed by ROBERSON.EDWARD.LEWIS.1124911626
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=ROBERSON.EDWARD.LEWIS.1124911626
Date: 2017.03.02 15:18:12 -06'00'

EDWARD L. ROBERSON, P.E.

Attachment:
Description of Proposed Action and Alternatives Addressing a Modern Entry Control Point on Joint Base San Antonio – Bullis, January 2017

Example Scoping Letter sent to Native American Tribes

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

Ms. Brenda Roesch
Joint Base Civil Engineer
502 CES/CL
1555 Gott Street
JBSA Lackland, TX 78236-5645

Mr. William Nelson Sr., Chairman
Comanche Nation
HC-32, Box 1720
584 NW Bingo Road
Lawton, OK 73502

Dear Chairman Nelson

The U.S. Air Force has initiated the development of an environmental assessment (EA), as required by the National Environmental Policy Act, to evaluate the potential environmental and socioeconomic impacts from the construction and operation of an Entry Control Point (ECP) at Joint Base San Antonio-Bullis (JBSA-BUL) in Bexar County, Texas (i.e., the Proposed Action).

The purpose of this Proposed Action will provide JBSA-BUL with an ECP that allows efficient and satisfactory proofing, vetting, and processing of personnel and visitors requesting access to JBSA-BUL. The proposed ECP also should accommodate future military and non-military traffic demands. The existing ECP has limited infrastructure and does not fully meet the requirements of Security Engineering standards.

The first alternative is located on NW Military Highway approximately 0.5 mile north of the existing ECP and approximately 0.5 mile south of the JBSA-BUL cantonment area (see **Figure 1).** This site is currently undeveloped and contains sparse vegetation. This site is within the Edwards Aquifer Contributing Zone but immediately adjacent to the Edwards Aquifer Recharge Zone. It is not within the 100-year floodplain. Electricity would need to be brought from the Camp Bullis Wastewater Treatment Plant. An onsite groundwater well with a 5,000-gallon aboveground storage tank would be constructed to provide potable water. Wastewater service would be provided via an onsite septic system. Camp Bullis Road would remain closed to traffic.

The second alternative is located on Camp Bullis Road approximately 1.3 miles northeast of IH 10 and 800 feet inside the boundary fence of Camp Bullis and approximately 0.5 mile west of the JBSA-BUL cantonment area (see **Figure 2**). This site is mostly undeveloped but contains moderate vegetation, several unpaved military training trails, and a wire fence along the perimeter of Camp Bullis Road. This site is also within the Edwards Aquifer Contributing Zone

and a portion is within the 100-year floodplain. Electrical service is already available to this site. An onsite groundwater well with a 5,000-gallon aboveground storage tank could be constructed to provide potable water if publicly supplied water is not available to this site by the time of construction. This alternative would change traffic patterns by opening Camp Bullis Road to all traffic and closing NW Military Highway at the installation boundary.

The No Action Alternative would continue use of the existing ECP on NW Military Highway and no construction or demolition would occur. The existing ECP would continue to be inadequate to meet the requirements of UFC Security Engineering standards. All traffic would continue to use NW Military Highway as is now the case.

The Air Force requests your participation and desires to know any comments, questions or concerns on this Proposed Action and its alternatives. The Draft EA is anticipated to be ready during late spring in 2017 and the Final EA by fall 2017. The Draft EA and other future projects will be sent to your office unless you indicate that you do not wish to receive them. If JBSA does not receive a written or email response within 30 days of this letter from the Comanche Nation when initial documents for a project is sent to the Comanche Nation, then JBSA will assume that the Comanche Nation does not have any comments, questions or concerns concerning that project and no further documentation for that project will be sent. Information for future projects will be sent until such time that the Comanche Nation indicates whether or not they wish to continue to receive information concerning projects. These consultations, conducted pursuant to Section 106 of the National Historic Preservation Act, 36 CFR Part 800, and Executive Order 13175, will provide an excellent opportunity to present any concerns or comments. The Comanche Nation always retains the right to respond in a timely fashion to any study or project.

Please address all questions and comments to Mr. Jock Flores, 502 CES/CEIE, 1555 Gott Street, JBSA-Lackland, Texas, 78236-5645. Comments are encouraged to be sent by email to jock.flores@us.af.mil indicating the specific project or EA. For questions, please email or call Mr. Flores at (210) 671-3944.

Sincerely

BRENDA ROESCH
Joint Base Civil Engineer

Responses to the Scoping Letters

From Federal Emergency Management Agency

+U. S. Department of Homeland Security
FEMA Region 6
800 North Loop 288
Denton, TX 76209-3698

FEMA

FEDERAL EMERGENCY MANAGEMENT AGENCY
REGION VI
MITIGATION DIVISION

RE: Modern Entry Control Point At Joint Base San Antonio-Bullis, Texas

NOTICE REVIEW/ENVIRONMENTAL CONSULTATION

☐ We have no comments to offer. ☒ We offer the following comments:

WE WOULD REQUEST THAT THE COMMUNITY FLOODPLAIN ADMINISTRATOR BE CONTACTED FOR THE REVIEW AND POSSIBLE PERMIT REQUIREMENTS FOR THIS PROJECT. IF FEDERALLY FUNDED, WE WOULD REQUEST PROJECT TO BE IN COMPLIANCE WITH EO11988 & EO 11990.

Robert Brach
Bexar County Development Services Manager
233 North Pecos-La Trinidad Street, Suite 420
San Antonio, TX 78207
rbrach@bexar.org
(210) 335- 6700

REVIEWER:

Charla Marchuk, CFM
Floodplain Management and Insurance Branch
Mitigation Division
(940) 898- 5561

DATE: April 3, 2017

From U.S. Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
10711 Burnet Road, Suite 200
Austin, Texas 78758
512 490-0057
FAX 490-0974

APR - 5 2017

In Reply Refer to:
02ETAU00-2017-CPA-0002

Mr. Jock Flores
502 CES/CEIE
1555 Gott Street
JBSA Lackland, Texas 78236-5645

Dear Mr. Flores,

This responds to your request dated March 1, 2017 concerning the development of an Environmental Assessment (EA) to evaluate potential impacts from construction of an Entry Control Point (ECP) at JBSA-BUL. Thank you for your invitation to comment on the proposed action of construction of a modern ECP at at Joint Base San Antonio-Bullis (JBSA-BUL) and alternatives to the action. The purpose of the proposed action is to provide JBSA-BUL with a modern ECP that meets the appropriate Unified Facility Criteria Security Engineering standards and allows for efficient and satisfactory proofing, vetting, and processing of personnel and visitors requesting access to JBSA-BUL. We are providing the following response in accordance with the National Environmental Policy Act (NEPA).

After reviewing the description of the Proposed Action and Alternatives the U.S. Fish and Wildlife Service (Service) concurs with the alternatives carried forward (NW Military Highway and Camp Bullis Road) by the Department of the Air Force. The carried forward alternatives have the least potential to adversely impact threatened and endangered species. As both alternatives meet the selection standards set forth, it is the Service's recommendation the Department of the Airforce utilizes the alternative with the smallest footprint and the least potential to adversely impact threatened and endangered species. The NW Military Highway alternative would have an approximate footprint of 4.2 acres, and referencing provided overhead imagery, would require the removal of vegetation in a seemingly disturbed area adjacent to a paved road. The Camp Bullis Road alternative would have an approximate footprint of 8.1 acres and require the removal of mature trees; thus, removing likely suitable habit for breeding and nesting birds which may include endangered and threatened species. Given the information presented to the Service in the description of the proposed action and alternatives, the Service recommends the Department of the Airforce consider the NW Military Highway alternative as it meets all selection standards, has the least potential to adversely impact threatened and endangered species, and has the smallest footprint of the two alternatives carried forward.

The Service has statutory authority and responsibility for enforcing the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712). Therefore, the Department of the Airforce should consider that JBSA-BUL is within a major migratory flyway for migratory birds. Consideration should be

TAKE PRIDE IN AMERICA

given as to when removal of vegetation in the proposed project area should occur. Vegetation removal should be as minimal as possible, and occur outside of the typical bird breeding and nesting season (March 15 – September 15) in order to avoid and minimize impacts to year-round and seasonal migrants.

Thank you for the opportunity to comment and ask questions, and your continued efforts to address any impacts the proposed project may have on the human and natural environment.

If you have questions, comments, or need additional information, please contact Jacob Ogdee, at 512-490-0057, ext. 243, or at Jacob_ogdee@fws.gov.

Sincerely,

Adam Zerrenner
Field Supervisor

From Comanche Nation

COMANCHE NATION

Department of the Air Force
Attn: Mr. Jock Flores
502 CES/CEIE, 1555 Gott Street
Texas 78236-5645

June 22, 2017

Re: Entry Control Point (ECP) at Joint Base San Antonio-Bullis (JBSA-BUL) in Bexar County, Texas

Dear Mr. Flores :

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of "***No Properties***" have been identified. (IAW 36 CFR 800.4(d)(1)).

Please contact this office at (580) 595-9960/9618 if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

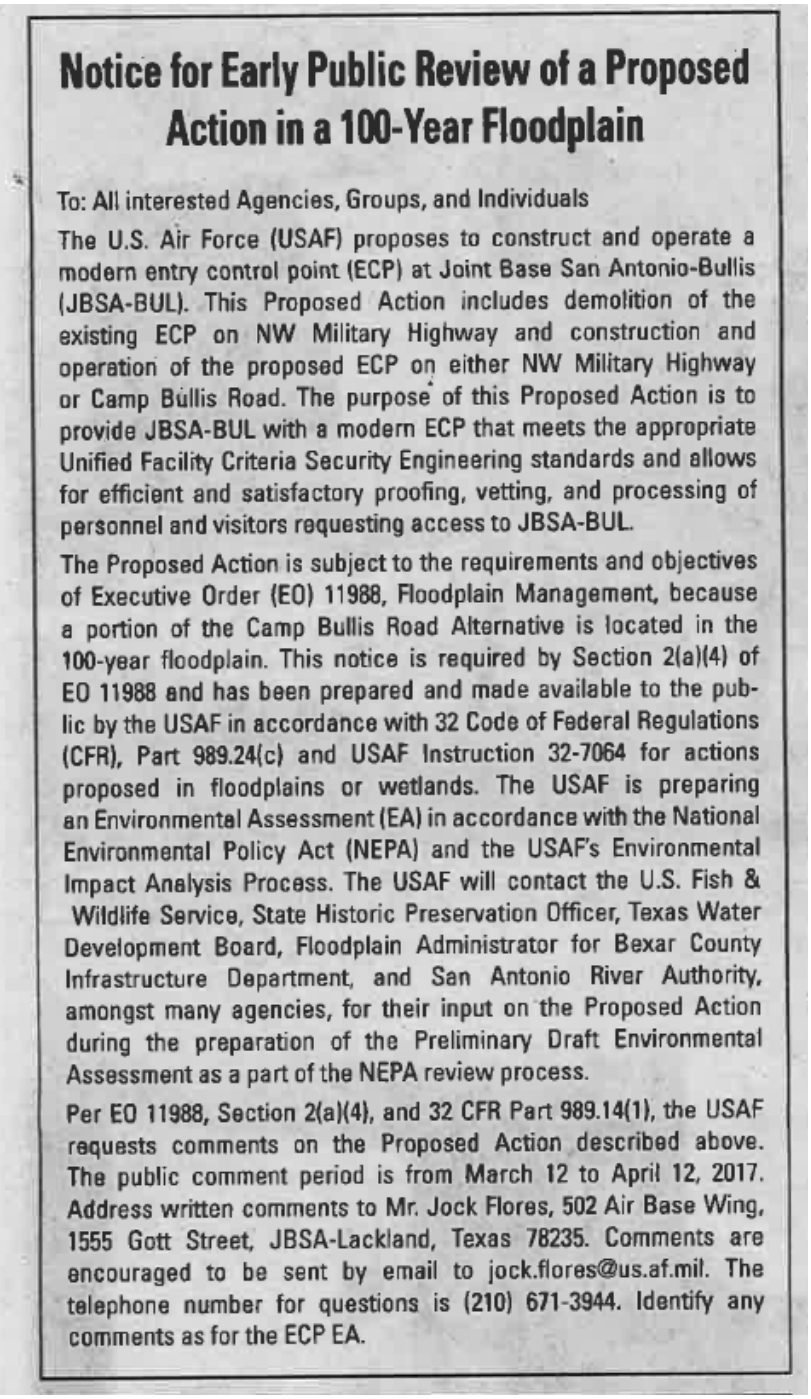
Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana ,Technician
#6 SW "D" Avenue , Suite C
Lawton, OK. 73502

COMANCHE NATION P.O. BOX 908 / LAWTON, OK 73502
PHONE: 580-492-4988 TOLL FREE:1-877-492-4988

Notice for Early Public Review

A Notice for Early Public Review of the Proposed Action was published in the *San Antonio Express-News* on Sunday, March 12, 2017, because of potential impacts within the 100-year floodplain. The notice, as it appeared in the newspaper, is below. No public comments were received from this notice.



Notice for Early Public Review of a Proposed Action in a 100-Year Floodplain

To: All interested Agencies, Groups, and Individuals

The U.S. Air Force (USAF) proposes to construct and operate a modern entry control point (ECP) at Joint Base San Antonio-Bullis (JBSA-BUL). This Proposed Action includes demolition of the existing ECP on NW Military Highway and construction and operation of the proposed ECP on either NW Military Highway or Camp Bullis Road. The purpose of this Proposed Action is to provide JBSA-BUL with a modern ECP that meets the appropriate Unified Facility Criteria Security Engineering standards and allows for efficient and satisfactory proofing, vetting, and processing of personnel and visitors requesting access to JBSA-BUL.

The Proposed Action is subject to the requirements and objectives of Executive Order (EO) 11988, Floodplain Management, because a portion of the Camp Bullis Road Alternative is located in the 100-year floodplain. This notice is required by Section 2(a)(4) of EO 11988 and has been prepared and made available to the public by the USAF in accordance with 32 Code of Federal Regulations (CFR), Part 989.24(c) and USAF Instruction 32-7064 for actions proposed in floodplains or wetlands. The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) and the USAF's Environmental Impact Analysis Process. The USAF will contact the U.S. Fish & Wildlife Service, State Historic Preservation Officer, Texas Water Development Board, Floodplain Administrator for Bexar County Infrastructure Department, and San Antonio River Authority, amongst many agencies, for their input on the Proposed Action during the preparation of the Preliminary Draft Environmental Assessment as a part of the NEPA review process.

Per EO 11988, Section 2(a)(4), and 32 CFR Part 989.14(1), the USAF requests comments on the Proposed Action described above. The public comment period is from March 12 to April 12, 2017. Address written comments to Mr. Jock Flores, 502 Air Base Wing, 1555 Gott Street, JBSA-Lackland, Texas 78235. Comments are encouraged to be sent by email to jock.flores@us.af.mil. The telephone number for questions is (210) 671-3944. Identify any comments as for the ECP EA.

Draft EA and Draft FONSI for the NW Military Highway Alternative Distribution List and Correspondence

This Draft EA and a Draft FONSI for the NW Military Highway Alternative were made available to the federal, state, and local government agencies and Native American tribes listed below for a 30-day comment period. The comment period for the government agencies began on September 15, 2017, and the comment period for the Native American tribes will begin in the near future. Signed examples of the distribution letters are on the following pages. Comments received will be included on the following pages.

Federal Agencies

Ron Curry, Administrator
USEPA Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

Adam Zerrenner, Field Supervisor
U.S. Fish and Wildlife Service
10711 Burnet Road, Suite 200
Austin, TX 78758

Stephen Brooks
U.S. Army Corps of Engineers
Regulatory Branch, Permit Section
Attn: CESWF-PER-R
819 Taylor Street, Room 3A37
Fort Worth, TX 76102

Ross Richardson, Chief
Floodplain Management and Insurance Branch
Federal Emergency Management Agency
800 North Loop 288
Denton, TX 76209-3698

State Agencies

Richard A. Hyde, Executive Director
Office of Permitting and Registration
Texas Commission on Environmental Quality
MC 122, P.O. Box 13087
Austin, TX 78711-3087

Julie Wicker, Program Supervisor
Ecosystem/Habitat Assessment Branch
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744-3291

Michael Segner, CFM
NFIP State Coordinator
Texas Water Development Board
1700 Congress Avenue
Austin, TX 78711

NEPA Coordinator
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Mario R. Jorge, P.E.
Texas Department of Transportation
San Antonio District Engineer
4615 NW Loop 410
San Antonio, TX 78229-0928

Eddie Reyes, P.E.
Texas Department of Transportation
Bexar Metro Area Engineer
9320 SE Loop 410
San Antonio, TX 78223

Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
1511 Colorado Street
Austin, TX 78701

Local Agencies

Tiffany Harris
Community Relations Coordinator
Alamo Area Council of Governments
8700 Tesoro Drive, Suite 700
San Antonio, TX 78217

John E. Cantu
Environmental Manager
Municipal Plaza Building
114 W. Commerce, 2nd Floor
P.O. Box 839966
San Antonio, TX 78283-3966

Robert Brach
Bexar County Floodplain Administrator and
Development Services Manager
233 North Pecos-La Trinidad Street
Suite 420
San Antonio, TX 78207

Patrice Melancon
Manager, Watershed Engineering
Department
San Antonio River Authority
100 East Guenther Street
San Antonio, TX 78204

Mariano Martino, P.E.
City of San Antonio
Development Services Department
Cliff Morton Development and Business
Services Center
1901 South Alamo Street
San Antonio, TX 78204

Native American Tribes

Mr. William Nelson Sr., Chairman
Comanche Nation
HC-32, Box 1720
584 NW Bingo Road
Lawton, OK 73502

Mr. Danny H. Breuninger, Sr., President
Mescalero Apache Tribe of the Mescalero
Reservation
P.O. Box 227
Mescalero, NM 88340

Terri Parton, President
Wichita and Affiliated Tribes
P.O. Box 729
Andarko, OK 73005

Mr. Russell Martin, President
Tonkawa Tribe of Indians of Oklahoma
1 Rush Buffalo Road
Tonkawa, OK 74653-4449

Distribution Letter for the Draft EA and Draft FONSI for the NW Military Highway Alternative sent to the U.S. Fish and Wildlife Service

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

29 August 2017

Mr. Edward L. Roberson, P.E.
Chief, Installation Management Flight
502 CES/CEI
1555 Gott Street
JBSA Lackland TX 78236-5645

Mr. Adam Zerrenner, Field Supervisor
U.S. Fish and Wildlife Service
10711 Burnet Road
Suite 200
Austin TX 78758

Reference Number: 02ETAU00-2017-CPA-0002

Dear Mr. Zerrenner

U.S. Air Force (USAF) has prepared a Draft Environmental Assessment (EA) on its proposal to replace the Joint Base San Antonio-Bullis (JBSA-BUL) entry control point (ECP) with a modern facility that meets the appropriate Unified Facilities Criteria Security Engineering standards and is sited to accommodate future military and non-military traffic demands. The Draft EA analyzes the potential for significant environmental and socioeconomic impacts from three alternatives to this Proposed Action: NW Military Highway Alternative, which is the Preferred Alternative; Camp Bullis Road Alternative; and No Action Alternative. A Traffic Impact Assessment was prepared as part of the Draft EA and is included as Appendix C of the Draft EA. The analysis contained within the Draft EA indicates that no significant impacts would occur from the NW Military Highway Alternative and a Finding of No Significant Impact (FONSI) would be appropriate for this alternative. USAF is not pursuing a FONSI for the Camp Bullis Road Alternative.

USAF has analyzed the effects of the Proposed Action and determined that the NW Military Highway Alternative would have no effect on federally-listed threatened and endangered species because this alternative would be consistent with the conservation measures outlined in the *Informal Consultation for the Continuation of the Military Mission and Mission Sustainment Activities on Joint Base San Antonio–Camp Bullis in Relation to 5 Listed Species* (see Sections 3.2.2 and 3.2.3 of the Draft EA). Therefore, USAF requests concurrence from the U.S. Fish and Wildlife Service that the NW Military Highway Alternative would have no effect on federally-listed species and that further consultation under Section 7 of the Endangered Species Act is not required for this alternative.

In accordance with Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, as amended by EO 12416 with the same title, we request your participation and comments on the attached Draft EA and Draft FONSI. Your comments will be considered in the development of the Final EA and USAF's decision on whether or not to sign the FONSI for the NW Military Highway Alternative.

Please provide your written questions or comments on the attached Draft EA and Draft FONSI at your earliest convenience but no later than 30 days from receipt of this document. Address all questions and comments to Mr. Jock Flores, 502 CES/CEIE, 1555 Gott Street, JBSA Lackland TX 78236-5645. Comments are encouraged to be sent by email to jock.flores@us.af.mil.

For questions, please email or call Mr. Flores at (210) 671-3944.

Sincerely

Edward L. Roberson

Digitally signed by ROBERSON.EDWARD.LEWIS.1125011888 DN: C=US, O=U.S. Government, OU=DoD, OU=PKI, OU=USAF, CN=ROBERSON.EDWARD.LEWIS.1125011888 Date: 2017.08.30 17:33:39 -05'00'

EDWARD L. ROBERSON, P.E.

Attachment:
Draft Environmental Assessment Addressing a Modern Entry Control Point at Joint Base San Antonio-Bullis, Texas. August 2017. Including Draft FONSI.

Distribution Letter for the Draft EA and Draft FONSI for the NW Military Highway Alternative sent to the Texas Historical Commission

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

29 August 2017

Mr. Edward L. Roberson, P.E.
Chief, Installation Management Flight
502 CES/CEI
1555 Gott Street
JBSA Lackland TX 78236-5645

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
1511 Colorado Street
Austin TX 78701

Dear Mr. Wolfe

U.S. Air Force (USAF) has prepared a Draft Environmental Assessment (EA) on its proposal to replace the Joint Base San Antonio-Bullis (JBSA-BUL) entry control point (ECP) with a modern facility that meets the appropriate Unified Facilities Criteria Security Engineering standards and is sited to accommodate future military and non-military traffic demands. The Draft EA analyzes the potential for significant environmental and socioeconomic impacts from three alternatives to this Proposed Action: NW Military Highway Alternative, which is the Preferred Alternative; Camp Bullis Road Alternative; and No Action Alternative. A Traffic Impact Assessment was prepared as part of the Draft EA and is included as Appendix C of the Draft EA. The analysis contained within the Draft EA indicates that no significant impacts would occur from the NW Military Highway Alternative and a Finding of No Significant Impact (FONSI) would be appropriate for this alternative. USAF is not pursuing a FONSI for the Camp Bullis Road Alternative.

USAF has analyzed the impacts of the Proposed Action and determined that the NW Military Highway Alternative and Camp Bullis Road Alternative would have no impacts on historic properties because there are no known historic properties located within the area of potential effects (see Sections 3.3.2 and 3.3.3 of the Draft EA). Therefore, USAF requests concurrence that further consultation with the Texas Historical Commission is not required for this Proposed Action.

In accordance with Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, as amended by EO 12416 with the same title, we request your participation and comments on the attached Draft EA and Draft FONSI. Your comments will be considered in the development of the Final EA and USAF's decision on whether or not to sign the FONSI for the NW Military Highway Alternative.

Please provide your written questions or comments on the attached Draft EA and Draft FONSI at your earliest convenience but no later than 30 days from receipt of this document. Address all questions and comments to Mr. Jock Flores, 502 CES/CEIE, 1555 Gott Street, JBSA Lackland TX 78236-5645. Comments are encouraged to be sent by email to jock.flores@us.af.mil.

For questions, please email or call Mr. Flores at (210) 671-3944.

Sincerely

Digitally signed by ROBERSON.EDWARD.LEWIS.1124911656
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=ROBERSON.EDWARD.LEWIS.1124911656
Date: 2017.08.30 17:38:01 -05'00'

EDWARD L. ROBERSON, P.E.

Attachment:
Draft Environmental Assessment Addressing a Modern Entry Control Point at Joint Base San Antonio-Bullis, Texas. August 2017. Including Draft FONSI.

Example Distribution Letter for the Draft EA and Draft FONSI for the NW Military Highway Alternative sent to the other Federal, State, and Local Government Agencies

DEPARTMENT OF THE AIR FORCE
502D AIR BASE WING
JOINT BASE SAN ANTONIO

29 August 2017

Mr. Edward L. Roberson, P.E.
Chief, Installation Management Flight
502 CES/CEI
1555 Gott Street
JBSA Lackland TX 78236-5645

Mr. Robert Brach
Bexar County Floodplain Administrator and Development Services Manager
233 North Pecos-La Trinidad Street
Suite 420
San Antonio TX 78207

Dear Mr. Brach

U.S. Air Force (USAF) has prepared a Draft Environmental Assessment (EA) on its proposal to replace the Joint Base San Antonio-Bullis (JBSA-BUL) entry control point (ECP) with a modern facility that meets the appropriate Unified Facilities Criteria Security Engineering standards and is sited to accommodate future military and non-military traffic demands. The Draft EA analyzes the potential for significant environmental and socioeconomic impacts from three alternatives to this Proposed Action: NW Military Highway Alternative, which is the Preferred Alternative; Camp Bullis Road Alternative; and No Action Alternative. A Traffic Impact Assessment was prepared as part of the Draft EA and is included as Appendix C of the Draft EA. The analysis contained within the Draft EA indicates that no significant impacts would occur from the NW Military Highway Alternative and a Finding of No Significant Impact (FONSI) would be appropriate for this alternative. USAF is not pursuing a FONSI for the Camp Bullis Road Alternative.

In accordance with Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, as amended by EO 12416 with the same title, we request your participation and comments on the attached Draft EA and Draft FONSI. Your comments will be considered in the development of the Final EA and USAF's decision on whether or not to sign the FONSI for the NW Military Highway Alternative.

Please provide your written questions or comments on the attached Draft EA and Draft FONSI at your earliest convenience but no later than 30 days from receipt of this document. Address all questions and comments to Mr. Jock Flores, 502 CES/CEIE, 1555 Gott Street, JBSA Lackland TX 78236-5645. Comments are encouraged to be sent by email to jock.flores@us.af.mil.

For questions, please email or call Mr. Flores at (210) 671-3944.

Sincerely

Digitally signed by ROBERSON.EDWARD.LEWIS.1124911636
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=ROBERSON.EDWARD.LEWIS.1124911636
Date: 2017.08.30 12:45:31 -05'00'

EDWARD L. ROBERSON, P.E.

Attachment:
Draft Environmental Assessment Addressing a Modern Entry Control Point at Joint Base San Antonio-Bullis, Texas. August 2017. Including Draft FONSI.

Notice of Availability for Public Review of the Draft EA and Draft FONSI for NW Military Highway Alternative

A NOA for public review of this Draft EA and a Draft FONSI for the NW Military Highway Alternative was published in the *San Antonio Express-News* on Sunday, September 17, 2017. The NOA is below. Public comments received will be included on the following pages.

Notice of Availability

Draft Environmental Assessment (EA) Addressing a Modern Entry Control Point (ECP) at Joint Base San Antonio-Bullis (JBSA-BUL), Texas

The U.S. Air Force (USAF) announces the availability of and invites public comments on the Draft EA evaluating the potential for significant environmental impacts from the construction and operation of a new ECP at JBSA-BUL, Texas. The USAF analyzed two action alternatives to this Proposed Action: NW Military Highway Alternative and Camp Bullis Road Alternative in addition to the No Action Alternative. The analysis contained in the EA indicates the NW Military Highway Alternative would not have a significant impact on the environment and a Finding of No Significant Impact (FONSI) would be appropriate for this alternative. The NW Military Highway Alternative is the USAF's Preferred Alternative. USAF is not pursuing a FONSI for the Camp Bullis Road Alternative.

USAF invites public participation through the solicitation of comments on the Draft EA and Draft FONSI for the NW Military Highway Alternative. Comments are invited and will be accepted for 30 days from the publication of this notice. The Draft EA and Draft FONSI for the NW Military Highway Alternative are available on the internet at http://www.jbsa.mil/Information/Environmental/. Hard copies also are available at the following library:

San Antonio Public Library
600 Soledad Street
San Antonio, TX 78205

Please provide written comments to Mr. Jock Flores, 502 CES/CENPL, 1555 Gott Street, JBSA Lackland, TX 78236. Comments are encouraged to be sent by email to jock.flores@us.af.mil. The telephone number for questions is (210) 671-3944. When submitting comments, please include your name and address and identify your comments as for the ECP EA.

B

Air Quality Calculations

Air Emissions for the Joint Base San Antonio-Bullis (JBSA-BUL) Entry Control Point (ECP) - NW Military Highway Alternative

Construction Year	**NO_x** (tpy)	**VOC** (tpy)	**CO** (tpy)	**SO_2** (tpy)	**PM_{10}** (tpy)	**$PM_{2.5}$** (tpy)	**CO_2e** (tpy)
Combustion	3.208	0.542	2.338	0.008	0.143	0.143	690.295
Fugitive Dust	NA	NA	NA	NA	7.747	0.775	NA
Haul Truck On-Road	0.173	0.017	0.062	0.000	0.007	0.006	53.280
Construction Commuter	0.144	0.132	1.713	0.001	0.003	0.002	150.998
Total Construction Emissions	***3.524***	***0.691***	***4.113***	***0.010***	***7.899***	***0.926***	***894.572***

Operational Year	**NO_x** (tpy)	**VOC** (tpy)	**CO** (tpy)	**SO_2** (tpy)	**PM_{10}** (tpy)	**$PM_{2.5}$** (tpy)	**CO_2e** (tpy)
Emergency Generator	3.764	0.307	0.811	0.248	0.265	0.265	139.991
Existing JBSA-BUL Potential to Emit	20.180	2.700	18.440	0.400	5.310	5.310	NA
New JBSA-BUL Potential to Emit	***23.944***	***3.007***	***19.251***	***0.648***	***5.575***	***5.575***	***NA***

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO_2, CO, $PM_{2.5}$, $PM_{10,}$ and CO_2e due to Construction and Demolition

	Construction and Demolition Activities	Area Disturbed		Source
1.)	Construct Identification Check Booths (Two at 32 ft^2 each)	64	ft^2	Table 2-2 of EA
2.)	Construct Gatehouse	576	ft^2	Table 2-2 of EA
3.)	Construct Canopy	3,200	ft^2	Table 2-2 of EA
4.)	Construct Visitor Control Center	1,200	ft^2	Table 2-2 of EA
5.)	Construct Overwatch Building	36	ft^2	Table 2-2 of EA
6.)	Construct Security Fence (4,650 linear feet multiplied by 2 feet wide)	9,300	ft^2	Table 2-2 of EA
7.)	Construct Gate at Wilderness Road and NW Military Highway	200	ft^2	Table 2-2 of EA
8.)	Repaving Along NW Military Highway	77,000	ft^2	Estimated based on Arizpe *Design Analysis Report*
9.)	Truck Access Road and Passenger and Commercial Vehicle Inspection Lanes	60,000	ft^2	Estimated based on Arizpe *Design Analysis Report*
10.)	Construct POV Parking Area	2,000	ft^2	Estimated based on Arizpe *Design Analysis Report*
11.)	Demolish Excess Pavement at Existing ECP	1,500	ft^2	Estimated based on Aerial Imagery
12.)	Demolish Existing Identification Check Booth	32	ft^2	Table 2-2 of EA
12.)	Demolish Existing Canopy	5,200	ft^2	Table 2-2 of EA
13.)	Demolish Existing Prefabricated Building	330	ft^2	Table 2-2 of EA
14.)	Other Landscaping and Area Between Site Features	100,000	ft^2	Estimated based on Arizpe *Design Analysis Report*

Total Building Construction Area:	5,076	ft^2	
	0.117	acres	
Total Building Demolition Area:	5,562	ft^2	
	0.128	acres	
Total Pavement Demolition Area:	78,500	ft^2	
	1.802	acres	
New Roadway and Pavement Construction Area	139,000	ft^2	
	3.191	acres	
Total Disturbed Area:	260,638	ft^2	
	5.983	acres	
Construction Duration:	12	months	
Annual Construction Activity:	264	days	Assumes 22 days per month.

All construction and demolition conservatively assumed to occur in one year.

Emission Factors Used for Construction Equipment

All emission factors are from the *Air Emissions Guide for Air Force Transitory Sources* , July 2016, Table 4-5. Page 57. These are valid for Calendar Year 2019.
Assumptions regarding the type and number of equipment are from Guide to Air Quality Assessment, SMAQMD, 2004 Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Bulldozer	1	1.695	0.223	0.839	0.002	0.068	0.068	239.588
Motor Grader	1	0.649	0.098	0.579	0.001	0.032	0.032	132.965
Water Truck	1	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Total per 10 acres of activity per 8-hour day	3	26.232	3.784	15.800	0.048	1.056	1.056	5,063.864

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Paver	1	0.583	0.105	0.497	0.001	0.039	0.039	78.171
Roller	1	0.413	0.063	0.386	0.001	0.026	0.026	67.185
Truck	2	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Total per 10 acres of activity per 8-hour day	4	22.928	3.776	15.976	0.064	1.032	1.032	5,329.728

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Loader	1	0.527	0.080	0.444	0.001	0.027	0.027	108.792
Haul Truck	1	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Total per 10 acres of activity per 8-hour day	2	11.696	1.856	8.008	0.032	0.472	0.472	2,953.776

Building Construction

Equipment[b]	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Stationary								
Generator Set	1	0.348	0.043	0.276	0.001	0.017	0.017	61.090
Industrial Saw	1	0.367	0.054	0.381	0.001	0.023	0.023	58.585
Welder	1	0.183	0.034	0.184	0.000	0.012	0.012	25.680
Mobile (non-road)								
Truck	1	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Forklift	1	0.192	0.034	0.217	0.001	0.009	0.009	54.474
Crane	1	0.724	0.095	0.398	0.001	0.029	0.029	128.844
Total per 10 acres of activity per 8-hour day	6	21.992	3.296	16.104	0.056	0.976	0.976	4,712.824

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Air Compressor	1	0.358	0.053	0.310	0.001	0.021	0.021	63.726
Total per 10 acres of activity per 8-hour day	1	2.864	0.424	2.480	0.008	0.168	0.168	509.808

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.

b) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Grading Equipment	1	26.232	3.784	15.800	0.048	1.056	1.056	5,063.864
Paving Equipment	1	22.928	3.776	15.976	0.064	1.032	1.032	5,329.728
Demolition Equipment	1	11.696	1.856	8.008	0.032	0.472	0.472	2,953.776
Building Construction	1	21.992	3.296	16.104	0.056	0.976	0.976	4,712.824
Air Compressor for Architectural Coating	1	2.864	0.424	2.480	0.008	0.168	0.168	509.808
Architectural Coating**			5.807					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	260,638	5.983	4	(from "Grading" worksheet)
Paving:	139,000	3.191	16	
Demolition:	5,562	0.128	7	
Building Construction:	5,076	0.117	264	
Architectural Coating	5,076	0.117	20	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Grading Equipment	104.928	15.136	63.200	0.192	4.224	4.224	20,255.456
Paving	366.848	60.416	255.616	1.024	16.512	16.512	85,275.648
Demolition	81.872	12.992	56.056	0.224	3.304	3.304	20,676.432
Building Construction	5,805.888	870.144	4,251.456	14.784	257.664	257.664	1,244,185.536
Architectural Coatings	57.280	124.611	49.600	0.160	3.360	3.360	10,196.160
Total Emissions (lbs):	**6,416.816**	**1,083.299**	**4,675.928**	**16.384**	**285.064**	**285.064**	**1,380,589.232**

Results: Total Project Annual Emission Rates

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Total Project Emissions (lbs)	6,416.816	1,083.299	4,675.928	16.384	285.064	285.064	1,380,589.232
Total Project Emissions (tons)	3.208	0.542	2.338	0.008	0.143	0.143	690.295

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
Demolition Activities	0.00042	lb PM_{10}/cubic foot	AFCEC 2016.
Grading, Excavating and Trenching.	0.220	ton PM_{10}/acre-month	AFCEC 2016.

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier	0.100	(10% of PM_{10} emissions assumed to be $PM_{2.5}$)	USEPA 2006
Control Efficiency for Grading, Excavating and Trenching Emissions	0.500	(assume 50% control efficiency for PM_{10} and $PM_{2.5}$ emissions)	USEPA 2006

Demolition (0.00042 lb PM_{10}/cubic foot)

Area of Buildings	5,562	square feet
Average Height of Buildings	15	feet

Grading, Excavating and Trenching (0.22 ton PM_{10}/acre-month)

Duration of Project	12	months
Area	5.856	acres

	Project Emissions (tons/year)	
	PM_{10}	**$PM_{2.5}$**
Demolition	0.018	0.002
Grading, Excavating and Trenching	7.730	0.773
Total	**7.747**	**0.775**

Construction Fugitive Dust Emission Factors

Demolition Emission Factor

0.00042 lb PM_{10}/cubic foot Source: AFCEC 2016

This emission factor is from AFCEC 2016, Section 4.3.1.1 and Equation 4-3.

Grading, Excavating and Trenching Emission Factor

0.220 ton PM_{10}/acre-month Source: AFCEC 2016

This emission factor is from AFCEC 2016, Section 4.3.1.2 and Equation 4-4.

$PM_{2.5}$ Multiplier **0.100**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (USEPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The USEPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (USEPA 2006). Wetting controls will be applied during project construction.

References:

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

Air Force Civil Engineering Center (AFCEC). 2016. *Air Emissions Guide for Air Force Transitory Sources*, July 2016. Pages 42 and 43.

Haul Truck Emissions

Emissions from hauling excavation material, demolition materials, and construction supplies are estimated in this spreadsheet.

Emission Estimation Method:
Air Force Civil Engineering Center (AFCEC). 2016. *Air Emissions Guide for Air Force Mobile Sources. Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations.* July 2016.

Assumptions:
Haul trucks carry 10 cubic yards of material per trip.
The average distance from the project site to the materials source is 15 miles; therefore, a haul truck will travel 30 miles round trip.
Estimated number of trips required by haul trucks = total amount of material/10 cubic yards per truck
Assumes soil would not need to be hauled to or from the site.

Amount of Building Materials =	1,692	cubic yards	Assumes 9 cubic feet of building material are needed per square foot of building space
Amount of Paving Material =	8,056	cubic yards	Assumes 1 cubic foot of pavement is needed per square foot of pavement construction. Additionally, 1 cubic foot of pavement debris is generated per square foot of pavement demolition.
Amount of Building Debris =	824	cubic yards	Assumes 4 cubic feet of demolition debris is generated per square foot of building space
Number of trucks required =	1,057	heavy duty diesel haul truck trips	
Miles per trip =	30	miles	

Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)

NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
4.936	0.479	1.768	0.013	0.189	0.174	1524.069

Notes:
Construction assumed to occur in Calendar Year 2019.
Emission factors for all pollutants are from AFCEC 2016, Table 5-24, On-Road Vehicle Emissions Factors - 2019 for HDDV in Texas, 2019. Page 276.

HDDV Haul Truck Emissions

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
lbs	345.114	33.491	123.614	0.909	13.214	12.166	106,559.392
tons	0.173	0.017	0.062	0.000	0.007	0.006	53.280

Example Calculation: NO_x emissions (lbs) = miles per trip * number of trips * NO_x emission factor (g/mile) * lb/453.6 g

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Assumptions:

The average round-trip commute for a construction worker =	40	miles
Number of construction days =	264	days
Number of construction workers (daily) =	30	people

Light-Duty Trucks (Gasoline Powered) Emission Factors for Year 2019 (grams/mile)

NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
0.411	**0.379**	**4.906**	**0.003**	**0.008**	**0.007**	**432.402**

Source: Air Force Civil Engineering Center (AFCEC). 2016. A*ir Emissions Guide for Air Force Mobile Sources. Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations.* July 2016. Table 5-24, On-Road Vehicle Emissions Factors - 2019 for LDGT in Texas, 2019. Page 276.

Construction Commuter Emissions

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
lbs	**287.048**	**264.698**	**3,426.413**	**2.095**	**5.587**	**4.889**	**301,995.048**
tons	**0.144**	**0.132**	**1.713**	**0.001**	**0.003**	**0.002**	**150.998**

Example Calculation: NO_x emissions (lbs) = miles/day * NO_x emission factor (grams/mile) * number of construction days * number of workers ÷ 453.56 grams/lb

Calculates Air Emissions from an Emergency Generator

Assumptions:
Number of Generators: 1
Generator Power Rating: 300 kilowatts
Generator Fuel: Diesel

Generator Kilowatts		Conversion from kW to Btu/hr	Engine Btu/hr (Assume 30% efficiency converting mechanical to electrical power)	Engine MMBtu/hr
300		3414.4	3,414,426	3.41

Diesel Industrial Engine Emission Factors from AP-42, Section 3.3	NOx	CO	TOC	PM_{10}	SO_2	CO_2
	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Emission Factor	4.41	0.95	0.36	0.31	0.29	164

Source: USEPA 1996. AP-42. Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines. Table 3.3-1. Page 3.3-6.

Assume max. 500 hrs/yr	NOx	CO	TOC	PM_{10}	SO_2	CO_2
	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)
Emissions (lbs/yr)	7,528.81	1,621.85	614.60	529.24	495.09	279,982.92

	NOx	CO	TOC	PM_{10}	SO_2	CO_2
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
Emissions (tons/yr)	**3.764**	**0.811**	**0.307**	**0.265**	**0.248**	**139.991**

Total Organic Compounds (TOCs) have been used in place of VOCs for this anaylsis

500 hour/year was used as a conservative assumption for generator use. It is equivalent to the USEPA guidance for calculating potential to emit for emergency generators.

PM_{10} used in place $PM_{2.5}$ for lack of $PM_{2.5}$ emission factors.

Air Emissions for the Joint Base San Antonio-Bullis (JBSA-BUL) Entry Control Point (ECP) - Camp Bullis Road Alternative

Construction Year	**NO_x** (tpy)	**VOC** (tpy)	**CO** (tpy)	**SO_2** (tpy)	**PM_{10}** (tpy)	**$PM_{2.5}$** (tpy)	**CO_2e** (tpy)
Combustion	3.149	0.532	2.298	0.008	0.140	0.140	677.103
Fugitive Dust	NA	NA	NA	NA	6.664	0.666	NA
Haul Truck On-Road	0.135	0.013	0.048	0.000	0.005	0.005	41.707
Construction Commuter	0.144	0.132	1.713	0.001	0.003	0.002	150.998
Total Construction Emissions	***3.428***	***0.678***	***4.060***	***0.009***	***6.812***	***0.814***	***869.807***

Operational Year	**NO_x** (tpy)	**VOC** (tpy)	**CO** (tpy)	**SO_2** (tpy)	**PM_{10}** (tpy)	**$PM_{2.5}$** (tpy)	**CO_2e** (tpy)
Emergency Generator	3.764	0.307	0.811	0.248	0.265	0.265	139.991
Existing JBSA-BUL Potential to Emit	20.180	2.700	18.440	0.400	5.310	5.310	NA
New JBSA-BUL Potential to Emit	***23.944***	***3.007***	***19.251***	***0.648***	***5.575***	***5.575***	***NA***

Combustion Emissions

Combustion Emissions of VOC, NO_x, SO_2, CO, $PM_{2.5}$, $PM_{10,}$ and CO_2e due to Construction and Demolition

	Construction and Demolition Activities	Area Disturbed		Source
1.)	Construct Identification Check Booths (Two at 32 ft^2 each)	64	ft^2	Table 2-3 of EA
2.)	Construct Gatehouse	576	ft^2	Table 2-3 of EA
3.)	Construct Canopy	3,200	ft^2	Table 2-3 of EA
4.)	Construct Visitor Control Center	1,200	ft^2	Table 2-3 of EA
5.)	Construct Overwatch Building	36	ft^2	Table 2-3 of EA
6.)	Construct Security Fence (1,730 linear feet multiplied by 2 feet wide)	3,460	ft^2	Table 2-3 of EA
7.)	Construct New Barricades on NW Military Highway	650	ft^2	Table 2-3 of EA
8.)	Repaving Along Camp Bullis Road	46,000	ft^2	Estimated based on Aerial Imagery
9.)	Truck Access Road and Passenger and Commercial Vehicle Inspection Lanes	60,000	ft^2	Estimated based on Arizpe *Design Analysis Report*
10.)	Construct POV Parking Area	2,000	ft^2	Estimated based on Arizpe *Design Analysis Report*
11.)	Demolish Excess Pavement at Existing ECP	1,500	ft^2	Estimated based on Aerial Imagery
12.)	Demolish Existing Barricades on Camp Bullis Road	650	ft^2	Table 2-3 of EA
13.)	Demolish Existing Identification Check Booth (Existing ECP)	32	ft^2	Table 2-3 of EA
14.)	Demolish Existing Canopy (Existing ECP)	5,200	ft^2	Table 2-3 of EA
15.)	Demolish Existing Prefabricated Building (Existing ECP)	330	ft^2	Table 2-3 of EA
16.)	Other Landscaping and Area Between Site Features	100,000	ft^2	Estimated based on Arizpe *Design Analysis Report*
	Total Building Construction Area:	5,076	ft^2	
		0.117	acres	
	Total Building Demolition Area:	5,562	ft^2	
		0.128	acres	
	Total Pavement Demolition Area:	47,500	ft^2	
		1.090	acres	
	New Roadway and Pavement Construction Area	108,000	ft^2	
		2.479	acres	
	Total Disturbed Area:	224,898	ft^2	
		5.163	acres	
	Construction Duration:	12	months	
	Annual Construction Activity:	264	days	Assumes 22 days per month.

All construction and demolition conservatively assumed to occur in one year.

Emission Factors Used for Construction Equipment

All emission factors are from the *Air Emissions Guide for Air Force Transitory Sources* , July 2016, Table 4-5. Page 57. These are valid for Calendar Year 2019.
Assumptions regarding the type and number of equipment are from Guide to Air Quality Assessment, SMAQMD, 2004 Table 3-1 unless otherwise noted.

Grading

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Bulldozer	1	1.695	0.223	0.839	0.002	0.068	0.068	239.588
Motor Grader	1	0.649	0.098	0.579	0.001	0.032	0.032	132.965
Water Truck	1	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Total per 10 acres of activity per 8-hour day	3	26.232	3.784	15.800	0.048	1.056	1.056	5,063.864

Paving

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Paver	1	0.583	0.105	0.497	0.001	0.039	0.039	78.171
Roller	1	0.413	0.063	0.386	0.001	0.026	0.026	67.185
Truck	2	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Total per 10 acres of activity per 8-hour day	4	22.928	3.776	15.976	0.064	1.032	1.032	5,329.728

Demolition

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Loader	1	0.527	0.080	0.444	0.001	0.027	0.027	108.792
Haul Truck	1	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Total per 10 acres of activity per 8-hour day	2	11.696	1.856	8.008	0.032	0.472	0.472	2,953.776

Building Construction

Equipment[b]	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Stationary								
Generator Set	1	0.348	0.043	0.276	0.001	0.017	0.017	61.090
Industrial Saw	1	0.367	0.054	0.381	0.001	0.023	0.023	58.585
Welder	1	0.183	0.034	0.184	0.000	0.012	0.012	25.680
Mobile (non-road)								
Truck	1	0.935	0.152	0.557	0.003	0.032	0.032	260.430
Forklift	1	0.192	0.034	0.217	0.001	0.009	0.009	54.474
Crane	1	0.724	0.095	0.398	0.001	0.029	0.029	128.844
Total per 10 acres of activity per 8-hour day	6	21.992	3.296	16.104	0.056	0.976	0.976	4,712.824

Note: Footnotes for tables are on following page

Architectural Coatings

Equipment	No. Reqd.[a] per 10 acres	NO_x (lb/hr)	VOC (lb/hr)	CO (lb/hr)	SO_X (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO_2e (lb/hr)
Air Compressor	1	0.358	0.053	0.310	0.001	0.021	0.021	63.726
Total per 10 acres of activity per 8-hour day	1	2.864	0.424	2.480	0.008	0.168	0.168	509.808

a) The SMAQMD 2004 guidance suggests a default equipment fleet for each activity, assuming 10 acres of that activity, (e.g., 10 acres of grading, 10 acres of paving, etc.). The default equipment fleet is increased for each 10 acre increment in the size of the construction project. That is, a 26 acre project would round to 30 acres and the fleet size would be three times the default fleet for a 10 acre project.

b) Typical equipment fleet for building construction was not itemized in SMAQMD 2004 guidance. The equipment list above was assumed based on SMAQMD 1994 guidance.

PROJECT-SPECIFIC EMISSION FACTOR SUMMARY

Source	Equipment Multiplier*	Project-Specific Emission Factors (lb/day)						
		NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Grading Equipment	1	26.232	3.784	15.800	0.048	1.056	1.056	5,063.864
Paving Equipment	1	22.928	3.776	15.976	0.064	1.032	1.032	5,329.728
Demolition Equipment	1	11.696	1.856	8.008	0.032	0.472	0.472	2,953.776
Building Construction	1	21.992	3.296	16.104	0.056	0.976	0.976	4,712.824
Air Compressor for Architectural Coating	1	2.864	0.424	2.480	0.008	0.168	0.168	509.808
Architectural Coating**			5.807					

*The equipment multiplier is an integer that represents units of 10 acres for purposes of estimating the number of equipment required for the project.

**Emission factor is from the evaporation of solvents during painting, per "Air Quality Thresholds of Significance", SMAQMD, 1994

Summary of Input Parameters

	Total Area (ft^2)	Total Area (acres)	Total Days	
Grading:	224,898	5.163	3	(from "Grading" worksheet)
Paving:	108,000	2.479	12	
Demolition:	5,562	0.128	7	
Building Construction:	5,076	0.117	264	
Architectural Coating	5,076	0.117	20	(per SMAQMD "Air Quality of Thresholds of Significance", 1994)

Total Project Emissions by Activity (lbs)

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Grading Equipment	78.696	11.352	47.400	0.144	3.168	3.168	15,191.592
Paving	275.136	45.312	191.712	0.768	12.384	12.384	63,956.736
Demolition	81.872	12.992	56.056	0.224	3.304	3.304	20,676.432
Building Construction	5,805.888	870.144	4,251.456	14.784	257.664	257.664	1,244,185.536
Architectural Coatings	57.280	124.611	49.600	0.160	3.360	3.360	10,196.160
Total Emissions (lbs):	**6,298.872**	**1,064.411**	**4,596.224**	**16.080**	**279.880**	**279.880**	**1,354,206.456**

Results: Total Project Annual Emission Rates

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Total Project Emissions (lbs)	6,298.872	1,064.411	4,596.224	16.080	279.880	279.880	1,354,206.456
Total Project Emissions (tons)	3.149	0.532	2.298	0.008	0.140	0.140	677.103

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
Demolition Activities	0.00042	lb PM_{10}/cubic foot	AFCEC 2016.
Grading, Excavating and Trenching.	0.220	ton PM_{10}/acre-month	AFCEC 2016.

$PM_{2.5}$ Emissions

$PM_{2.5}$ Multiplier	0.100	(10% of PM_{10} emissions assumed to be $PM_{2.5}$)	USEPA 2006
Control Efficiency for Grading, Excavating and Trenching Emissions	0.500	(assume 50% control efficiency for PM_{10} and $PM_{2.5}$ emissions)	USEPA 2006

Demolition (0.00042 lb PM_{10}/cubic foot)

Area of Buildings	5,562	square feet
Average Height of Buildings	15	feet

Grading, Excavating and Trenching (0.22 ton PM_{10}/acre-month)

Duration of Project	12	months
Area	5.035	acres

	Project Emissions (tons/year)	
	PM_{10}	**$PM_{2.5}$**
Demolition	0.018	0.002
Grading, Excavating and Trenching	6.647	0.665
Total	**6.664**	**0.666**

Construction Fugitive Dust Emission Factors

Demolition Emission Factor

0.00042 lb PM_{10}/cubic foot Source: AFCEC 2016

This emission factor is from AFCEC 2016, Section 4.3.1.1 and Equation 4-3.

Grading, Excavating and Trenching Emission Factor

0.220 ton PM_{10}/acre-month Source: AFCEC 2016

This emission factor is from AFCEC 2016, Section 4.3.1.2 and Equation 4-4.

$PM_{2.5}$ Multiplier **0.100**

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (USEPA 2006).

Control Efficiency for PM_{10} and $PM_{2.5}$ **0.50**

The USEPA National Emission Inventory documentation recommends a control efficiency of 50% for PM_{10} and $PM_{2.5}$ in PM nonattainment areas (USEPA 2006). Wetting controls will be applied during project construction.

References:

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

Air Force Civil Engineering Center (AFCEC). 2016. *Air Emissions Guide for Air Force Transitory Sources*, July 2016. Pages 42 and 43.

Haul Truck Emissions

Emissions from hauling excavation material, demolition materials, and construction supplies are estimated in this spreadsheet.

Emission Estimation Method:
Air Force Civil Engineering Center (AFCEC). 2016. *Air Emissions Guide for Air Force Mobile Sources. Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations.* July 2016.

Assumptions:
Haul trucks carry 10 cubic yards of material per trip.
The average distance from the project site to the materials source is 15 miles; therefore, a haul truck will travel 30 miles round trip.
Estimated number of trips required by haul trucks = total amount of material/10 cubic yards per truck
Assumes soil would not need to be hauled to or from the site.

Amount of Building Materials =	1,692	cubic yards	Assumes 9 cubic feet of building material are needed per square foot of building space
Amount of Paving Material =	5,759	cubic yards	Assumes 1 cubic foot of pavement is needed per square foot of pavement construction. Additionally, 1 cubic foot of pavement debris is generated per square foot of pavement demolition.
Amount of Building Debris =	824	cubic yards	Assumes 4 cubic feet of demolition debris is generated per square foot of building space
Number of trucks required =	828	heavy duty diesel haul truck trips	
Miles per trip =	30	miles	

Heavy Duty Diesel Vehicle (HDDV) Average Emission Factors (grams/mile)

NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
4.936	0.479	1.768	0.013	0.189	0.174	1524.069

Notes:
Construction assumed to occur in Calendar Year 2019.
Emission factors for all pollutants are from AFCEC 2016, Table 5-24, On-Road Vehicle Emissions Factors - 2019 for HDDV in Texas, 2019. Page 276.

HDDV Haul Truck Emissions

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
lbs	270.150	26.216	96.764	0.711	10.344	9.523	83,413.136
tons	0.135	0.013	0.048	0.000	0.005	0.005	41.707

Example Calculation: NO_x emissions (lbs) = miles per trip * number of trips * NO_x emission factor (g/mile) * lb/453.6 g

Construction Commuter Emissions

Emissions from construction workers commuting to the job site are estimated in this spreadsheet.

Assumptions:

The average round-trip commute for a construction worker =	40	miles
Number of construction days =	264	days
Number of construction workers (daily) =	30	people

Light-Duty Trucks (Gasoline Powered) Emission Factors for Year 2019 (grams/mile)

NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
0.411	**0.379**	**4.906**	**0.003**	**0.008**	**0.007**	**432.402**

Source: Air Force Civil Engineering Center (AFCEC). 2016. A*ir Emissions Guide for Air Force Mobile Sources. Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations.* July 2016. Table 5-24, On-Road Vehicle Emissions Factors - 2019 for LDGT in Texas, 2019. Page 276.

Construction Commuter Emissions

	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
lbs	**287.048**	**264.698**	**3,426.413**	**2.095**	**5.587**	**4.889**	**301,995.048**
tons	**0.144**	**0.132**	**1.713**	**0.001**	**0.003**	**0.002**	**150.998**

Example Calculation: NO_x emissions (lbs) = miles/day * NO_x emission factor (grams/mile) * number of construction days * number of workers ÷ 453.56 grams/lb

Calculates Air Emissions from an Emergency Generator

Assumptions:
Number of Generators: 1
Generator Power Rating: 300 kilowatts
Generator Fuel: Diesel

Generator Kilowatts		Conversion from kW to Btu/hr	Engine Btu/hr (Assume 30% efficiency converting mechanical to electrical power)	Engine MMBtu/hr
300		3414.4	3,414,426	3.41

Diesel Industrial Engine Emission Factors from AP-42, Section 3.3	NOx	CO	TOC	PM_{10}	SO_2	CO_2
	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Emission Factor	4.41	0.95	0.36	0.31	0.29	164

Source: USEPA 1996. AP-42. Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines. Table 3.3-1. Page 3.3-6.

Assume max. 500 hrs/yr	NOx	CO	TOC	PM_{10}	SO_2	CO_2
	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)	(lbs/yr)
Emissions (lbs/yr)	7,528.81	1,621.85	614.60	529.24	495.09	279,982.92

	NOx	CO	TOC	PM_{10}	SO_2	CO_2
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
Emissions (tons/yr)	**3.764**	**0.811**	**0.307**	**0.265**	**0.248**	**139.991**

Total Organic Compounds (TOCs) have been used in place of VOCs for this anaylsis

500 hour/year was used as a conservative assumption for generator use. It is equivalent to the USEPA guidance for calculating potential to emit for emergency generators.

PM_{10} used in place $PM_{2.5}$ for lack of $PM_{2.5}$ emission factors.

C

Traffic Impact Assessment

Draft

Traffic Impact Assessment

for an Environmental Assessment Addressing a Modern Entry Control Point

Joint Base San Antonio-Bullis, Texas

August
2017

ABBREVIATIONS AND ACRONYMS

BUL	Bullis
EA	Environmental Assessment
ECP	entry control point
HCM	Highway Capacity Manual
I	Interstate
JBSA	Joint Base San Antonio
LOS	level(s) of service
MTP	Metropolitan Transportation Plan
NW	Northwest
TIA	Traffic Impact Assessment
TxDOT	Texas Department of Transportation
vpd	vehicles per day
W	West

Draft

TRAFFIC IMPACT ASSESSMENT
for an
Environmental Assessment Addressing a Modern Entry Control Point
at
Joint Base San Antonio-Bullis, Texas

Prepared for:

U.S. Army Corps of Engineers, Tulsa District

Prepared by:

HDR Inc.
Texas Registered Engineering Firm No: F754

AUGUST 2017

Executive Summary

This Traffic Impact Assessment (TIA) was prepared to document potential impacts on traffic from the operation of a new entry control point (ECP) at Joint Base San Antonio (JBSA)-Bullis (BUL), Texas. The purpose of this TIA is to evaluate traffic impacts near JBSA-BUL from two alternative locations for the new ECP. The following two alternative ECP locations were considered in this TIA:

- ***Northwest (NW) Military Highway Alternative***: Construct the proposed ECP on NW Military Highway to the north of the existing ECP. All traffic would continue to use NW Military Highway, and Camp Bullis Road would remain closed to traffic except during emergency situations.
- ***Camp Bullis Road Alternative***: Construct the proposed ECP on Camp Bullis Road to the east of the existing road barricades. Camp Bullis Road would open to traffic while NW Military Highway would close to traffic except during emergency situations.

To establish the existing conditions, HDR obtained average daily traffic estimates from various sources and peak period turning movement counts for intersections in the vicinity of the proposed ECP sites. Additionally, 24-hour traffic counts were obtained for NW Military Highway south of the current ECP and for Camp Bullis Road east of West (W) Tejas Trail. Existing levels of service (LOS) at these intersections established baseline conditions for the study area.

Year 2018 forecasted traffic conditions were evaluated at the study area intersections to determine LOS under the two alternatives. A 2 percent annual growth rate was used to grow existing background traffic volumes. Additional background traffic generated by future developments in the vicinity of JBSA-BUL was added to develop forecasted traffic volumes for the analysis year.

Capacity analysis was performed for the following intersections under all three analysis scenarios (i.e., 2016 existing conditions, 2018 NW Military Highway Alternative, and 2018 Camp Bullis Road Alternative) for the AM and PM peak periods:

- Loop 1604 and NW Military Highway
- Interstate (I)-10 and Camp Bullis Road
- Camp Bullis Road and W Tejas Trail.

Based on this analysis, LOS at Loop 1604 and NW Military Highway would be E during both the AM and PM peaks under both alternatives, assuming the roadway and intersection improvements listed in **Table ES-1** are implemented. LOS at I-10 and Camp Bullis Road would be C and D during AM and PM peak periods, respectively, under the NW Military Highway Alternative. Under the Camp Bullis Road Alternative, the I-10 and Camp Bullis Road interchange would operate at LOS D and E during the AM and PM peak periods, respectively, assuming no additional roadway or intersection improvements are implemented. With the signal timing optimization and geometry improvements listed in **Table ES-1**, LOS would be C and D during the AM and PM peak periods, respectively, at this interchange.

Based on this analysis, relocation of the ECP to Camp Bullis Road would result in delay reduction at the intersection of Loop 1604 and NW Military Highway and would result in more efficient transit operations between JBSA sites. However, it would require signal timing and geometric improvements at the I-10 and Camp Bullis Road interchange in order to maintain No Action Alternative LOS. No additional roadway and intersection improvements are necessary if the ECP is constructed on NW Military Highway.

Table ES-1 lists all improvements (i.e., those implemented by others and those implemented by JBSA) for the roadways and intersections within the study area.

Table ES-1. Roadway and Intersection Improvements

Location	Action	Responsibility	Alternative
Loop 1604 and NW Military Highway	Install a 365-foot right-turn deceleration lane with 100-foot taper for southbound approach of NW Military Highway at Loop 1604 westbound Frontage Road.	Other Project Development	Both
	Extend southbound auxiliary through lane by 465 feet.	Other Project Development	Both
	Optimize signal timing at this intersection.	TxDOT	Both
I-10 and Camp Bullis Road	Optimize signal timing at this intersection.	JBSA, City of San Antonio	Camp Bullis Road Alternative
	Install right-turn lane for the westbound approach of Camp Bullis Road at the I-10 northbound Frontage Road.	JBSA	Camp Bullis Road Alternative

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Figures

Tables

1 Introduction

Joint Base San Antonio (JBSA)-Bullis (BUL) is in Bexar County, Texas, approximately 16 miles north of downtown San Antonio. The installation occupies more than 28,000 acres northeast of the intersection of Interstate (I)-10 and Loop 1604 (see **Figure 1-1**) (TxSHA 2014).

JBSA-BUL has proposed to construct and operate a modern entry control point (ECP) (i.e., Proposed Action) because the installation's existing ECP, currently located on Northwest (NW) Military Highway, does not comply with Unified Facilities Criteria Security Engineering standards and does not provide adequate proofing, vetting, and processing of persons requesting access to JBSA-BUL.

The proposed ECP would have six integrated components, including two identification check booths, a gatehouse, visitor control center, an overwatch building, passive and active vehicle barriers, and utility infrastructure (e.g., electrical, potable water, sanitary sewer). Ancillary components of the proposed ECP—including fire protection, emergency electrical power generation, exterior lighting, site drainage, parking, sidewalks, signage, landscaping, passive intrusion barriers and emergency fast operation controls—would also be included. The proposed ECP would be constructed in 2018.

JBSA-BUL is considering three alternatives to the Proposed Action:

- ***NW Military Highway Alternative:*** Construct the proposed ECP on NW Military Highway to the north of the existing ECP. All traffic would continue to use NW Military Highway, and Camp Bullis Road would remain closed to traffic except during emergency situations (see **Figure 1-2**).
- ***Camp Bullis Road Alternative:*** Construct the proposed ECP on Camp Bullis Road to the east of the existing road barricades. Camp Bullis Road would open to traffic while NW Military Highway would close to traffic except during emergency situations (see **Figure 1-3**).
- ***No Action Alternative:*** No action would be taken and no construction would occur. The existing ECP on NW Military Highway would remain open. All traffic would continue to use NW Military Highway, and Camp Bullis Road would remain closed to traffic except in emergency situations.

Only one of these three alternatives would be selected for implementation. JBSA-BUL would not operate ECPs on NW Military Highway and Camp Bullis Road simultaneously. JBSA-BUL has identified the NW Military Highway Alternative as the Preferred Alternative but is giving equal consideration to all three alternatives.

HDR is preparing an Environmental Assessment (EA) on the construction and operation of the proposed ECP under these three alternatives. This Traffic Impact Assessment (TIA) is a component of the EA because increased traffic, both overall and on local roadways, is a key environmental concern associated with this Proposed Action. In support of the EA, this TIA performs capacity analyses for existing conditions and two of the alternatives (i.e., NW Military

Figure 1-1. JBSA-BUL Site Vicinity Map

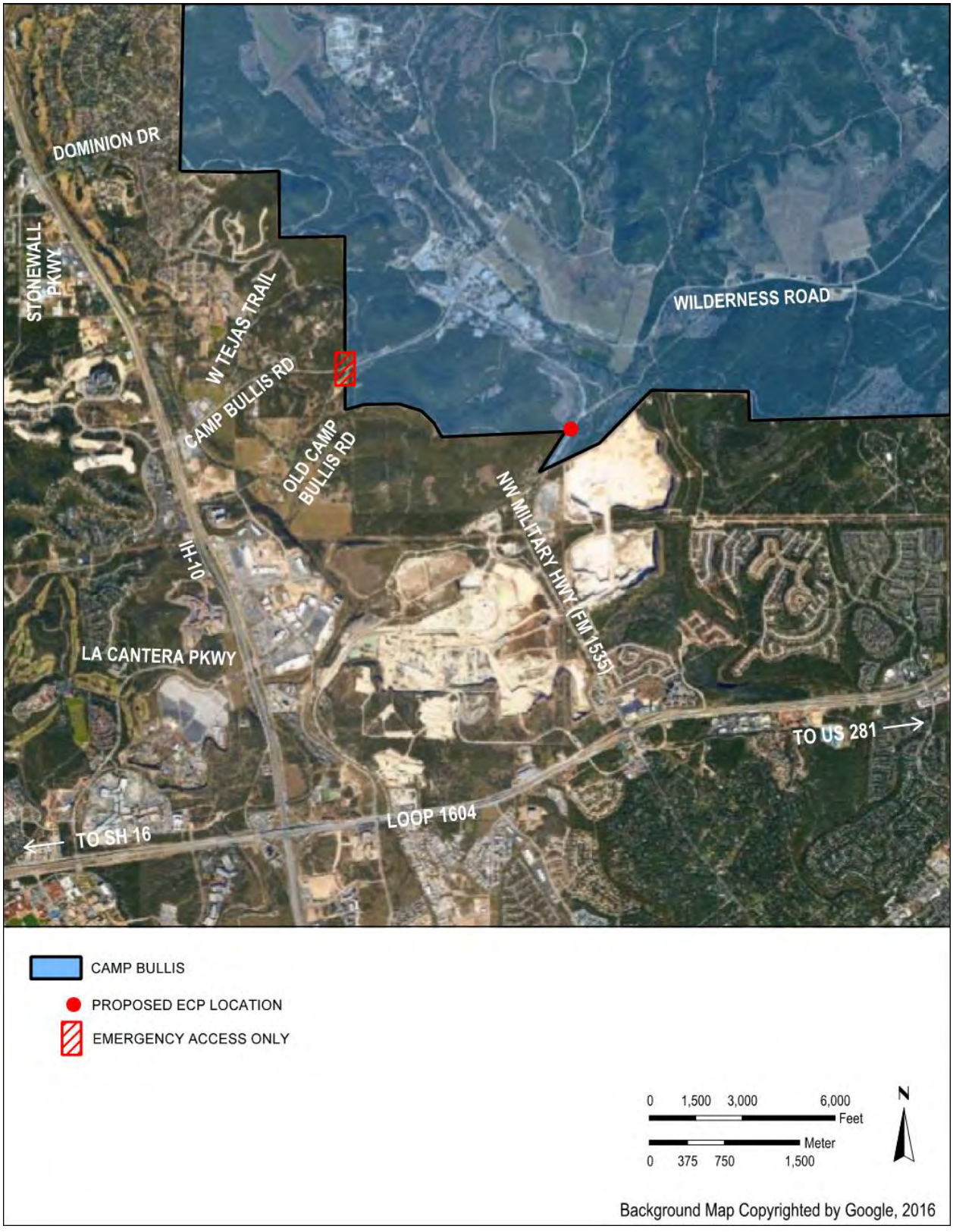

Figure 1-2. NW Military Highway Alternative

Figure 1-3. Camp Bullis Road Alternative

Highway and Camp Bullis Road) to document levels of service (LOS) at the following intersections:

1. Loop 1604 and NW Military Highway (two intersections)
2. I-10 and Camp Bullis Road (two intersections)
3. Camp Bullis Road and West (W) Tejas Trail.

The NW Military Highway and Camp Bullis Road Alternatives are the only alternatives analyzed in this TIA because the NW Military Highway Alternative and the No Action Alternative would result in identical impacts on traffic.

The analysis in this TIA includes estimates for additional traffic generated by future development in the vicinity of JBSA-BUL. This TIA is intended to help JBSA-BUL determine the alternative to implement.

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2 JBSA-BUL Access Characteristics

Access to JBSA-BUL currently is provided via the existing ECP on NW Military Highway, as shown in **Figure 1-2**. Camp Bullis Road currently is closed to traffic except in emergency situations. The proposed ECP would provide access to JBSA-BUL either through NW Military Highway or Camp Bullis Road. Whichever alternative is not chosen would be closed to traffic and operate as an emergency egress point from JBSA-BUL. JBSA-BUL would not operate ECPs on NW Military Highway and Camp Bullis Road simultaneously.

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3 Existing Thoroughfare System

The roadways affected by the Proposed Action include I-10, Loop 1604, NW Military Highway, and Camp Bullis Road. Characteristics of these roads are described below, and average daily traffic counts are shown on **Figure 1-1**. Average daily traffic estimates for these roadways were obtained from Texas Department of Transportation (TxDOT) average daily traffic counts (TxDOT 2016), TxDOT saturation counts (TxDOT 2010), and by counts conducted by CJ Hensch & Associates in August 2016. The City of San Antonio Major Thoroughfare Plan 2016 (City of San Antonio 2016) catalogs the classifications of these roadways, and the Alamo Area Metropolitan Planning Organization Mobility 2040 Metropolitan Transportation Plan (MTP) (AAMPO 2014) documents proposed improvements. The TxDOT project tracker web application also provides detailed information on proposed improvements on state system roadways (TxDOT 2015).

I-10

The City of San Antonio Major Thoroughfare Plan classifies I-10 as a freeway in the vicinity of JBSA-BUL. I-10 is a four-lane freeway with one-way, three-lane frontage roads. According to TxDOT traffic counts, the 2015 traffic volume on I-10 was approximately 89,175 vehicles per day (vpd) north of Stonewall Parkway. According to TxDOT, I-10 from Stonewall Parkway/Dominion Drive to La Cantera Parkway will be expanded from a four-lane expressway to an eight-lane expressway. Two new general-purpose lanes and two new high-occupancy vehicle lanes will be added to this segment. Construction of this project began in summer 2017.

Loop 1604

The City of San Antonio Thoroughfare Plan classifies Loop 1604 as a freeway in the vicinity of JBSA-BUL. Loop 1604 is a four-lane freeway with one-way, two-lane frontage roads. According to TxDOT traffic counts, the 2015 traffic volume on Loop 1604 was 129,500 vpd east of I-10. According to TxDOT, four new managed lanes will be added to Loop 1604 from State Highway 16 to US 281. Construction of this project is expected to begin in January 2020. According to the Alamo Area Metropolitan Planning Organization MTP, a turnaround is proposed for Loop 1604 at NW Military Highway. The construction of the turnaround is temporarily placed in fiscal year 2027.

NW Military Highway (FM 1535)

The City of San Antonio Major Thoroughfare Plan classifies NW Military Highway as Primary Arterial Type A roadway in the vicinity of JBSA-BUL. NW Military Highway is a four-lane undivided roadway south of Loop 1604 and a two-lane undivided roadway north of Loop 1604. The existing ECP for JBSA-BUL is located on NW Military Highway, south of Wilderness Road. According to TxDOT traffic counts, the 2015 traffic volume on NW Military Highway was approximately 15,892 vpd south of Loop 1604 and 7,224 vpd north of Loop 1604.

Traffic signal improvements, lane reconfigurations and extensions, and safety lighting are proposed at the interchange of NW Military Highway and Loop 1604 according to TxDOT. Construction of this project is expected to begin in September 2018. Additionally, a two-way left

turn lane, bike lanes, and sidewalks will be constructed on NW Military Highway from south of Loop 1604 to Huebner Road. Construction of this project is expected to begin in November 2019. Finally, NW Military Highway will be expanded from two to four lanes with raised medians or center turn lanes, bike lanes, and sidewalks from 1 mile north of Loop 1604 to Loop 1604. Construction of this project is expected to begin in November 2020.

Camp Bullis Road

The City of San Antonio Major Thoroughfare Plan classifies Camp Bullis Road as Secondary Arterial Type A roadway in the vicinity of JBSA-BUL. Camp Bullis Road is a two-lane undivided road east of I-10 and a four-lane divided road west of I-10. Barricades are set on Camp Bullis Road to the east of Old Camp Bullis Road to prohibit access to JBSA-BUL. According to TxDOT saturation counts, the 2010 traffic volume on Camp Bullis Road was approximately 2,750 vpd east of I-10. No improvements are currently planned in the MTP on Camp Bullis Road in the vicinity of JBSA-BUL.

4 Traffic Analysis of the Proposed Action

In order to assess the traffic impacts of the Proposed Action, two time periods (i.e., AM and PM) and three travel conditions were evaluated:

- Existing Conditions (2016)
- Forecasted NW Military Highway Alternative (2018)
- Forecasted Camp Bullis Alternative (2018).

Intersections in the vicinity of JBSA-BUL are considered the locations of principal concern because they are the locations of highest traffic conflict and delay. The standard used to evaluate traffic conditions at intersections is LOS, which is a qualitative measure of the effect of factors such as speed, traffic volume, geometric features, traffic interruptions, freedom to maneuver, safety, driving comfort, convenience, and operating cost.

The two types of intersections to be evaluated are signalized and unsignalized, which use different criteria for assessment of operating levels. The analysis procedures are described in the following sections.

Signalized Intersection LOS

Signalized intersection LOS is defined in terms of delay, which is a direct and/or indirect measure of driver discomfort, frustration, fuel consumption, and lost travel time. The LOS have been established based on driver acceptability of various delays. The delay for each approach lane group is calculated based on a number of factors including lane geometrics, percentage of trucks, peak hour factor, number of lanes, signal progression, volume, signal green time to total cycle time ratio, roadway grades, parking conditions, and pedestrian flows.

Because delay is a complex measure, its relationship to capacity is also complex. The City of San Antonio considers overall intersection LOS A through C to be acceptable, while an overall LOS of D through F is unacceptable (City of San Antonio 2006).

Table 4-1 summarizes the LOS that are appropriate for different levels of average control delay and includes a qualitative description for each. The 2010 Highway Capacity Manual (HCM) uses the criteria of average control delay (TRB 2010). Average control delay includes initial deceleration, delay, queue move-up time, stopped delay, and final acceleration delay.

Table 4-1. Signalized Intersection: LOS Measurement and Qualitative Descriptions

Level of Service	Control Delay Per Vehicle (seconds)	Qualitative Description
A	< 10	Good progression and short cycle lengths
B	> 10 and < 20	Good progression or short cycle lengths, more vehicle stops
C	> 20 and < 35	Fair progression and/or longer cycle lengths, some cycle failures
D	> 35 and < 55	Congestion becomes noticeable, high volume to capacity ratio
E	> 55 and < 80	Limit of acceptable delay, poor progression, long cycles, and/or high volume
F	> 80	Unacceptable to drivers, volume greater than capacity

Source: TRB 2010

Unsignalized Intersection LOS

Unsignalized intersection LOS is defined in terms of average control delay and, in some cases, volume-to-capacity ratio. Control delay is the portion of total delay attributed to traffic control measures, either traffic signals or stop signs. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

For two-way stop-controlled intersections, the analysis method assumes that major street through traffic is not affected by minor street flows. Major street left-turning traffic and the traffic on the minor approaches will be affected by opposing movements. Stop or yield signs are used to assign the right-of-way to the major street. This designation forces drivers on the controlled street to select gaps in the major street flow through which to execute crossing or turning maneuvers. Thus, the capacity of the controlled legs is based upon two factors:

- The distribution of gaps in the major street traffic stream
- Driver judgment in selecting gaps through which to execute their desired maneuvers.

The LOS procedure computes a capacity for each movement based upon the critical time gap required to complete the maneuver and the volume of traffic that is opposing the movement. The average control delay for any particular movement is calculated as a function of the capacity of the approach and the degree of saturation (volume-to-capacity ratio). The degree of saturation is defined as the volume for a movement, expressed as an hourly flow rate, divided by the capacity of the movement, expressed as an hourly flow rate. With the 2010 HCM methodology (TRB 2010), overall LOS is best quantified based on minor street movement average control delay. The 2010 HCM methodology adjusts individual movement delay to account for a degree of saturation (volume-to-capacity ratio) that is greater than 1.0. Those movements are assigned an LOS of F regardless of the average control delay. Engineering judgment must be used to determine which minor street movement controls for overall LOS, and whether unacceptable LOS on minor street movements appropriately reflect unacceptable LOS for the overall intersection.

Table 4-2 shows the relationship between the average control delay and the LOS. The LOS range for unsignalized intersections is different than that for signalized intersections. This difference is because drivers expect different levels of performance from different kinds of transportation facilities. Unsignalized intersections carry lower traffic volume than signalized intersections, and delays at unsignalized intersections are variable. For these reasons, control delay would be lower for an unsignalized intersection than for a signalized intersection. The overall approach LOS is computed as a weighted average of the vehicle delay for each movement; therefore, an approach may have an overall LOS of C or D and have individual movements that are LOS E or F.

HDR analyzed traffic flow using the microcomputer program “Synchro 9.1” by Trafficware (Trafficware 2014), which is based on the procedures contained in the HCM (TRB 2010).

Table 4-2. Unsignalized Intersection: LOS Measurement

Level of Service	Control Delay Per Vehicle (seconds)
A	< 10
B	> 10 and < 15
C	> 15 and < 25
D	> 25 and < 35
E	> 35 and < 50
F	> 50

4.1 2016 Existing Conditions

The analysis of existing traffic required the collection of data on roadways and intersections. Peak hour turning traffic counts were collected on Thursday, 25 August 2016, while schools were in session, at the following locations:

- Loop 1604 and NW Military Highway (two intersections)
- I-10 and Camp Bullis Road (two intersections)
- Camp Bullis Road and W Tejas Trail.

The 24-hour counts were collected on Thursday, 25 August 2016, when schools were in session, at the following locations:

- NW Military Highway south of the current ECP
- Camp Bullis Road east of W Tejas Trail.

For the purpose of this TIA, both the overall intersection delay and the individual approach with the highest delay will be discussed for two-way stop controlled intersections. **Figure 4-1** shows existing turning movement counts. Brief descriptions of the intersections follow.

Loop 1604 and NW Military Highway

As shown in **Figure 4-2**, Loop 1604 and NW Military Highway form a signalized diamond interchange consisting of two intersections. At the intersection of Loop 1604 eastbound Frontage Road and NW Military Highway, the eastbound approach of Loop 1604 eastbound Frontage Road provides a left-turn/through shared lane, a through lane, and a channelized yield-controlled right-turn lane. The northbound approach of NW Military Highway provides two through lanes and a channelized yield-controlled right-turn lane. The southbound approach of NW Military Highway provides one left-turn/through shared lane and a through lane. At the intersection of Loop 1604 westbound Frontage Road and NW Military Highway, the westbound approach of Loop 1604 provides one U-turn lane, one left-turn lane, one left-turn/through shared lane, one through lane, and one channelized, yield-controlled right-turn lane. The northbound approach of NW Military Highway provides one left-turn lane and one left-turn/through shared lane. The southbound approach of NW Military Highway provides one through/right-turn shared lane with yield-controlled right-turn channelization. The overall interchange currently operates at LOS F under 2016 existing traffic conditions during both the AM and PM peak periods.

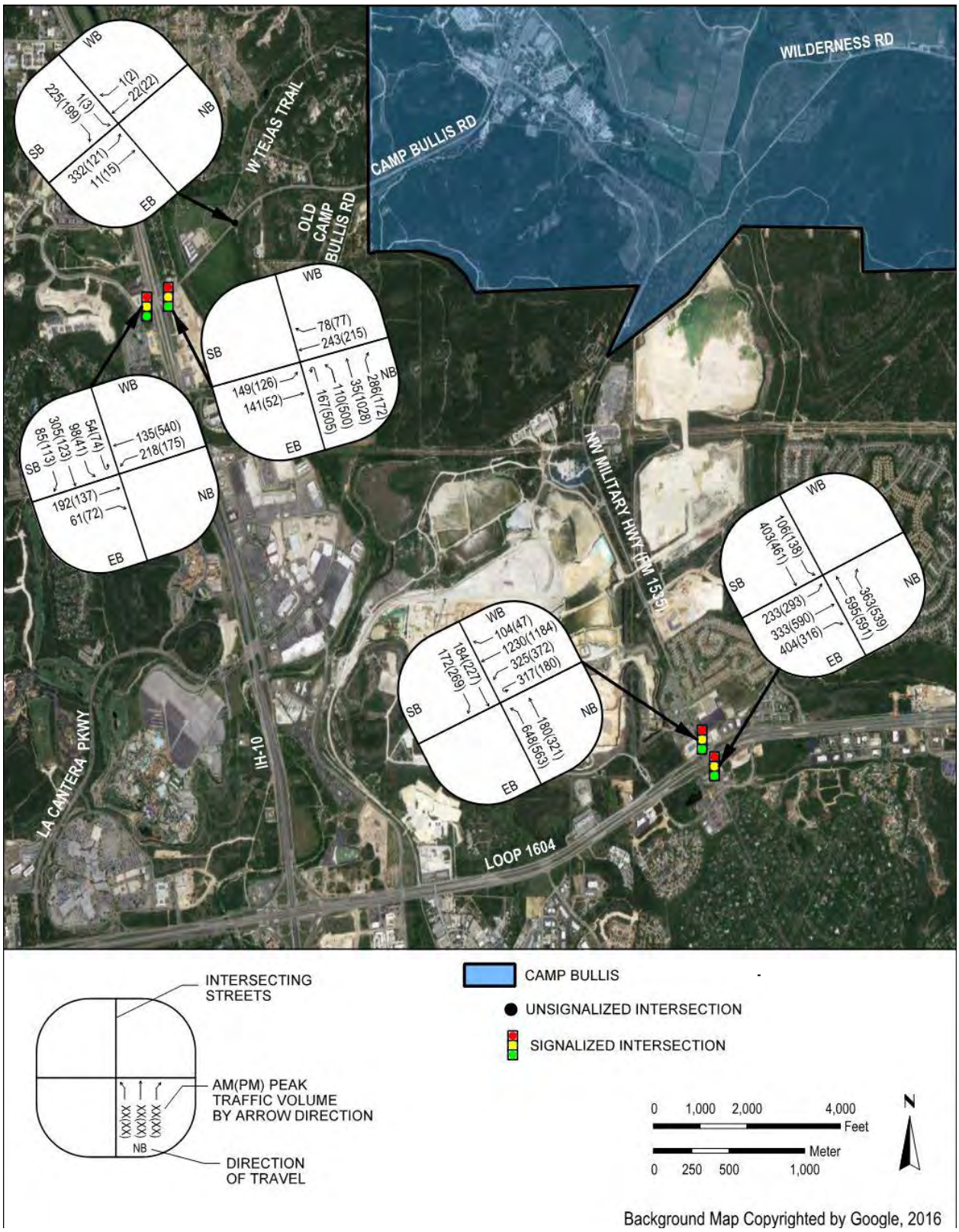

Figure 4-1. Existing Traffic Volume

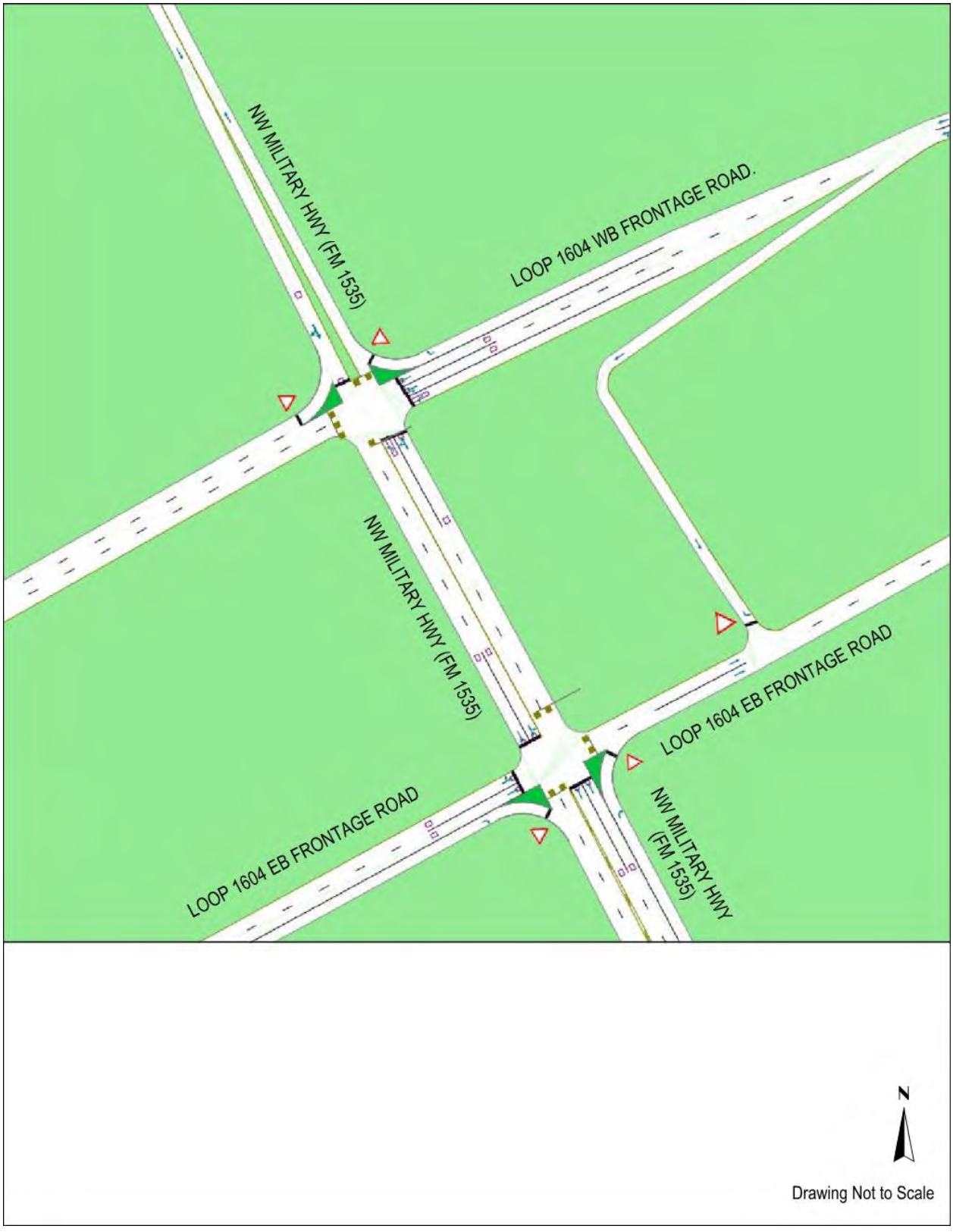

Figure 4-2. Loop 1604 and NW Military Highway Existing Geometric Conditions

I-10 and Camp Bullis Road

As shown in **Figure 4-3**, I-10 and Camp Bullis Road form a signalized diamond interchange consisting of two intersections. At the intersection of I-10 northbound Frontage Road and Camp Bullis Road, the northbound approach of I-10 northbound Frontage Road provides one U-turn lane, one left-turn lane, one left-turn/through shared lane, one through lane, and one channelized yield-controlled right-turn lane. The eastbound approach of Camp Bullis Road provides one left-turn lane and one through lane. The westbound approach of Camp Bullis Road provides one through lane and one through/right-turn shared lane. At the intersection of I-10 southbound Frontage Road and Camp Bullis Road, the southbound approach of I-10 southbound Frontage Road provides one U-turn lane, one left-turn lane, two through lanes, and one channelized yield-controlled right-turn lane. The eastbound approach of Camp Bullis Road provides one through lane and one through/right-turn shared lane. The westbound approach of Camp Bullis Road provides one left-turn lane, one left-turn/through shared lane, and one through lane. The overall interchange currently operates at LOS C under 2016 existing traffic conditions during both the AM and PM peak periods.

Camp Bullis Road and W Tejas Trail

As shown in **Figure 4-4**, Camp Bullis Road and W Tejas Trail form a two-way stop controlled intersection. The eastbound approach of Camp Bullis Road provides one left-turn/through shared lane, and the westbound approach of Camp Bullis Road provides one through/right-turn shared lane. The stop-controlled southbound approach of W Tejas Trail provides one left-turn/right-turn shared lane. The intersection operates at LOS A under 2016 existing traffic conditions during both the AM and PM peak periods. The highest delay minor street approach (southbound) operates at LOS A during both the AM and PM peak periods.

4.2 2018 Forecasted Conditions

Construction of the proposed ECP is anticipated to be completed by approximately 2018. This time frame was used to assess the major roadway effects and to facilitate evaluation of potential improvements. The 2018 forecasted traffic volumes were developed using existing traffic volumes on study area roadways. Existing JBSA-BUL traffic volumes, detailed in **Figure 4-5**, were subtracted from existing traffic volumes to create the existing background traffic volume. The existing background traffic volume (i.e., all non-JBSA-BUL traffic) was then grown using a 2 percent background growth rate, which was developed based on background traffic growth rates observed in TxDOT historical traffic data in the vicinity of JBSA-BUL. Other project traffic was then added to the 2018 background traffic volumes to reflect development of the following future projects:

- Cornerstone Christian School, located on the east side of NW Military Highway, north of Loop 1604
- Emerus Baptist Emergency Hospital, located on the northwest corner of the Loop 1604 and NW Military Highway interchange
- North Rim Auto Mall, located on the southeast corner of the I-10 and Camp Bullis Road interchange.

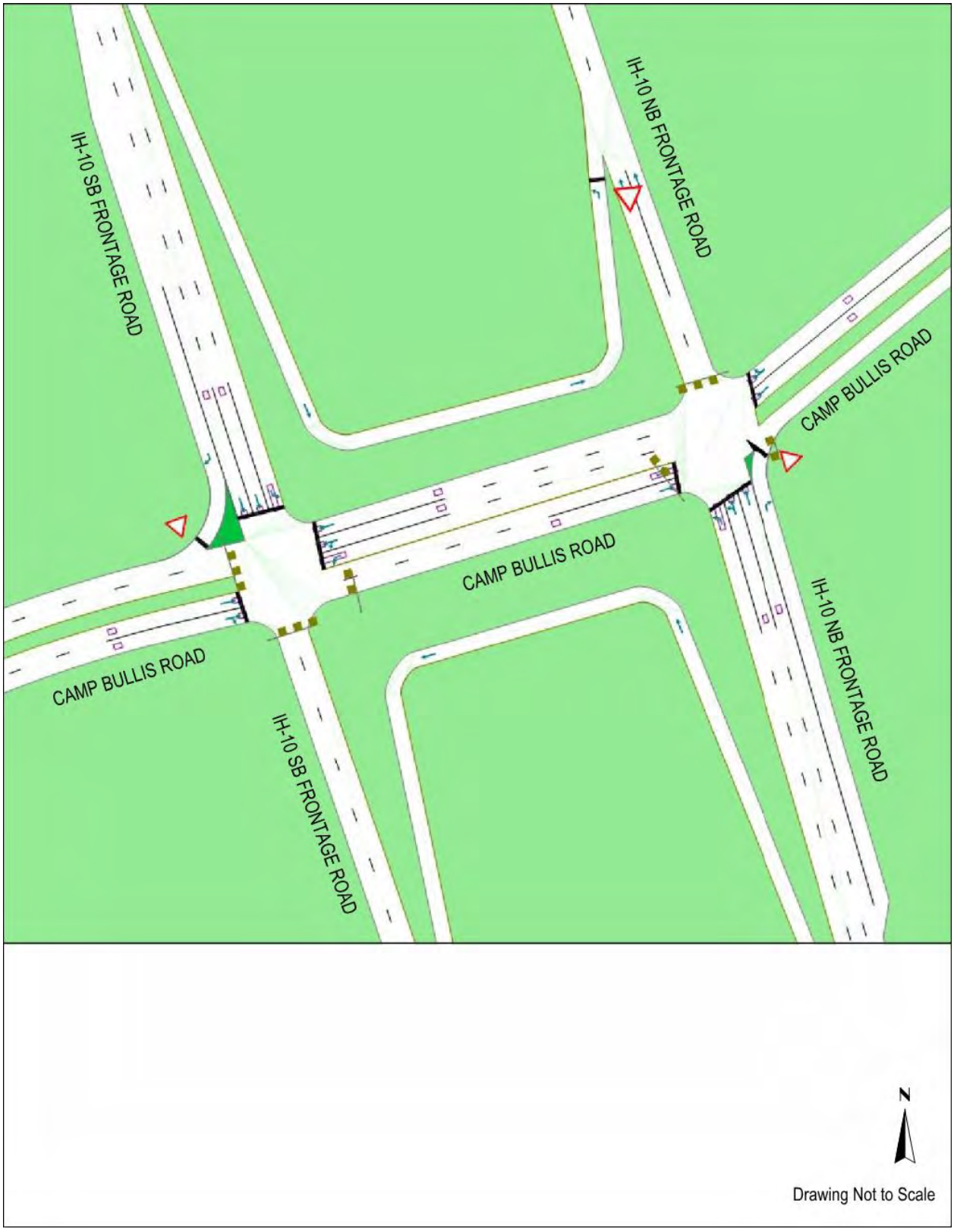

Figure 4-3. I-10 and Camp Bullis Road Existing Geometric Conditions

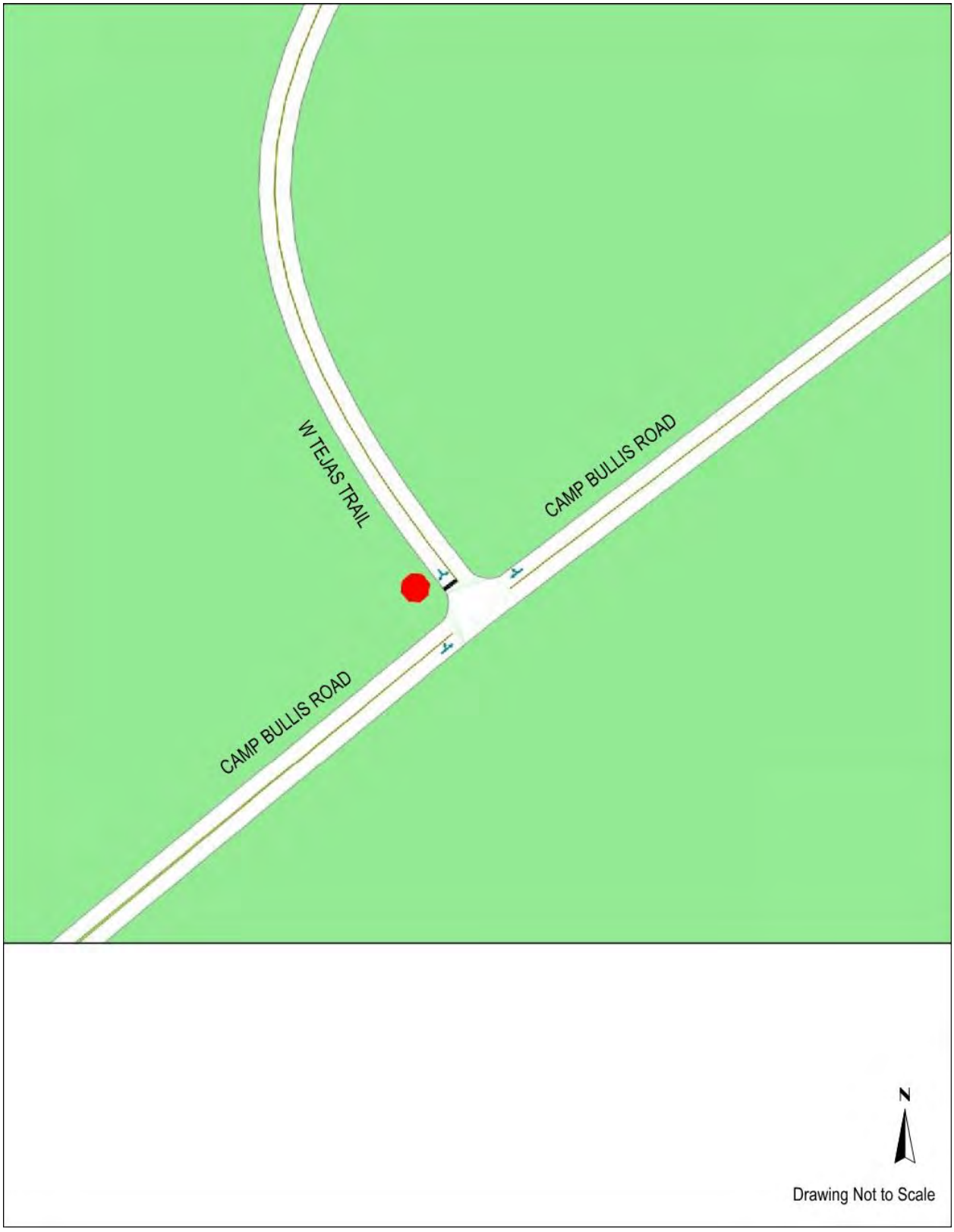

Figure 4-4. Camp Bullis Road and W Tejas Trail Existing Geometric Conditions

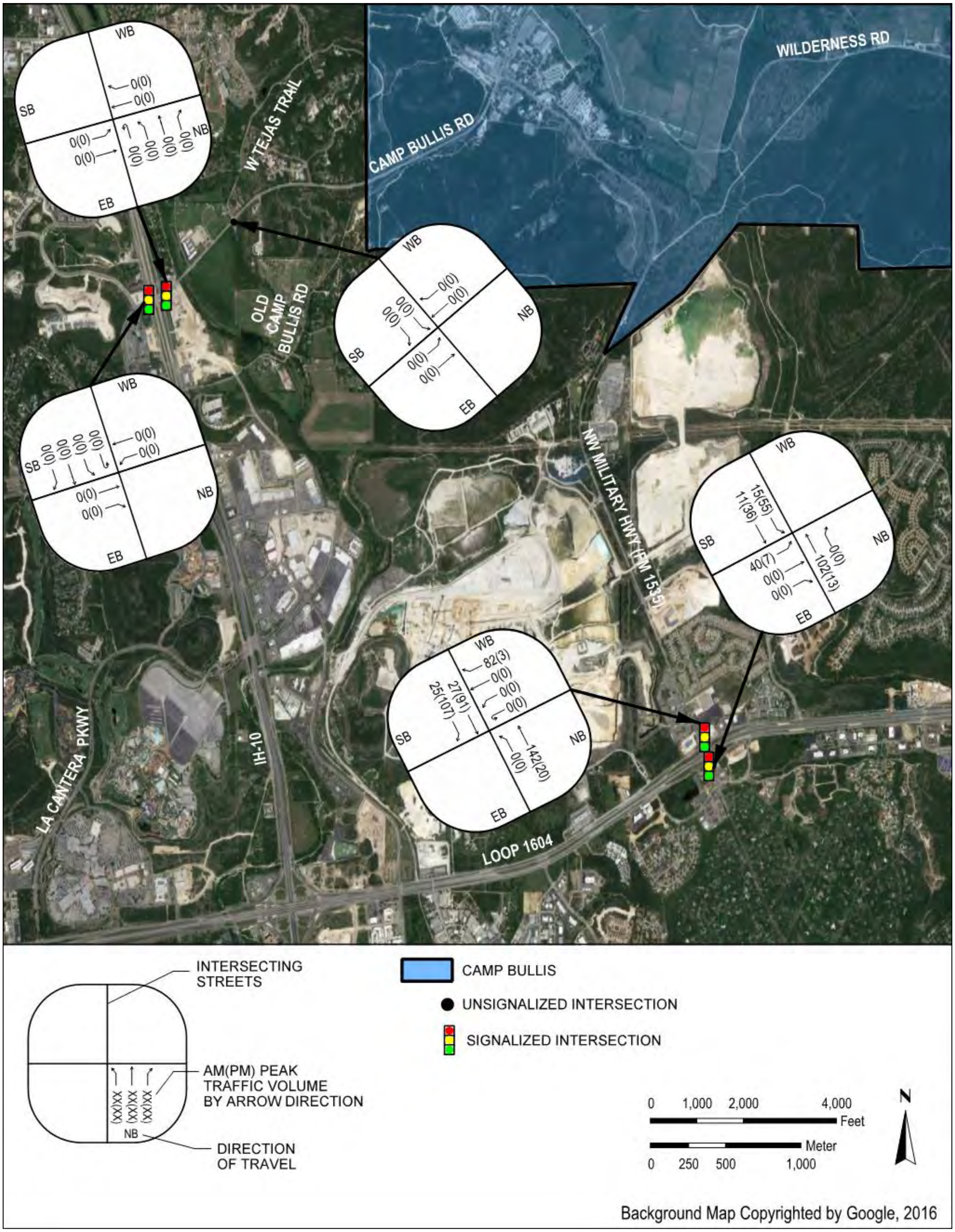

Figure 4-5. Existing JBSA-BUL Traffic Volume

Figure 4-6 presents the locations of these future projects and the 2018 non-JBSA-BUL forecasted traffic volumes.

4.2.1 2018 JBSA-BUL Traffic

Due to personnel plateau, JBSA-BUL traffic is not expected to grow from existing conditions by 2018. Therefore, the existing JBSA-BUL traffic was added to the 2018 non-JBSA-BUL forecasted traffic volumes to develop the 2018 JBSA-BUL plus forecasted traffic volumes.

4.2.2 Directional Distribution

To develop the 2018 JBSA-BUL plus forecasted traffic volumes under the NW Military Highway Alternative, the JBSA-BUL traffic was distributed to the roadway network based on existing traffic patterns observed at the Loop 1604 and NW Military Highway interchange. No JBSA-BUL traffic was distributed to Camp Bullis Road under this alternative. To develop 2018 JBSA-BUL plus forecasted traffic volumes under the Camp Bullis Road Alternative, the JBSA-BUL traffic was distributed to the roadway network based on existing traffic patterns observed at the I-10 and Camp Bullis Road interchange. No JBSA-BUL traffic was distributed to NW Military Highway under this alternative.

Figures 4-7 and **4-8** present the JBSA-BUL traffic distribution projected under the NW Military Highway Alternative and Camp Bullis Road Alternative, respectively. JBSA-BUL traffic volumes under the two alternatives are given in **Figures 4-9** and **4-10**. 2018 JBSA-BUL plus forecasted traffic volumes are presented in **Figures 4-11** and **4-12** for the NW Military Highway Alternative and the Camp Bullis Road Alternative, respectively.

4.2.3 Intersection Analysis

For this TIA, the 2018 forecasted traffic demand is a sum of the traffic generated by the other project traffic, existing JBSA-BUL traffic, and forecasted growth in existing non-JBSA-BUL traffic. The City of San Antonio considers overall intersection LOS A through C to be acceptable, while an overall LOS of D through F is unacceptable (City of San Antonio 2006).

Overall intersection LOS and delay resulting from existing conditions (2016), the NW Military Highway Alternative (2018), and the Camp Bullis Road Alternative (2018) traffic conditions are presented in **Table 4-3**. Highest-delay approach LOS and delay results for unsignalized intersections are presented in **Table 4-4**.

The 2018 forecasted traffic operations assumes the following baseline roadway and intersection improvements would occur under both alternatives:

- Installation of a 365-foot southbound right turn deceleration lane with a 100-foot taper on the NW Military Highway approach to Loop 1604 westbound Frontage Road as part of the development of Cornerstone Christian School
- Extension of the southbound auxiliary through lane on the NW Military Highway approach to Loop 1604 westbound Frontage Road to provide 365 feet of storage as part of the development of Cornerstone Christian School

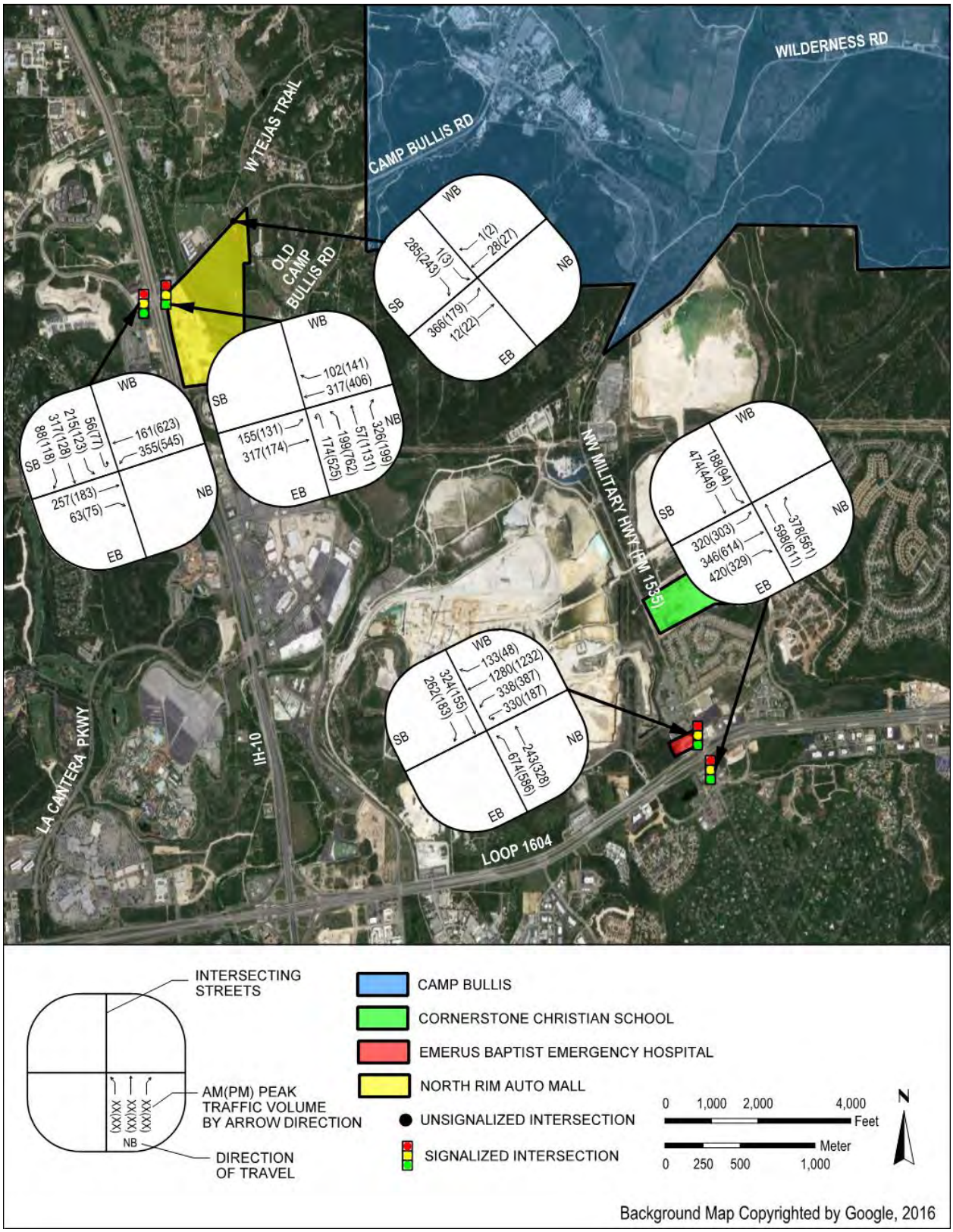

Figure 4-6. Forecasted 2018 Non-JBSA-BUL Traffic Volume

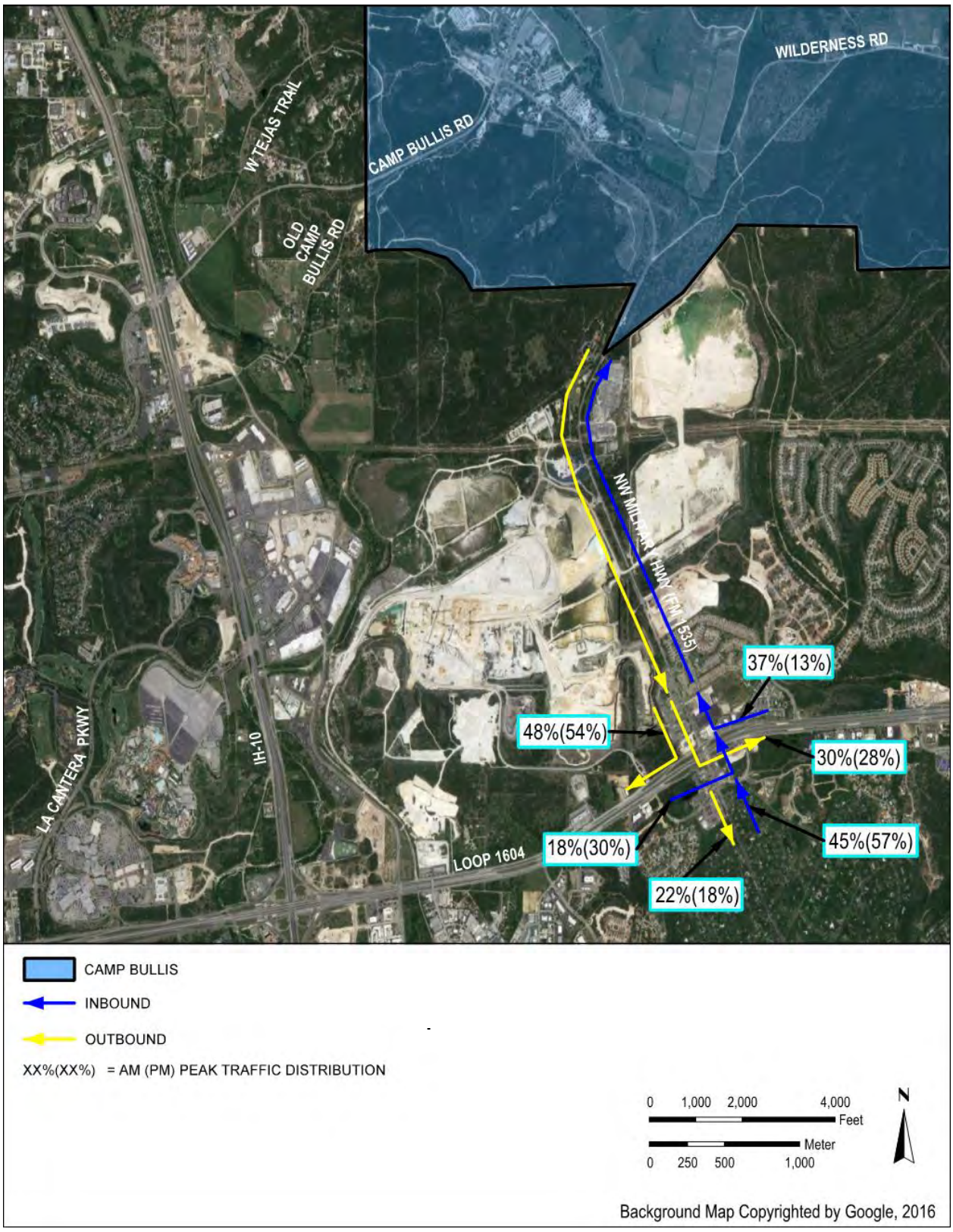

Figure 4-7. NW Military Highway Alternative JBSA-BUL Traffic Distribution

Figure 4-8. Camp Bullis Road Alternative JBSA-BUL Traffic Distribution

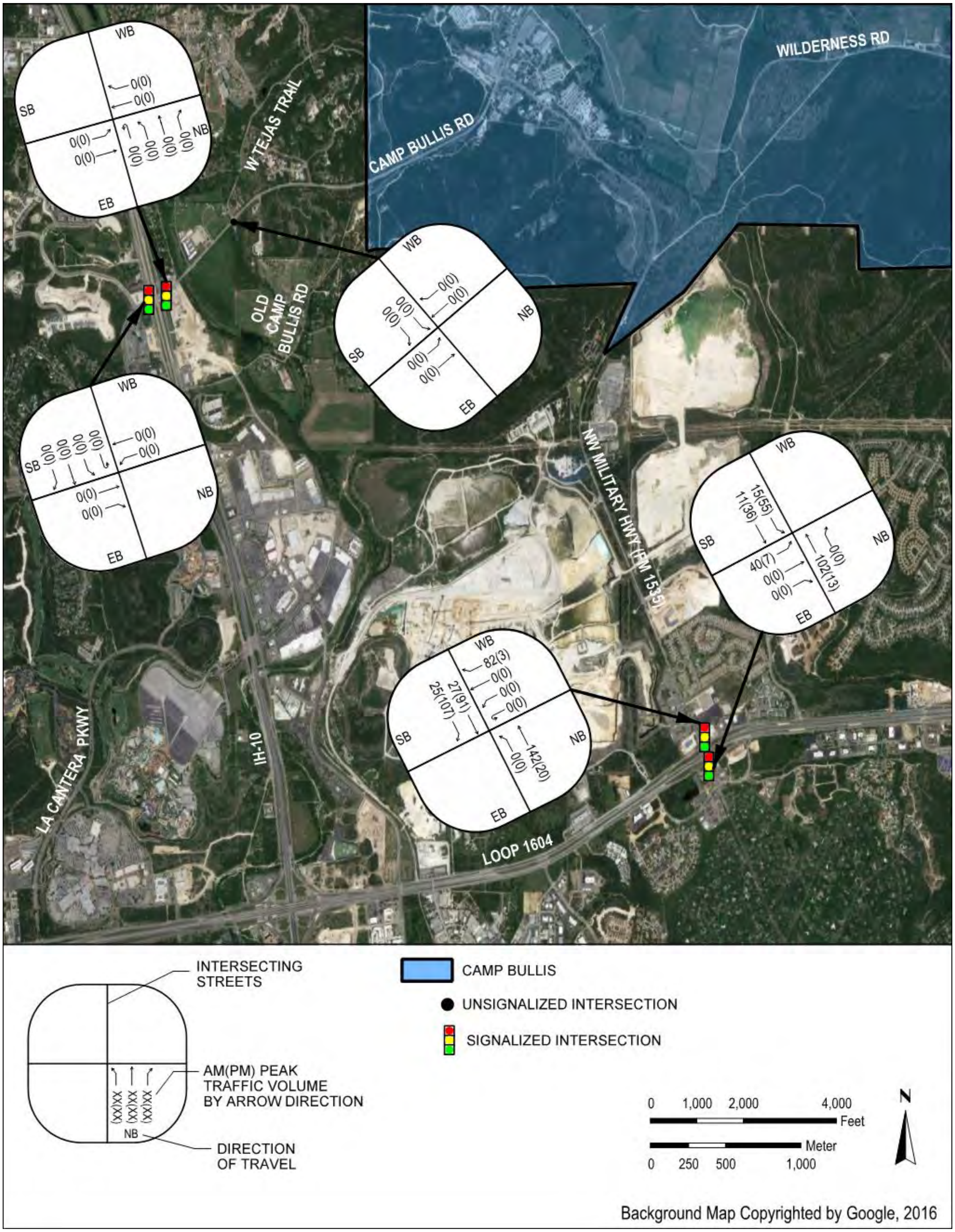

Figure 4-9. NW Military Highway Alternative JBSA-BUL Traffic Volume

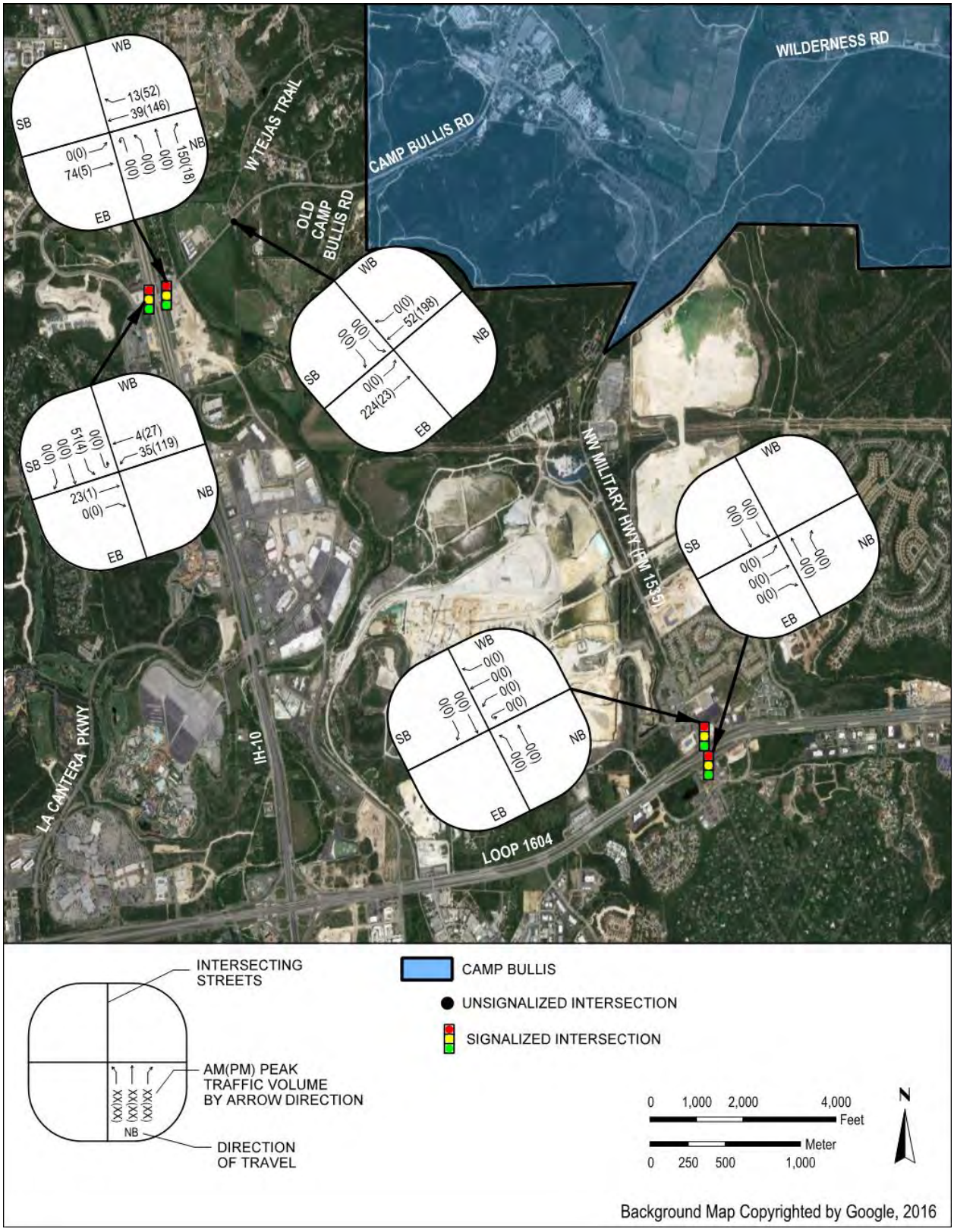

Figure 4-10. Camp Bullis Road Alternative JBSA-BUL Traffic Volume

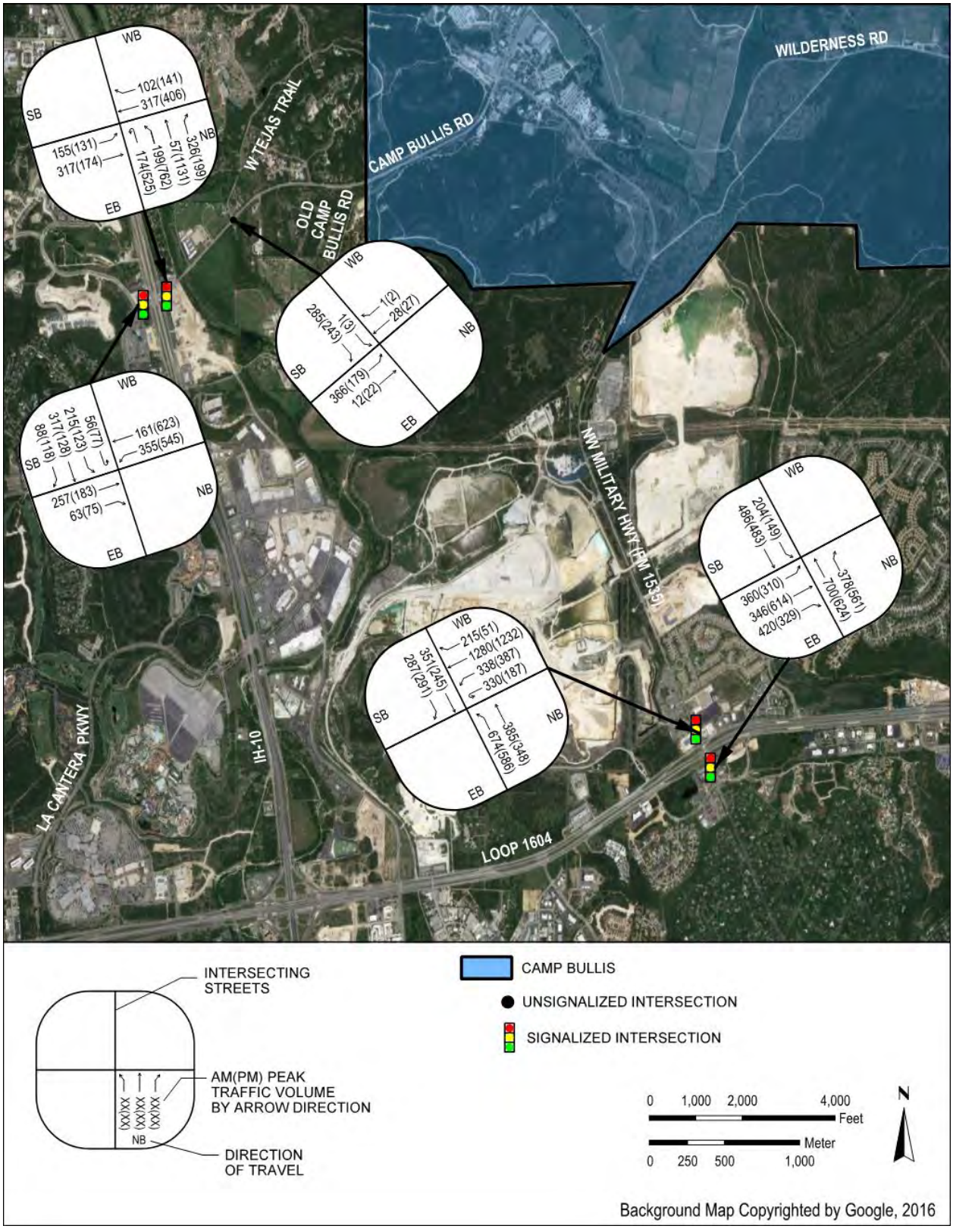

Figure 4-11. 2018 JBSA-BUL Plus Forecasted NW Military Highway Alternative Traffic Volume

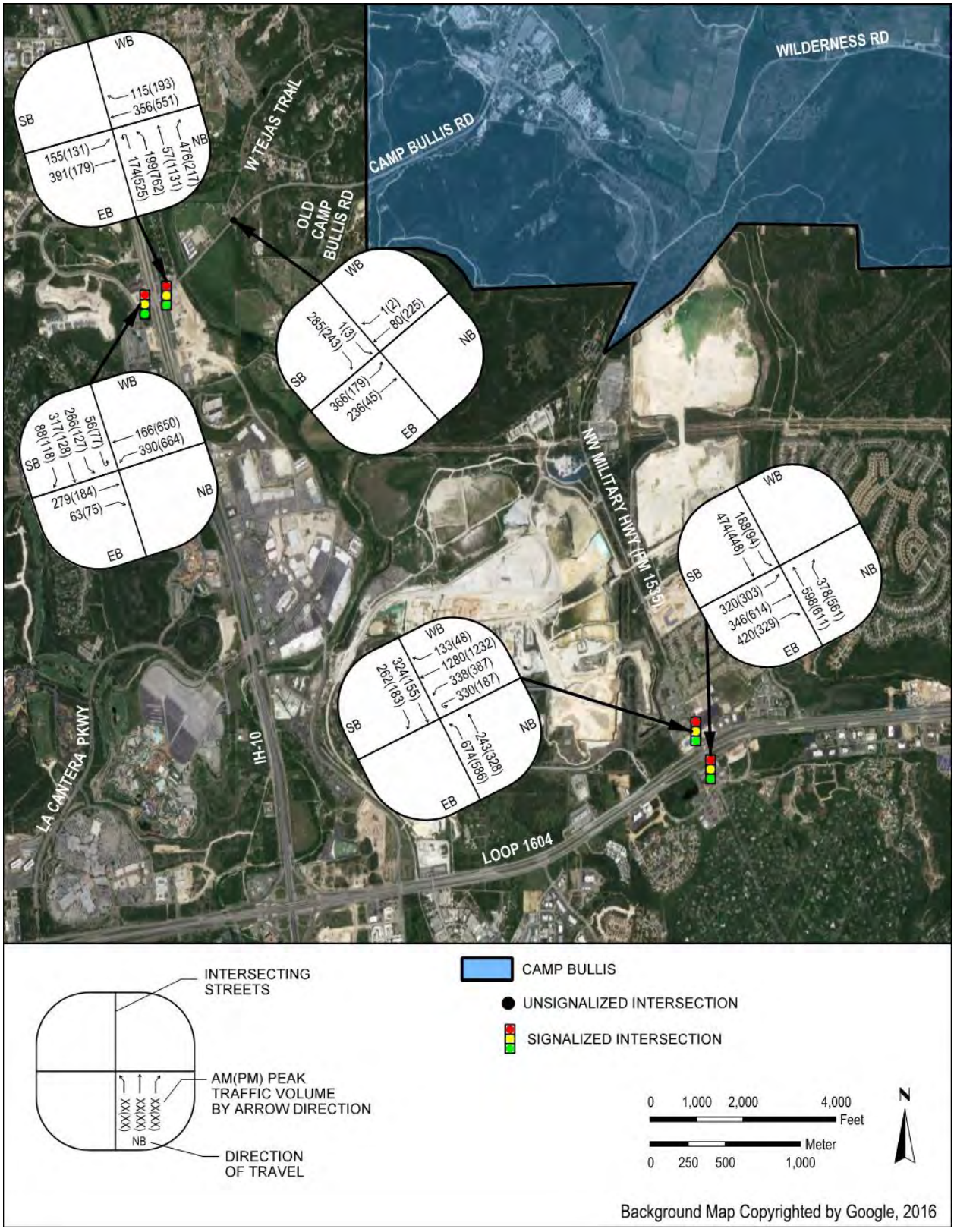

Figure 4-12. 2018 JBSA-BUL Plus Forecasted Camp Bullis Road Alternative Traffic Volume

Table 4-3. Overall Intersection LOS and Delay (seconds per vehicle)

Intersection	Existing Conditions (2016)		NW Military Highway Alternative (2018)		Camp Bullis Road Alternative* (2018)		Camp Bullis Road Alternative** (2018)	
	AM	PM	AM	PM	AM	PM	AM	PM
Loop 1604 and NW Military Highway (Signalized)	F (91.9)	F (107.7)	E (73.0)	E (71.5)	E (58.9)	E (55.5)	E (58.9)	E (55.5)
I-10 and Camp Bullis Road (Signalized)	C (21.2)	C (29.2)	C (28.1)	D (52.7)	D (35.4)	E (74.1)	C (28.1)	D (46.4)
Camp Bullis Road and W Tejas Trail (Unsignalized)	A (8.2)	A (7.8)	A (8.5)	A (7.9)	A (6.4)	A (6.5)	A (6.4)	A (6.5)

* Assumes JBSA makes no improvements to the I-10 and Camp Bullis Road interchange.
** Assumes JBSA makes the improvements identified in **Table 4-7** for the I-10 and Camp Bullis Road interchange.

Table 4-4. Highest-Delay Approach LOS and Delay (seconds per vehicle)

Intersection	Existing Conditions (2016)		Military Highway Alternative (2018)		Camp Bullis Road Alternative (2018)	
	AM	PM	AM	PM	AM	PM
Camp Bullis Road and W Tejas Trail (SB Approach)	A (9.7)	A (9.5)	B (10.2)	A (9.8)	B (11.0)	B (12.4)

- Optimization of traffic signal timing at the intersection of Loop 1604 and NW Military Highway as proposed by TxDOT.

These baseline roadway and intersection improvements would occur regardless of the alternative selected by JBSA and would be implemented by others (i.e., not JBSA). Additional roadway and intersection improvements may be required to alleviate impacts on the network roadways and intersections due to JBSA-BUL traffic. A description of the impacts on the network roadways and intersections and required roadway and intersection improvements follow.

Loop 1604 and NW Military Highway

The overall interchange LOS for Loop 1604 and NW Military Highway would be E under the NW Military Highway Alternative traffic conditions during both the AM and PM peak periods, assuming the ECP is constructed on NW Military Highway and baseline roadway and intersection improvements are implemented. The overall interchange LOS for Loop 1604 and NW Military Highway would be E under the Camp Bullis Road Alternative traffic conditions during both the AM and PM peak periods, assuming the ECP is constructed on Camp Bullis Road and baseline roadway and intersection improvements are implemented. No JBSA-implemented roadway or intersection improvements are necessary for this interchange under either scenario. The proposed interchange geometrics are provided in **Figure 4-13**.

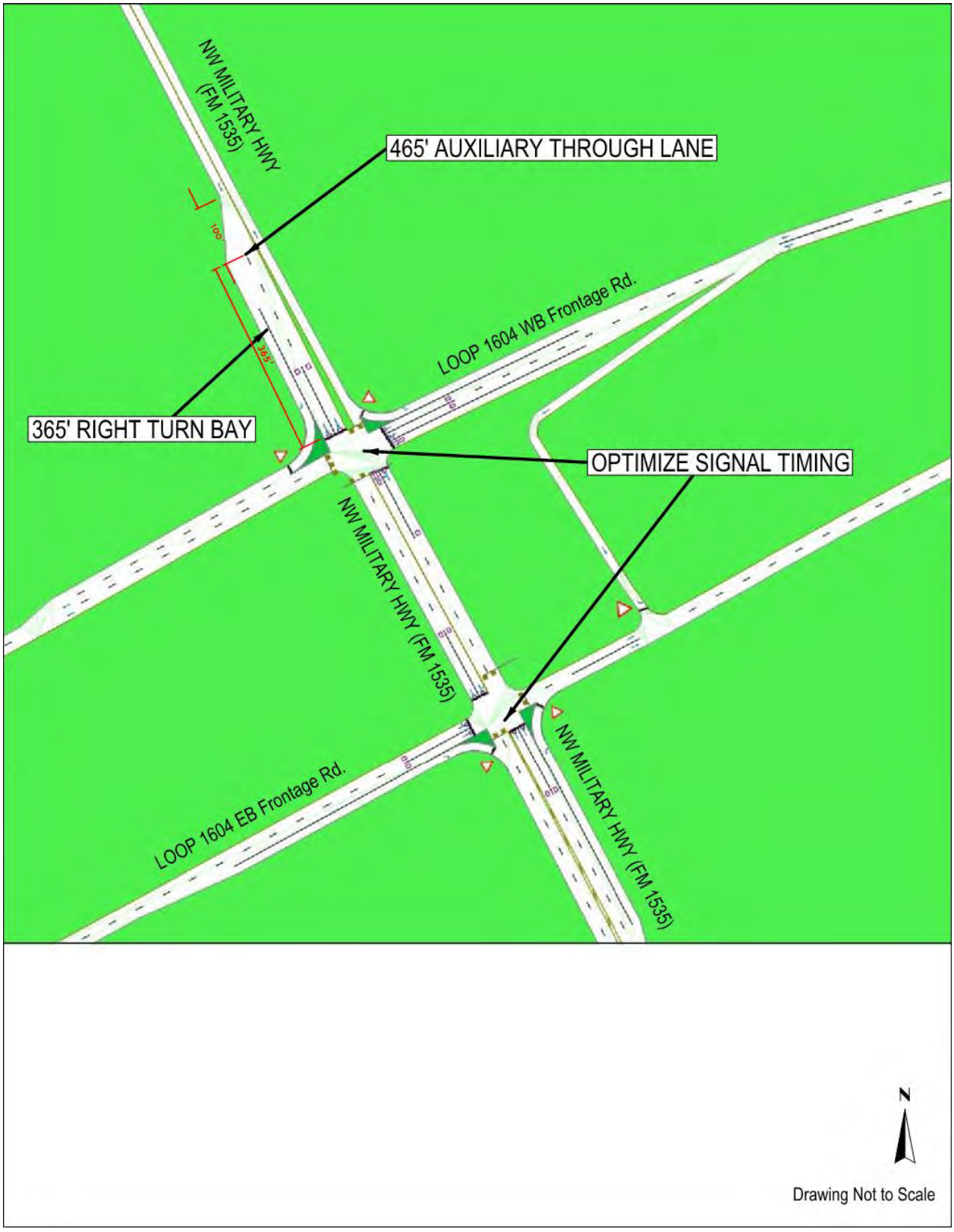

Figure 4-13. Loop 1604 and NW Military Highway Improvements (Both Alternatives)

Compared to the existing delay and LOS in **Table 4-3**, LOS for this interchange improves from F to E due to the baseline road and intersection improvements under both alternatives. Reduction of JBSA-BUL traffic from the NW Military Highway interchange as part of the Camp Bullis Road Alternative would further improve operations at this interchange, resulting in reductions in average control delay, but would not result in additional LOS improvement over the NW Military Highway Alternative.

I-10 and Camp Bullis Road

The overall interchange LOS for I-10 and Camp Bullis Road would be C and D under the NW Military Highway Alternative traffic conditions during the AM and PM peak periods, respectively, assuming the ECP is constructed on NW Military Highway. The overall interchange of I-10 and Camp Bullis Road would operate at LOS D and E under the Camp Bullis Road Alternative traffic conditions during the AM and PM peak hours, respectively, assuming the ECP is constructed on Camp Bullis Road and no additional roadway or intersection improvements at the interchange are implemented. LOS for the I-10 and Camp Bullis Road interchange could be improved to C and D under the Camp Bullis Road Alternative traffic conditions assuming the following roadway and intersection improvements shown on **Figure 4-14** are implemented:

- Install right-turn bay for Camp Bullis Road westbound approach at I-10 northbound Frontage Road
- Optimize traffic signal timing at the intersection I-10 and Camp Bullis Road.

Deterioration of interchange LOS from C to D would occur due to increases in background traffic volume, regardless of increases in traffic due to operations at JBSA-BUL. However, increase in JBSA-BUL traffic at the interchange as part of the Camp Bullis Road Alternative would further deteriorate operations at the interchange over the NW Military Highway Alternative. The improvements listed above would alleviate the impact of increased JBSA-BUL traffic due to the relocation of the ECP to Camp Bullis Road. These improvements are only needed as part of the Camp Bullis Road Alternative and are not required as part of the NW Military Highway Alternative.

Camp Bullis Road and W Tejas Trail

The intersection of Camp Bullis Road and W Tejas Trail would operate at LOS A under the NW Military Highway Alternative traffic conditions during both the AM and PM peak periods, assuming the ECP is constructed on NW Military Highway. The intersection of Camp Bullis Road and W Tejas Trail would operate at LOS A under the Camp Bullis Road Alternative traffic conditions during both the AM and PM peak periods, assuming the ECP is constructed on Camp Bullis Road.

The highest-delay minor street approach (i.e., W Tejas Trail southbound approach) would operate at LOS B and A during the AM and PM peak periods, respectively, under the NW Military Highway Alternative traffic conditions and would operate at LOS B during both the AM and PM peak periods under the Camp Bullis Road Alternative traffic conditions. No improvements are needed for this intersection under either alternative. The existing intersection geometrics to remain are shown in **Figure 4-4**.

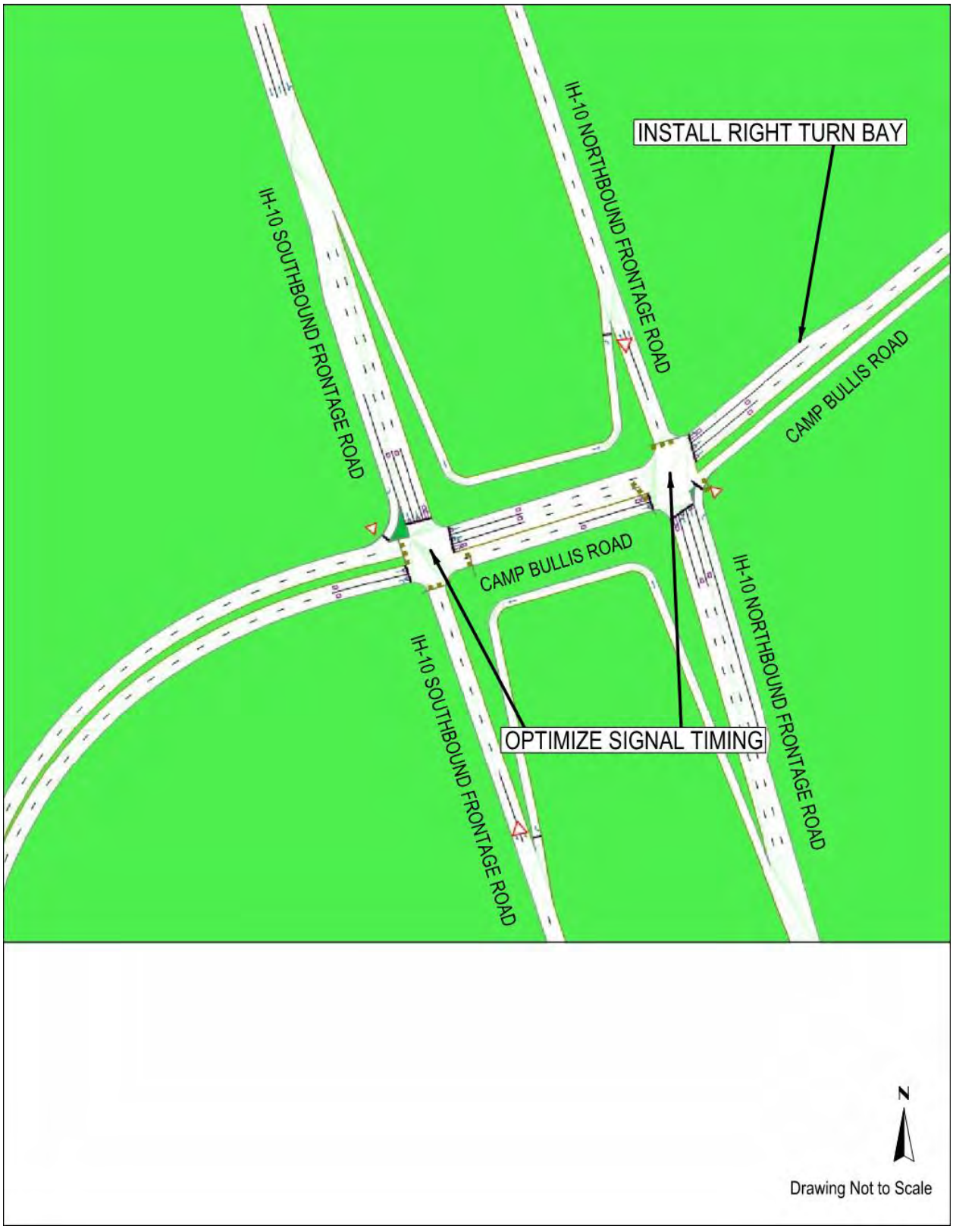

Figure 4-14. I-10 and Camp Bullis Road Improvements (Camp Bullis Road Alternative)

4.3 Traffic Between JBSA Sites

A significant share of the JBSA-BUL traffic originates from JBSA-Sam Houston and JBSA-Lackland. Buses transporting troops between the sites arrive between 5:30 and 9:00 a.m. and depart between 1:30 and 4:00 p.m. Maintenance of efficient transportation between JBSA-BUL and both JBSA-Sam Houston and JBSA-Lackland is a primary objective of the Proposed Action. Transportation of troops from JBSA sites to JBSA-BUL is a greater concern during the AM peak period, as bus arrival times coincide with the AM peak for background traffic, whereas the afternoon bus departures fall outside of the PM peak period.

The shortest routes from JBSA-Lackland and JBSA-Sam Houston are assumed to be utilized for troop transport operations. The shortest route from JBSA-Lackland to JBSA-BUL utilizes I-410 and I-10. The shortest route from JBSA-Sam Houston to JBSA-BUL utilizes I-35 and I-10. **Figure 4-15** shows troop transportation routes from both JBSA-Lackland and JBSA-Sam Houston to JBSA-BUL.

Current travel time from both JBSA-Sam Houston and JBSA-Lackland to JBSA-BUL via NW Military Highway and via Camp Bullis Road was obtained from Google Maps (Google 2016) for a typical Tuesday. **Table 4-5** shows the travel times between JBSA-Lackland and JBSA-BUL via NW Military Highway and via Camp Bullis Road. **Table 4-6** presents the travel times between JBSA-Sam Houston and JBSA-BUL via NW Military Highway and Camp Bullis Road.

HDR makes the following observations based on the typical travel times noted above:

- Travel time deterioration is greatest on the route between JBSA-Lackland and JBSA-BUL during the AM peak period.
- During the AM peak period, entering JBSA-BUL through Camp Bullis Road experiences travel time reductions of as much as five minutes compared to entering through NW Military Highway.
- Traffic congestion is heavier during the AM peak period on Loop 1604 from I-10 to NW Military Highway than on I-10 from Loop 1604 to Camp Bullis Road.

4.4 Summary and Recommendations

This TIA analyzed the traffic conditions near JBSA-BUL to identify traffic impacts from the operation of a new ECP at JBSA-BUL. Relocation of the ECP to Camp Bullis Road would result in delay reduction at the intersection of Loop 1604 and NW Military Highway and would result in more efficient transit operations between JBSA sites. However, it would require signal timing and geometric improvements at the I-10 and Camp Bullis Road interchange in order to maintain No Action Alternative LOS. No additional intersection improvements are recommended if the ECP is constructed on NW Military Highway. **Table 4-7** lists all recommended improvements (i.e., those implemented by others and those implemented by JBSA) for the roadways and intersections within the study area.

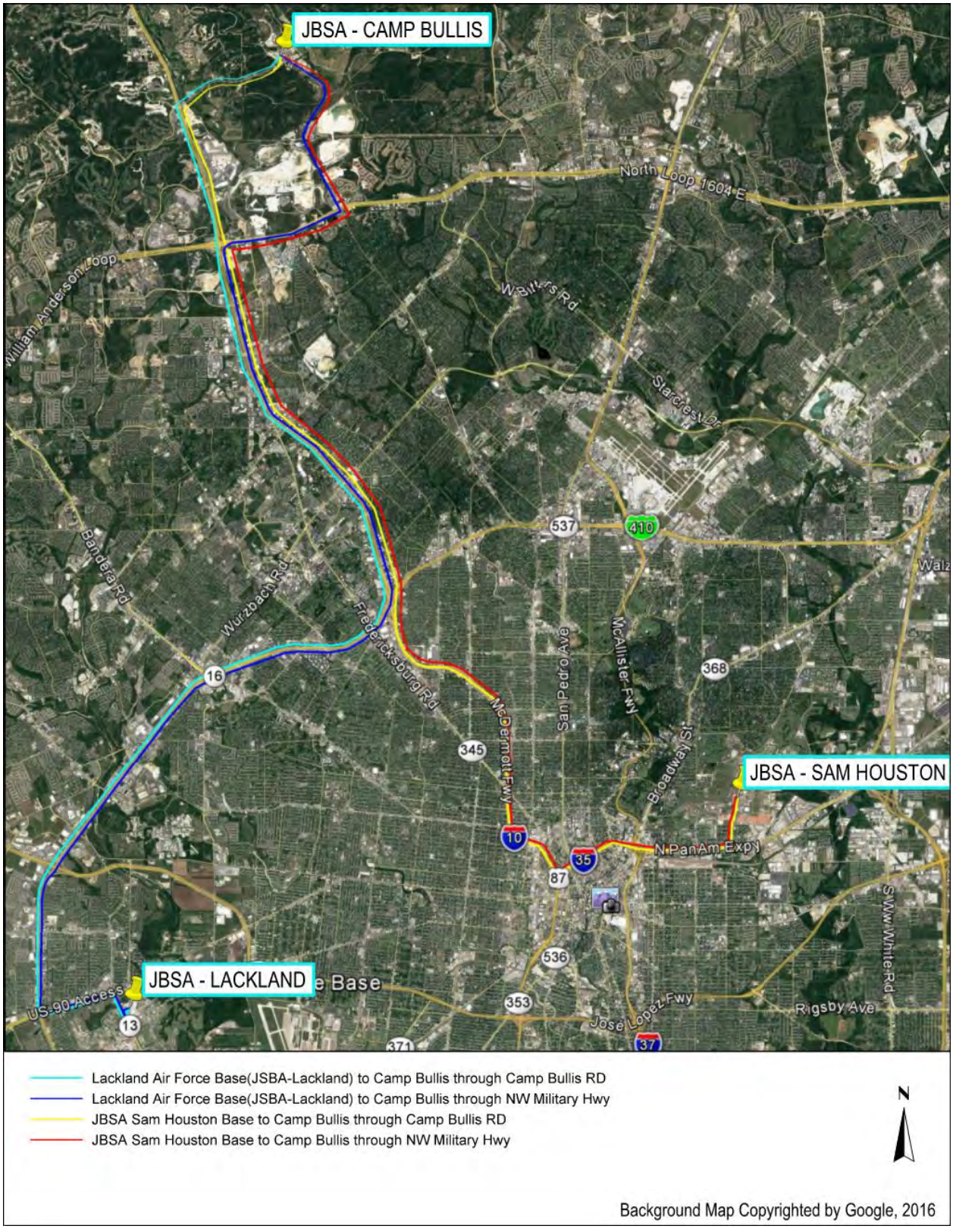

Figure 4-15. Troop Transportation Routes from JBSA-Lackland and JBSA-Sam Houston to JBSA-BUL

Table 4-5. Typical Travel Times Between JBSA-Lackland and JBSA-BUL

Arrival/Departure	Time	Travel Time Via NW Military Hwy	Travel Time Via Camp Bullis Road
Arrival	5:00–6:30 a.m.	30 minutes	26-30 minutes
Arrival	7:00 a.m.	30-40 minutes	30-40 minutes
Arrival	7:30 a.m.	30-50 minutes	30-45 minutes
Arrival	8:00 a.m.	40-60 minutes	35-55 minutes
Arrival	8:30 a.m.	35-65 minutes	35-60 minutes
Arrival	9:00 a.m.	30-50 minutes	28-45 minutes
Departure	1:00–2:30 p.m.	28-40 minutes	28-40 minutes
Departure	3:00 p.m.	28-45 minutes	28-40 minutes
Departure	3:30 p.m.	30-45 minutes	28-45 minutes
Departure	4:00 p.m.	30-50 minutes	30-50 minutes

Table 4-6. Typical Travel Times Between JBSA-Sam Houston and JBSA-BUL

Arrival/Departure	Time	Travel Time Via NW Military Highway	Travel Time Via Camp Bullis Road
Arrival	5:00–6:00 a.m.	24-28 minutes	24-28 minutes
Arrival	6:30 a.m.	24-30 minutes	24-28 minutes
Arrival	7:00 a.m.	24-30 minutes	24-28 minutes
Arrival	7:30 a.m.	24-30 minutes	24-30 minutes
Arrival	8:00 a.m.	26-35 minutes	24-35 minutes
Arrival	8:30 a.m.	26-35 minutes	24-35 minutes
Arrival	9:00 a.m.	26-35 minutes	24-30 minutes
Departure	1:00–3:00 p.m.	26-35 minutes	24-35 minutes
Departure	3:30 p.m.	26-40 minutes	26-35 minutes
Departure	4:00 p.m.	26-40 minutes	26-40 minutes

Table 4-7. Roadway and Intersection Improvement Recommendations

Location	Action	Responsibility	Alternative
Loop 1604 and NW Military Highway	Install a 365-foot right-turn deceleration lane with 100-foot taper for southbound approach of NW Military Highway at Loop 1604 westbound Frontage Road.	Other Project Development	Both
	Extend southbound auxiliary through lane by 465 feet.	Other Project Development	Both
	Optimize signal timing at this intersection.	TxDOT	Both
IH-10 and Camp Bullis Road	Optimize signal timing at this intersection.	JBSA, City of San Antonio	Camp Bullis Road Alternative
	Install right-turn lane for the westbound approach of Camp Bullis Road at the IH-10 northbound Frontage Road.	JBSA	Camp Bullis Road Alternative

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