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Management
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Draft Final Environmental Assessment for the Construction and Maintenance of Stormwater Controls at Tiefort City

Fort Irwin, California

Notice: Reviewers should provide the Department of the Army (DA) with their comments during the review period of the Environmental Assessment (EA). This will enable the DA to analyze and respond to the comments at one time and to use information acquired in the preparation of the EA, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions (Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553, 1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the Final Environmental Impact Statement (City of Angoon v. Hodel, 9th Cir, 1986; and Wisconsin Heritages Inc., v. Harris, 490F. Supp. 1334, 1338, E.D. Wis. 1980). Comments on the EA should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 *Code of Federal Regulations* [CFR] 1503.3).

Comments received in response to this document, including names and addresses of those who comment, will be considered part of the public record on this proposed action and will be available for public inspection. Comments submitted anonymously will be accepted and considered; however, those who submit anonymous comments will not have standing to appeal the subsequent decision under 36 CFR Parts 215 or 217. Additionally, pursuant to 7 CFR 1.27(d), any person may request the agency to withhold a submission from the public record by showing how the Freedom of Information Act (FOIA) permits such confidentiality. Persons requesting such confidentiality should be aware that, under FOIA, confidentiality may be granted in only very limited circumstances, such as to protect trade secrets. The DA will inform the requester of the agency's decision regarding the request for confidentiality, and where the request is denied the agency will return the submission and notify the requester that the comments may be resubmitted, with or without name and address.

Additional documentation, reports, and analysis referenced in this document can be found in the administrative record files. These items have not been included in this document due to the technical nature, excessive length, or are reference materials used to develop the analysis in this document. All supporting documents in the planning record are located at the Environmental Management Division, Department of Public Works, Fort Irwin, California.

SIGNATURE PAGE

ENVIRONMENTAL ASSESSMENT

Construction and Maintenance of Stormwater Controls at Tiefort City

Proponent: U.S. Army Garrison, Fort Irwin, California

NEPA Lead agency: U.S. Army Garrison, Fort Irwin, California

APPROVAL

This Environmental Assessment meets the requirements of NEPA, 40 CFR 1500-1508, Army Regulation 200-1, Environmental Protection and Enhancement, dated 13 December 2007 and 32 CFR 651 (AR 200-2) Environmental Analysis of Army Actions, dated 29 March 2002.

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AB 32	Global Warming Solutions Act of 2006
AFCCC	Air Force Combat Climatology Center
amsl	above mean sea level
APE	area of potential effect
AR	Army Regulation
ARB	Air Resources Board [California]
Army	U.S. Army
BLM	Bureau of Land Management
BMP	best management practice
BO	Biological Opinion
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CDFW	California Department of Fish and Wildlife
CDMG	California Division of Mines and Geology
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CH_4	methane
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CWA	Clean Water Act of 1977
DAR	defense access road
DOT	U.S. Department of Transportation
DTSC	California Department of Toxic Substances Control
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency

ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FNSI	Finding of No Significant Impact
Fort Irwin	U.S. Army National Training Center at Fort Irwin
GHG	greenhouse gas
GIS	geographic information system
HFC	hydrofluorocarbon
I-15	Interstate 15
INRMP	Integrated Natural Resources Management Plan
$\mu g/m^3$	micrograms per cubic meter
MBTA	Migratory Bird Treaty Act
MDAPCD	Mojave Desert Air Pollution Control District
MDAQMD	Mojave Desert Air Quality Management District
MDPA	Mojave Desert Planning Area
MOUT	Military Operations on Urban Terrain
mph	miles per hour
N_2O	nitrous oxide
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAWS	Naval Air Weapons Station
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O_3	ozone
O&M	operation and maintenance
PFC	perfluorocarbon
PM_{10}	particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in aerodynamic diameter
ppm	parts per million, by volume
RCRA	Resource Conservation and Recovery Act of 1976

RONA	Record of Non-applicability
RV	recreational vehicle
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Office
SIP	state implementation plan
SO_2	sulfur dioxide
SWMP	stormwater management plan
SWPPP	stormwater pollution prevention plan
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator
UXO	unexploded ordnance
VOC	volatile organic compound
WWTP	wastewater treatment plant

Executive Summary

ES-1 Introduction

One of the training missions on Fort Irwin includes Military Operations on Urban Terrain (MOUT). An area used for MOUT training on Fort Irwin is at Tiefort City, a mock city used to simulate potential combat scenarios. The mock city includes numerous buildings and objectives that resemble an urban area in the Middle East. Tiefort City is approximately 10 miles northeast of the cantonment. The MOUT training area is on a broad alluvial fan that originates from the mountains and hill to the south. Tiefort Wash passes through the western edge of the Tiefort City training complex.

On August 25, 2013, a large flood event occurred that deposited sediment and debris throughout Tiefort City. Flows from the flood damaged structures and monitoring equipment, rendering the mock city unsafe for training. Tiefort City was closed to allow for removal of the sediment and to repair damages caused by floodwaters. Flood flows that affected the mock city originate mainly from Tiefort Wash and three smaller drainages directly to the south.

The U.S. Army Corps of Engineers (USACE) conducted a floodplain analysis to study the drainages and flows affecting Tiefort City. Based on the results of that analysis, USACE prepared a stormwater management plan (SWMP). The SWMP provides alternatives to prevent a 100-year flood event from affecting the MOUT training area in the future. Fort Irwin proposes to construct and maintain the preferred alternative of the SWMP.

ES-2 Purpose and Need of the Proposed Action

The purpose of the Proposed Action is to improve training efficiency by eliminating disruptions to MOUT training activities in Tiefort City by preventing flooding and reducing the effects of a 100-year flood event.

The Proposed Action is needed to eliminate training disruptions following 100-year flood events and to ensure that Tiefort City remains a viable training area for Fort Irwin to sustain the Fort Irwin training mission. Tiefort City must remain operable throughout the year to meet the training needs of soldiers rotating through Fort Irwin.

ES-3 Proposed Action and Alternatives

The USACE SWMP identified two alternatives that would meet the purpose and need of the Proposed Action. However, one of these alternatives was dismissed because it would impact a major maneuver training corridor. The preferred alternative as presented in the USACE SWMP is the Proposed Action.

ES-3.1 Proposed Action

The Proposed Action is to implement the Tiefort City SWMP through construction and maintenance of the following components:

- Earthen berms: Earthen berms would redirect stormwater runoff and debris flows away from the MOUT structures. The berms would vary in size and could be 5 to 15 feet in height and up to 20 feet wide at the top with 3:1 side slopes. The berms could be lined with riprap to prevent erosion. The riprap would be placed on a layer of bedding material and would extend 10 feet below the toe of the berm. Berms could be constructed alone or adjacent to existing and constructed channels.
- Channels: Channels could be built to redirect runoff away from Tiefort City. In-channel detention basins and riprap energy dissipaters could be used to control flows. Trapezoidal channels would be sized to accommodate the 100-year flood event. The channels could be stabilized with riprap placed along both sides of the lower half of the channel walls to prevent erosion, and gabion drop

structures placed within the channel to control velocities. Both banks of the channel would be lined with riprap within 500 feet upstream and downstream of each drop structure. Channel construction could include adjacent berms.

- Debris Basins: Debris basins could be constructed to collect sediment from the hills to the south and limit the amount of sediment entering the stormwater control area around Tiefort City. The basins would be less than 10 feet deep and would be sized to store between eight and 13 acre-feet of sediment (12,907 to 20,973 cubic yards). Each basin would include a riprap-lined spillway so that excess runoff would overtop the basin embankment in a controlled manner to reduce the effects of erosion. Each basin would have an access ramp to allow for maintenance and a dirt access road connected to roads in Tiefort City.

Construction of these components would impact approximately 400 acres of land to the west and south of Tiefort City and would take approximately nine to 12 months. The components would be designed and constructed to control a 100-year flood event. Soils to construct the berms would come from the project area. Riprap would be used extensively to prevent erosion and to reduce velocities of flows. Annual maintenance of the stormwater control features would be required. Sediment would be removed from the channels and debris basins annually and after very large flood events. Routine inspections would be conducted every 12 months and after every large flood event.

ES-3.2 No Action Alternative

Under the No Action Alternative, construction and operation of stormwater controls to protect Tiefort City from a 100-year flood event would not occur. Subsequent flood events would likely inundate Tiefort City and deposit sediments, rendering Tiefort City unsafe and unusable for training purposes after those events. Training activities conducted at Tiefort City would likely be disrupted so that maintenance crews could remove the sediment deposits and repair or replace any structures damaged or ruined by subsequent flood events. The No Action Alternative would adversely affect the MOUT training mission of Fort Irwin.

ES-4 Summary of Effects

ES-4.1 Direct Effects

The effects on environmental and socioeconomic resources resulting from implementation of the Proposed Action and the No Action Alternative are summarized in Table ES-1.

TABLE ES-1
Summary of Effects
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Proposed Action Environmental Consequences	No Action Alternative Environmental Consequences
Land Use Planning		
Project Area	No effect.	No effect.
Surrounding Area	No effect.	No effect.
Geology, Soils, and Mineral Resources		
Geology and Mineral Resources	No effect.	No effect.
Soils	Short-term potential for soil erosion effects on disturbed soils during construction and O&M.	No effect.
Seismicity	No effect.	No effect.

TABLE ES-1
Summary of Effects
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Proposed Action Environmental Consequences	No Action Alternative Environmental Consequences
Biological Resources		
Flora	Temporary, minor effects from clearing up to 394 acres of degraded habitat. Negligible effect for maintenance activities.	No effect.
Fauna	Temporary, minor effect to common wildlife during construction due to disturbances in degraded habitat. Temporary, negligible effect during maintenance activities due to disturbances in degraded habitat.	No effect.
Special-status Species	Temporary, minor effects to desert tortoise during construction with mitigation measures implemented. Temporary, negligible effects to desert tortoise during maintenance activities with mitigation measures implemented. Temporary, negligible effect to burrowing owl, kit fox, and special-status and MBTA avian species during construction and maintenance activities with mitigation measures implemented.	No effect.
Water Resources		
Surface Water	Temporary and long-term effect from construction in Tiefort Wash and three other drainages. BMPs would be utilized during construction. Temporary disturbance of soils during maintenance activities. BMPs would be used during maintenance activities as needed.	No effect.
Groundwater	Negligible effect from potential increase in evaporation and percolation.	No effect.
Air Quality	Potential for short-term fugitive dust emissions from soil disturbance during construction and maintenance activities. BMPs would be implemented to reduce fugitive dust. Short-term vehicle and equipment exhaust emissions during construction and maintenance activities.	No effect.
Noise	Short-term negligible increase in noise level from construction and maintenance activities.	No effect.
Cultural Resources	No effect.	No effect.
Socioeconomics	Short-term beneficial effects on regional economic activity from construction. No Environmental Justice and Protection of Children effects.	No effect.
Recreation	No effect.	No effect.

TABLE ES-1
Summary of Effects
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Proposed Action Environmental Consequences	No Action Alternative Environmental Consequences
Health and Human Safety	Short-term adverse effect during construction from construction hazards and potential for exposure to valley fever. Long-term beneficial effect by protecting Tiefort City from a 100-year flood event, which would improve safety conditions during training and maintenance activities.	Long-term adverse effects by not protecting Tiefort City from 100-year flood event, which could make training conditions unsafe, as well as maintenance activities.
Transportation	Negligible effects on traffic in the cantonment area due to construction and maintenance traffic.	No effect.
Solid Waste	No effect.	No effect.
Aesthetics	Negligible long-term effect from change to viewshed due to diversion berms.	No effect.
Hazardous and Toxic Substances	Negligible short-term effect from use of small quantities of potentially hazardous materials (e.g., oils or grease) during construction. Waste would be characterized and disposed in an appropriate manner.	No effect.

BMP = best management practice
MBTA = Migratory Bird Treaty Act

ES-4.2 Cumulative Effects

Constructing new facilities, as well as modifying existing facilities and infrastructure, are ongoing at Fort Irwin. Recently completed projects include the construction of a new hospital and new water treatment plant (Irwin Water Works). Multiple other construction projects could occur on Fort Irwin simultaneously and could include wastewater and water infrastructure improvements, construction related to an Energy Savings Performance Contract at the Fort Irwin landfill, facilities to support the operation of a new Unmanned Aircraft Systems hangar and maintenance facility, a solar facility, and expansion of the Recreational Vehicle (RV) Park. Cumulative effects on soils, biological resources, traffic, and air quality from the Proposed Action could occur, but would be temporary and minimal with use of project design measures. No long-term cumulative effects would result from the Proposed Action.

ES-5 Summary of Project Design Measures

Measures would be implemented to ensure that adverse environmental effects of construction and operation of the Proposed Action would be avoided or minimized. These measures would be incorporated into the final design, implemented by the construction contractor, and included in the contract documents. A summary of these measures is presented in Table ES-2.

TABLE ES-2
Summary of Project Design Measures
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Potential Effect	Construction and O&M Design Measures
Soils		
	Soil erosion	Construction and O&M Phases: Employ BMPs for control of erosion and sediment that could include: compost blankets, mulching, riprap, watering, seeding and sodding, geotextiles, and slope drains. Sediment control measures could include compost filter berms and socks; fiber rolls or berms; temporary sediment basins, rock dams, filters, chambers, or traps; silt fences; storm drain inlet protection; and hay bales. Staked fiber rolls would be placed at all drainages during construction and for two weeks after completion of construction activities. Work would not occur in drainages during rain events or if rain is expected. Wind erosion control measures would consist of wetting the ground with water, chemical stabilization; and, adherence to the measures described in MDPA Rules 403 and 403.2. Prepare and implement an SWPPP.
Biological Resources		
	Desert tortoise (may affect, but not likely to adversely affect)	Construction and O&M Phases: Before construction begins, personnel working on the site would receive a briefing on the desert tortoise, detailing the life history of a tortoise and the protocol to follow if a tortoise is encountered in the project area. An authorized biologist would conduct the briefing. Within two weeks of the onset of construction, 100 percent coverage ground surveys would be conducted of the project area for tortoises, signs of use, or burrows. If no tortoises or active burrows are identified, then construction would proceed without interruption. During land clearing and construction, a biological monitor would be available to observe construction activities and to verify that no tortoises wander into the construction area. If a tortoise is present, construction in the immediate vicinity would be halted while the tortoise is relocated out of the construction area. Desert tortoise burrows located within 100 feet of the limits of construction would be marked and protected by conducting additional briefings on their location to ensure avoidance. Desert tortoise burrows that cannot be avoided would be excavated by hand either by or under the direct supervision of an authorized biologist. Burrow excavation and subsequent handling of any desert tortoise would follow the most up-to-date guidelines that are acceptable to USFWS. Desert tortoise exclusion fencing would be placed at staging and parking areas. Desert tortoise guards would be placed at entrances to the staging and parking areas. Fence installation would be overseen by an authorized biologist. Workers will be required to inspect the underside of all onsite parked vehicles before moving them (unless parked in staging or parking area protected by exclusion fencing). If a desert tortoise is detected, then an authorized biologist will remove the animal to a safe place or wait until the animal moves to safety on its own. Speed limits in and around the project area will be enforced throughout construction and O&M activities. Vehicles shall not exceed 15 mph on unpaved roads and the right-of-way accessing the construction sites or 10 mph during the night.

TABLE ES-2
Summary of Project Design Measures
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Potential Effect	Construction and O&M Design Measures
		To the extent possible, construction activities involving vegetation clearing and/or ground disturbances will be scheduled when tortoises are inactive (November 1 to March 15). Channels and basins would be designed so that desert tortoise can easily pass through these features unimpeded.
	Special-status and avian species (potential disturbance)	Construction and O&M Phases: Land and vegetation clearing would occur outside the breeding season for birds of concern, defined as February 15 to August 31, where practicable. If vegetation clearing is required during the breeding and nesting season, preconstruction surveys of breeding birds, including burrowing owl, would be conducted. Identified active nests or burrows would be protected from disturbance by a 500-foot nesting buffer, which would remain in place until the young have fledged from the nest or burrow and no new nests or burrows are initiated for the season. If a kit fox burrow is identified on or adjacent to the project area during the preconstruction survey, Fort Irwin natural resources staff will be contacted. Fort Irwin staff would determine the status of the burrow and establish an exclusion zone if necessary. Fort Irwin staff would decide if fencing or flagging would suffice to delineate the exclusion zone.
	Pest species	Construction and O&M Phases: All trash and debris would be placed in covered receptacles for delivery to approved landfill facilities. Daily cleanup of trash and debris would be required, including emptying and disposing of trash in covered receptacles. Any water applied during construction activities will be applied in such a manner as to avoid pooling to prevent subsidies for ravens and other pest species.
Water Resources		
Surface Water	Soil erosion, runoff, and sedimentation	Construction and O&M Phases: Proper BMPs would be implemented prior to the start of land grading or trenching activities. Native vegetation would be preserved when possible. Erosion, runoff, and sediment control measures would be implemented in case of a storm event. Construction would not occur in drainages during rain events or if rain is expected. Erosion control measures such as compost blankets, mulching, riprap, geotextiles, and slope drains could be used to protect exposed soil and minimize erosion. BMPs such as check dams, slope diversions, and temporary diversion dikes could be implemented for runoff control. Sediment control measures that could be implemented include compost filter berms and socks; fiber rolls or berms; sediment basins, rock dams, filters, chambers, or traps; silt fences; and weed-free hay bales. Staked fiber rolls would be placed at all drainage features for the duration of construction and left in place two weeks after completion of construction. Good housekeeping measures would be practiced during construction. Site-specific stormwater BMPs would be detailed in a construction SWPPP, which would be prepared before breaking ground.
Groundwater	Water supply	Construction Phase: Use recycled water for dust suppression.

TABLE ES-2
Summary of Project Design Measures
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Potential Effect	Construction and O&M Design Measures
Air Quality	Fugitive dust	Construction and O&M Phases: BMPs such as dust suppression techniques that could include spraying the ground with water would be implemented for construction and maintenance activities. Fort Irwin currently implements dust abatement programs that address problems associated with wind erosion and suspension of particles, including chemical stabilization and revegetation. Additionally, the requirements set forth in Rule 403.2, Fugitive Dust Control for the MDPA, would be adhered to, and would include implementation of a dust control plan.
Hazardous and Toxic Substances	Releases from equipment maintenance	Construction and O&M Phases: Implement a SWPPP consistent with hazardous waste and pollution regulations, which would include guidelines and BMPs to prevent a release of hazardous materials into the environment. Implement a project-specific site safety plan to avoid significant risks and health hazards associated with the use of hazardous materials and hazardous waste generation and disposal.
Health and Human Safety		
	Potential exposure to valley fever (would apply to non-military personnel)	Construction and O&M Phases: A brochure detailing valley fever, its cause, and symptoms would be made available to those working in the project area. The brochure would include information on how to control the spread of the illness, such as changing clothes daily, using respiratory protection, applying water to the soil, and cleaning equipment and materials. Breathing protection gear would be made available to all workers, at their request and at no cost to the worker. Workers would be educated through briefings to recognize the symptoms of valley fever, and to quickly report suspected symptoms of work-related valley fever. Signs would be posted at the project site notifying visitors and workers to the threat of valley fever.

BMP = best management practice
MDPA = Mojave Desert Planning Area
mph = miles per hour
O&M = operation and maintenance
SWPPP = stormwater pollution prevention plan
USFWS = U.S. Fish and Wildlife Service

SECTION 1

Purpose and Need

1.1 Introduction

Fort Irwin is located approximately 37 miles northeast of Barstow, California, in the north-central part of the High Mojave Desert, as shown on Figure 1-1. Fort Irwin encompasses approximately 1,190 square miles (761,405 acres). Approximately 80 percent of Fort Irwin's land area is used for battlefield training. A cantonment area occupies approximately three square miles (1,920 acres), and provides temporary and permanent living quarters for soldiers and their families along with the support facilities. Fort Irwin's population includes approximately 4,450 assigned military members; 5,630 rotational soldiers; 7,200 civilian workforce; and 7,700 family members (Fort Irwin, 2015a). Training rotations occur approximately 10 times each year.

Military Operations on Urban Terrain (MOUT) are a part of the Fort Irwin training mission. One of the areas on Fort Irwin where MOUT training occurs is at Tiefort City, which is approximately 10 miles northeast of the cantonment, as shown on Figure 1-2. Tiefort City is a mock city that includes numerous buildings and objectives, such as a helicopter pad, hospital, palace, prison, and train station (U.S. Army [Army], 2008). Tiefort City simulates potential combat scenarios, such as urban areas in the Middle East. Tiefort City is approximately 0.34-square mile (215 acres) in size and is generally on a broad alluvial fan surface originating from mountains and hills to the south (U.S. Army Corps of Engineers [USACE], 2014).

Rain at Fort Irwin typically comes in summer months in the form of monsoons. Monsoon thunderstorms can cause three to four inches of rain within 24 hours, and often within six hours (Air Force Combat Climatology Center [AFCCC], 2004). The annual rainfall at Fort Irwin typically ranges from zero to eight inches, with a majority of the rain resulting from two to three storms annually. A flood event at Fort Irwin that was estimated to be a 500-year to 1,000-year rainfall event occurred on August 25, 2013. The flood event inundated Tiefort City and deposited significant amounts of sediment within the structures and throughout the training complex. Sediment deposited after the flood event indicated that flood depths exceeded three feet within the training grounds and up to six feet inside of structures. Tiefort City was closed to allow for the removal of the sediment and to replace training monitoring equipment damaged by floodwaters. Erosion caused during the flood event undermined and damaged multiple structures, requiring the structures to be abandoned (USACE, 2014).

A floodplain analysis was conducted to determine the conditions contributing to flood events in Tiefort City and the surrounding area. The source of runoff is from drainages located south of Tiefort City, primarily from Tiefort Wash (USACE, 2014). USACE completed a stormwater management plan (SWMP) for Tiefort City that identifies potential alternatives to prevent and reduce the adverse effects of future flood events. Fort Irwin proposes to implement the preferred alternative as described in the Tiefort City SWMP.

1.2 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to improve training efficiency by eliminating disruptions to MOUT training activities in Tiefort City by preventing flooding and reducing the effects of a 100-year flood event.

USACE conducted a study that included Tiefort City and the surrounding area that contributes runoff that affects Tiefort City to develop floodplain maps for up to a 100-year flood event. It was determined that flood protection for a larger flood event would be infeasible due to the high cost. Floodplain analysis indicated that large portions of Tiefort City are inundated by a 100-year flood (Figure 1-3).

Legend

Fort Irwin Boundary

0 12.5 25 50
Miles

N

FIGURE 1-1
Vicinity Map
Tiefort City Stormwater Management Plan EA
Fort Irwin, CA

LEGEND

Project Area

Cantonment Area

N

0 0.125 0.25 Miles

1:15,840

FIGURE 1-2
Tiefort City and Project Area
Tiefort City Stormwater Management Plan EA
Fort Irwin, California

Source: Esri World Imagery

Z:\ISBG\MDeseo\FortIrwin\656419\Mapfiles\Project\Fig_Overview_TiefortCity.mxd

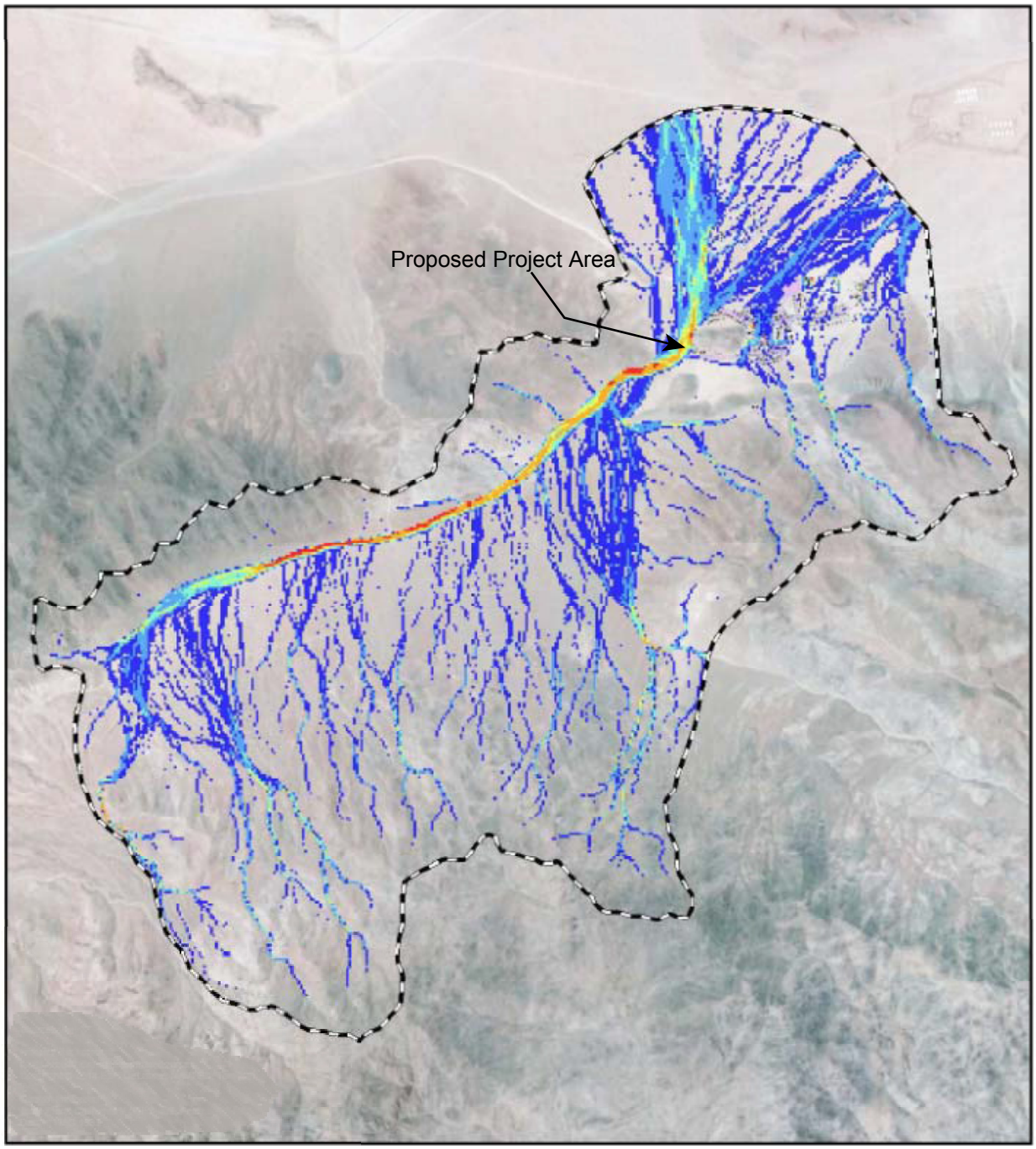

FIGURE 1-3
Floodplain Analysis
Tiefort City Stormwater Management Plan EA
Fort Irwin, California

Runoff from Tiefort Wash combines with runoff from mountains to the south and southwest and passes through the western portion of Tiefort City before fanning out. There are three additional drainages directly south of Tiefort City that contribute to flood events. Structures on the western side of Tiefort City were inundated by flows from Tiefort Wash, while the central portions of Tiefort City were inundated mainly by runoff from the hills directly south of Tiefort City. A sediment yield analysis concluded that the largest sub-basin in the study area yields approximately 116 acre-feet of sediment and debris during a 100-year flood event. Much of the sediment and flood debris is deposited in Tiefort City.

1.2.1 Project Need

Tiefort City is one of the main and largest MOUT training assets on Fort Irwin. The Proposed Action is needed to eliminate training disruptions following 100-year flood events and to ensure that Tiefort City remains a viable training area for Fort Irwin to sustain the Fort Irwin training mission. Tiefort City must remain operable throughout the year to meet the training needs of soldiers rotating through Fort Irwin.

1.2.2 Project Objectives

The Proposed Action would achieve the following objectives:

- Prevent runoff as a result of 100-year storms or smaller storm events from inundating the structures and infrastructure within Tiefort City
- Manage debris flows to ensure proposed improvements have adequate capacity to control a 100-year flood event

1.3 Scope of Analysis

This Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and implementing regulations specified in 40 *Code of Federal Regulations* (CFR) Part 1500 through Part 1508, and 32 CFR Part 651. The purpose of this EA is to describe current environmental resources on and adjacent to the location of the proposed stormwater controls and inform decision makers and the public of the potential environmental consequences of implementing the Proposed Action, while presenting the rationale used for evaluating and determining impacts. Mitigation measures are identified and described where warranted.

This EA identifies, documents, and evaluates the potential environmental and socioeconomic effects of the Proposed Action and seeks to ensure that appropriate consideration has been given to environmental resources. It includes an evaluation of direct, indirect, and cumulative effects, both temporary and permanent, that could occur as a result of implementing the Proposed Action. Reasonably foreseeable future actions that may contribute to cumulative effects are identified in Section 4, *Environmental Consequences*. Any additional requirements stemming from other unrelated military actions would undergo separate NEPA analysis and evaluation.

This EA also considers the potential effects of the No Action Alternative, as required by NEPA. The No Action Alternative provides a baseline against which the potential effects of the Proposed Action and the alternatives can be compared.

An interdisciplinary team of environmental scientists, biologists, planners, economists, engineers, archaeologists, historians, and military technicians has analyzed the Proposed Action and alternatives in light of existing conditions and has identified relevant beneficial and adverse effects associated with the action and alternatives.

1.3.1 Resource Areas Eliminated from Analysis

The following resource areas have been eliminated from analysis in the EA because there is no potential for effects to them from the Proposed Action. These resource areas will not be further discussed in the EA.

Land Use

The Proposed Action would occur within a portion of Fort Irwin dedicated to training. No modifications to existing uses would occur as a result of the Proposed Action and no changes in use of adjacent land would occur. There would be no changes to land use as a result of the Proposed Action.

Geology, Mineral Resources, and Seismicity

The Proposed Action would not affect underlying geology or mineral resources because disturbance would generally be limited to surface grading. Mineral resources, such as iron and gold and potentially silver, are within the boundaries of Fort Irwin; however, no mining or exploration is carried out within the original boundaries of Fort Irwin due to an exclusion signed by President Roosevelt in the 1940s (Army, 2006). No known mineral resources are in the project area. Seismicity would not be affected by the Proposed Action, because the project area is not underlain by a seismically active fault. The California Division of Mines and Geology (CDMG) has not identified any Alquist-Priolo Fault-Rupture Hazard Zones in the project area. Several Quaternary faults, which indicate evidence of seismic activity in the past 1.6 million years, occur in the Irwin Basin, which includes Garlic Springs Fault approximately nine miles southwest of the proposed project area. However, this fault has not been active in the past 11,000 years (CDMG, 1999). The Proposed Action would have no effects related to the exposure of people or structures to the risk of loss, injury, or death from seismic activity because of the limited potential for the stormwater controls in a military training area to pose a safety risk.

Noise

The Proposed Action would occur in a remote area of Fort Irwin where there are no human receptors. Noise from the Proposed Action would not affect those residing in the cantonment. There could be temporary effects to wildlife from noise during construction and maintenance activities. Potential noise effects to wildlife are discussed in the biological resources section.

Socioeconomic Resources

Socioeconomic resources would not be adversely affected by the Proposed Action. The Proposed Action could be constructed and maintained by either Army personnel training at Fort Irwin or a private contractor. Depending upon who constructs the Proposed Action there could be minor short-term beneficial effects on the local economy as a result of the construction effort.

Environmental Justice and Protection of Children

The Proposed Action would occur in a remote area of Fort Irwin dedicated to training purposes. There are no populations of low-income residents, minorities, or children on or near the project area. The area is restricted from public access. No effects to environmental justice populations or children would occur as a result of the Proposed Action.

Recreation

The project area is dedicated for training purposes and restricted from the public. There are no recreation areas on or near the project area. No effect to recreation would occur as a result of the Proposed Action.

Utilities and Infrastructure

Tiefort City has limited utilities and infrastructure, as Tiefort City is for training purposes only. Construction and maintenance of the Proposed Action would not adversely affect utilities and infrastructure dedicated to serving Tiefort City and would not affect the Fort Irwin cantonment.

1.3.2 Resource Areas Analyzed

This EA includes an analysis of all other resource areas that could be impacted by the Proposed Action. These include the following, which will be discussed in Section 3, *Affected Environment*, and Section 4, *Environmental Consequences*:

- Soils
- Biological Resources
- Water Resources
- Air Quality
- Cultural Resources
- Hazardous and Toxic Substances
- Health and Human Safety
- Aesthetics
- Transportation

1.4 Framework for Decision Making

The Army is the lead agency for completing a NEPA analysis for the Proposed Action. The EA will be used to identify any potentially significant effects of the Proposed Action, to identify environmental concerns in advance of project implementation, and to discuss any appropriate mitigation measures for those concerns. Agencies could use the EA to support their decision to issue approvals and/or permits for the Proposed Action.

1.5 Permits, Approvals, and Agreements Required by Other Agencies

This section lists and summarizes some of the permits and approvals that may be needed to implement the Proposed Action. This section provides the reader with a general understanding of the regulatory requirements that may need to be met before the Proposed Action is implemented. Discussions with those agencies would be required to determine the specific nature of any future permits or approvals that might be required from those agencies. Their inclusion in this document is intended to acknowledge the potential role of these agencies and ensure their notification and subsequent inclusion of any comments from them. This list is not intended to be all inclusive; for example, a variety of permits and approvals might be needed from local and regional agencies that are not reflected here. In addition, the permits and approvals required would vary depending on the implementing agency. Table 1-1 lists permits and approvals that may be required for the Proposed Action.

This EA could be used to support obtaining permits and approvals from other agencies, such as the Mojave Desert Air Pollution Control District (MDAPCD). MDAPCD could require a permit to construct. Agency discussions and coordination would be needed to determine the specifics of any future permit or approval that may be required. MDAPCD is included in this document to acknowledge the potential role of this agency and to notify MDAPCD of the availability of this document so that their comments and concerns can be included and given consideration.

TABLE 1-1
Permits and Approvals
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Permitting or Approval Agency	Permit or Approval	Requirement	Comments
California Department of Fish and Wildlife	CESA, CDFW Code Section 2081(b) permit, or Natural Community Conservation Plan Section 2835 permit	CESA prohibits the taking of threatened, endangered, or candidate species, except as otherwise provided in that statute. CDFW may permit the taking of those species pursuant to Sections 2081(b) or 2835, if specified conditions are met.	Applies to any implementing agency.
	Lake and Streambed Alteration Agreement	CDFW Code Section 1600 et seq. requires any person, state, or local government agency, or public utility proposing a project that may substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of a river, stream, or lake to notify CDFW before beginning the project. If CDFW determines that the project may substantially adversely affect existing fish and wildlife resources, a Lake or Streambed Alteration Agreement is required.	CDFW Code Section 1600 does not apply to activities by the federal government.
California Department of Toxic Substances Control	Various permits and approvals related to hazardous materials	The storage, transport, and disposal of hazardous materials are primarily regulated by DTSC under various federal and state regulations.	Applies to any implementing agency.
California Department of Transportation or Federal Highway Administration	Encroachment and Transportation Permits	Encroachment permits would be needed for any activities in a federal, state, or county road or highway right-of-way. Transportation permits would be needed for oversized vehicles or extralegal loads.	Applies to any implementing agency.
Lahontan Regional Water Quality Control Board	CWA Section 401 Water Quality Certification	Section 401 of the CWA requires that federally authorized discharges into Waters of the United States not violate state water quality standards.	Required if a CWA Section 402 or 404 Permit is required. There are no Waters of the United States on Fort Irwin. The requirement is addressed under the project's general construction permit.
	CWA Section 402 NPDES Permit	Section 402 of the CWA authorizes states to issue NPDES permits for discharges to surface water both from point sources and non-point sources. Compliance is required for all discharges into Waters of the United States, or for construction projects that would disturb one acre or more.	Applies to any implementing agency. There are no Waters of the United States on Fort Irwin. The requirement is addressed under project's general construction permit.
	Waste Discharge Requirements, Porter-Cologne Water Quality Control Act	Waste discharge requirements are required for activities that may discharge waste in a diffuse manner (such as from soil erosion or waste discharges to land), including the discharge of waste from construction operations, and dredge and fill activities.	The requirement is addressed under the project's general construction permit.

TABLE 1-1
Permits and Approvals
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Permitting or Approval Agency	Permit or Approval	Requirement	Comments
Project Lead Agency (implementing agency) and all Responsible Agencies	Project-level CEQA Compliance	The CEQA applies to all discretionary activities proposed to be carried out or approved by public agencies, including state, regional, county, and local agencies in the State of California. The CEQA also applies to private activities that require discretionary approval by a public agency.	The CEQA does not apply to federal activities, unless such activities require a discretionary action from a public agency in California.
Project Lead Agency (federal), all Federal Cooperating Agencies, and the Advisory Council on Historic Preservation	Section 106 of the NHPA	Section 106 requires federal agencies to evaluate the effects of federal undertakings on historical, archaeological, and cultural resources. An agency is required to coordinate with the SHPO or Tribal Historic Preservation Officer and other interested parties on effects on historic, cultural, and Tribal resources.	Applies to all actions on federal lands, sponsored or permitted by a federal agency, or funded with federal monies.
Project Lead Agency (implementing agency) and Various Federal, State, and Local Agencies	Land acquisition, land leases, and right-of-way acquisitions	Depending on the implementing agency, the following land acquisition, land leases, and right-of-way acquisitions may be needed: • Federal approvals for use of federal lands • Encroachment permits and approvals by public agencies for activities on public lands or public right-of-ways (approval agencies could include the California State Parks or San Bernardino County) • State Lands Commission Land Use Lease for any activities on state sovereign lands • Land acquisition where appropriate	Extent and requirements for land acquisition, land leases, and right-of-way acquisitions will vary greatly depending on the final implementing agency.
Mojave Air Quality Management District	CAA General Conformity Determination	CAA Section 176(c) requires federal actions to conform to applicable federal or SIPs to ensure that the actions do not interfere with strategies employed to attain the NAAQS.	Applicable to federal actions. May require modification of the SIP emission budgets for NO_x and respirable PM_{10}.
Mojave Air Quality Management District	Permits to Construct and Operate Stationary Sources	Various air quality permits would be needed for construction and O&M of stationary sources such as generators, pumping plants, and treatment facilities.	Applies to any implementing agency.
Mojave Air Quality Management District	Approval of Large Operation Notification (Dust Control Plan)	The purpose is to reduce the amount of particulate matter entrained in the ambient air as a result of manmade fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. Compliance with this regulation would be required for a variety of alternative activities.	Applies to any implementing agency.

TABLE 1-1
Permits and Approvals
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Permitting or Approval Agency	Permit or Approval	Requirement	Comments
U.S. Army Corps of Engineers	CWA Section 404 Permit	Section 404 of the CWA requires that a permit be obtained from the USACE before discharging dredge or fill material into Waters of the United States, their tributaries, and associated wetlands. Activities regulated by 404 permits include, but are not limited to, dredging, construction activities in waterways, and flood control actions.	There are no waters considered Waters of the United States within the boundaries of Fort Irwin.
U.S. Fish and Wildlife Service	ESA Section 7 Incidental Take Statement, or Section 10 Incidental Take Permit	The ESA requires USFWS to maintain lists of threatened and endangered species and protects these listed species (and any designated critical habitat) from unauthorized take. Section 7 of the ESA requires all federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat. Section 10 describes how USFWS may authorize take of a listed species by non-federal agencies.	The ESA applies to any action that may result in "may affect" a federally listed species, regardless of the implementing agency.

CAA = Clean Air Act
CDFW = California Department of Fish and Wildlife
CEQA = California Environmental Quality Act
CESA = California Endangered Species Act
CWA = Clean Water Act
DTSC = California Department of Toxic Substances Control
ESA = Endangered Species Act (federal)
NAAQS = National Ambient Air Quality Standards
NHPA = National Historic Preservation Act
NO_x = nitrogen oxide
NPDES = National Pollutant Discharge Elimination System
O&M = operation and maintenance
PM_{10} = particulate matter less than 10 microns in aerodynamic diameter
SHPO = State Historic Preservation Office
SIP = state implementation plan
USACE = U.S. Army Corps of Engineers
USFWS = U.S. Fish and Wildlife Service

1.6 Relevant Statutes, Regulations, and Executive Orders

A decision on whether to proceed with the Proposed Action depends on numerous factors, including mission requirements, regulatory requirements, and environmental considerations. In addressing environmental considerations, Fort Irwin was guided by relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resources management and planning.

These include, but are not necessarily limited to, the following:

Federal Statutes

- Archaeological Resources Protection Act of 1979 (16 U.S. Code [U.S.C.] 470)
- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996, as amended)
- CAA (42 U.S.C. 7401 et seq., as amended)
- CWA and the Water Quality Act of 1987 (33 U.S.C. 1251 et seq., as amended)

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (as amended by the Superfund Amendments and Reauthorization Act of 1986 [42 U.S.C. 9601 et seq.])
- ESA (16 U.S.C. 1531-1543)
- Energy Policy Act of 2005 (42 U.S.C. 15801)
- Farmland Protection Act of 1981 (7 U.S.C. 4201 et seq., as amended)
- Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.)
- MBTA (16 U.S.C. 701, et seq.)
- National Energy Conservation Policy Act (42 U.S.C. 8251)
- NEPA (42 U.S.C. 4321-4370)
- NHPA (16 U.S.C. 470 et seq., as amended)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 et seq., as amended)
- Noise Control Act of 1972 (42 U.S.C. 4901 – 4918)
- Resource Conservation and Recovery Act of 1976 (RCRA) (42 U.S.C. 6901)
- Toxic Substances Control Act (15 U.S.C. 2601 et seq., as amended)

Regulations

- Army Regulation (AR) 190-13, The Army Physical Security Program
- AR 200-1, Environmental Protection and Enhancement
- AR 210-20, Installation Master Planning
- AR 385-10, The Army Safety Program
- AR 525-13, Antiterrorism
- Council on Environmental Quality Regulations for Implementing NEPA (Title 40 CFR, Parts 1500-1508 [40 CFR 1500-1508])
- Protection of Historic Properties (36 CFR Part 800)
- Environmental Analysis of Army Actions (32 CFR 651)

Executive Orders

- EO 11514, Protection and Enhancement of Environmental Quality (amended by EO 11991)
- EO 11988, Floodplain Management
- EO 11990, Protection of Wetlands
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12372, Intergovernmental Review of Federal Programs
- EO 12580, Superfund Implementation
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- EO 12902, Energy Efficiency and Water Conservation at Federal Facilities

- EO, 13007 Protection of Indian Sacred Sites
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risk
- EO 13101, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition
- EO 13123, Greening the Government Through Efficient Energy Management
- EO 13149, Greening the Government Through Federal Fleet and Transportation Efficiency
- EO 13154, Federal Leadership in Environmental, Energy, and Economic Performance
- EO 13175, Consultation and Coordination with Indian Tribal Governments
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
- EO 13327, Federal Real Property Asset Management (amended by EO 13423)
- EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management
- EO 13693, Planning for Federal Sustainability in the Next Decade

1.7 Agency and Public Participation

The Army invites public participation in the proposed federal action. Considering the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, and members of the public having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision-making process.

Public participation opportunities with respect to this EA and decision making on the Proposed Action are guided by 32 CFR Part 651. Upon completion of the EA, the Final EA and Draft Finding of No Significant Impact (FNSI) will be made available to the public for comment for a period of 30 days. At the end of the 30-day public review, the Army will consider all comments submitted by individuals, agencies, and organizations; this correspondence is presented in Appendix A. As appropriate, the Army may then execute the FNSI and proceed with implementation of the Proposed Action. If implementing the Proposed Action is determined to result in significant effects, then the Army will publish a Notice of Intent in the *Federal Register* to prepare an Environmental Impact Statement or will not take the action.

Throughout this process, the public may obtain information on the status and progress of the Proposed Action and the EA through Mr. Clarence Everly, Fort Irwin Directorate of Public Works, Environmental Division, Building 602, P.O. Box 105085, Fort Irwin, California, 92310-5085 or via email at clarence.a.everly.civ@mail.mil.

SECTION 2

Description of Proposed Action and Alternatives

This section describes the Proposed Action and alternatives for construction and maintenance of stormwater controls at Tiefort City that meet the project purpose and need as described in Section 1.2, *Purpose and Need for the Proposed Action*. Two alternatives (the Proposed Action and the No Action Alternative) were selected for detailed analysis. One additional alternative was considered, but not carried forward.

2.1 Proposed Action

The Proposed Action is to implement the Tiefort City SWMP. The Proposed Action would construct and maintain stormwater controls to provide protection from runoff from a 100-year flood event to Tiefort City (USACE, 2014). The Proposed Action includes stormwater controls designed to handle runoff from a 100-year flood event. Approximately 400 acres of land would be disturbed for construction of stormwater controls around Tiefort City. Features that would be constructed in the stormwater control area are shown on Figure 2-1, and could include some or all of the following:

- Earthen berms: Earthen berms would redirect stormwater runoff and debris flows away from the MOUT structures. The berms would vary in size and could be 5 to 15 feet in height and up to 20 feet wide at the top with 3:1 side slopes. The berms could be lined with riprap to prevent erosion. The riprap would be placed on a layer of bedding material and would extend 10 feet below the toe of the berm. Berms could be constructed alone or adjacent to existing and constructed channels.
- Channels: Channels could be built to redirect runoff away from Tiefort City. In-channel detention basins and riprap energy dissipaters could be used to control flows. Trapezoidal channels would be sized to accommodate the 100-year flood event. The channels could be stabilized with riprap placed along both sides of the lower half of the channel walls to prevent erosion, and gabion drop structures placed within the channel to control velocities. Both banks of the channel would be lined with riprap within 500 feet upstream and downstream of each drop structure. Channel construction could include adjacent berms.
- Debris Basins: Debris basins could be constructed to collect sediment from the hills to the south and limit the amount of sediment entering the stormwater control area around Tiefort City. The basins would be less than 10 feet deep and would be sized to store between eight and 13 acre-feet of sediment (12,907 to 20,973 cubic yards). Each basin would include a riprap-lined spillway so that excess runoff would overtop the basin embankment in a controlled manner to reduce the effects of erosion. Each basin would have an access ramp to allow for maintenance and a dirt access road connected to roads in Tiefort City.

Construction would take approximately nine to 12 months. The area of disturbance, also referred to as the project area, is shown on Figure 1-2. Earth-moving equipment, such as bulldozers, excavators, front-end loaders, and dump trucks would be used.

Fill material from excavated materials within the project area would be used to meet the needs for construction of the stormwater control features. Excavated material used for construction would be screened and sorted prior to placement. Large boulders would be removed from excavated materials. Excess excavated material would be placed in a designated area north of Tiefort City until a permanent disposal site is identified. Rock would be imported to the project area from an established quarry within Fort Irwin, which is approximately 9.5 miles from the project area.

Annual maintenance of the stormwater control features would be required. Sediment would be removed from channels and debris basins annually and after very large flood events. The sediment removed would be used to repair any damage to debris channels/basins caused by rain events. Routine inspections would be conducted every 12 months and after every large flood event.

Existing access routes to Tiefort City would be modified to accommodate the stormwater controls. Berms and channels would be designed to include hardened crossings at points where military equipment/vehicle would need to cross these features for access to training areas. Access crossings would be constructed of concrete with riprap placed on each end of the concrete crossing pad to provide erosion protection. For smaller crossings, culverted crossings could be installed to provide access road crossings in smaller channels. The current access road to Tiefort City could be realigned to direct traffic to the north and around berms. Bridges capable of accommodating tanks and heavy military equipment could be constructed over channels. Bridges would be constructed of permanent materials, such as concrete, and protected with riprap, concrete, or other bank protection around and leading up to the bridge abutments to prevent erosion.

Construction costs could be reduced by using engineering battalions rotating through Fort Irwin to construct some of the features for training. Costs of maintenance activities could be reduced by using soldiers training at Fort Irwin.

Source: USACE, 2014

0 500 1,000 1,500 2,000
Feet

N

Legend

- Proposed South Channel
- Proposed South Levee
- Proposed Stormwater Controls
- Proposed Crossing
- Tiefort Wash
- Proposed Sediment Removal
- Proposed South Basins
- Tiefort Study Area Boundary
- Proposed Spillway Location

FIGURE 2-1
Proposed Action
Tiefort City Stormwater Management Plan EA
Fort Irwin, California

2.2 No Action Alternative

Under the No Action Alternative, construction and operation of stormwater controls to protect Tiefort City from a 100-year flood event would not occur. Subsequent flood events would likely inundate Tiefort City and deposit sediments, rendering Tiefort City unsafe and unusable for training purposes after those events. Training activities conducted at Tiefort City would likely be disrupted so that maintenance crews could remove the sediment deposits and repair or replace any structures damaged or ruined by subsequent flood events. The No Action Alternative would adversely affect the MOUT training mission of Fort Irwin.

2.3 Alternatives Considered but Not Carried Forward

One other alternative was considered in the Tiefort City SWMP, but was not carried forward. This alternative was dismissed because it would impact a major maneuver training corridor (USACE, 2014).

Alternative 1

Alternative 1 would include the construction and maintenance of a 70-feet-high and 1,000-feet-long dam southwest of Tiefort City along the opening between the mountains and across Tiefort Wash. The dam would intercept all flows from Tiefort Wash. The upstream side of the dam (south side) would be armored to prevent erosion. A spillway would be constructed in the hills east of the proposed dam, which would prevent runoff flows from overtopping the dam. The dam would retain stormwater runoff and debris transported by Tiefort Wash. Stormwater would pool behind the dam during large storm events, which would gradually percolate into the ground or evaporate, leaving sediment in the basin behind the dam. A collector channel would be constructed to direct excess stormwater away from the dam and toward the spillway.

This alternative would eliminate a major maneuver training corridor into the Tiefort City training complex; therefore, it was eliminated from consideration.

SECTION 3

Affected Environment

This section describes the existing environmental conditions of the preferred alternative area that could be affected by implementing the Proposed Action. These resources include soils, biological resources, cultural resources, water resources, air quality, hazardous materials, aesthetics/visual resources, transportation, and health and safety. Resources that would not be affected include land use; geology, seismicity, and mineral resources; noise; utilities; socioeconomics; and recreation. These resource areas are not discussed in detail because they would not be affected by the Proposed Action.

3.1 Soils

The landscape at Fort Irwin is dominated by alluvial basins between mountain ranges. Mountain tops in the region have been eroded, exposing outcrops of bedrock, while the land between consists of a variety of coarse and fine sediment materials.

Soils commonly occurring in the region include coarse materials derived from mountainous rock and finer materials located on the valley floors. Soils on the alluvial fans along the bases of mountain ranges (upper bajadas) consist of coarse gravels that change to loamy gravels toward the toe of alluvial fans. Soils on the lower bajadas include sandy loams and finer loamy materials. Dry lakes (playas) at the bottom of basins have soils of silts and clays, and typically develop salt pans (USACE, 2003; Army, 2006).

Desert soils develop slowly and are fragile. Hardened soil crusts form on clay or silty desert soils by the biological activity of resident bacteria, algae, and lichens. Cryptogamic crusts (biological soil crusts) stabilize surface integrity and resist wind and water erosion from both drops and water flows. These crusts fix atmospheric nitrogen in low quantities, making it available to desert flora. Vehicles disturb the soil crust, making the soil susceptible to wind and water erosion. In addition, desert soils are highly vulnerable to compaction from activities, such as vehicle movement, that disturb the soil crusts, leaving the underlying soils vulnerable to erosion by wind and water (Army, 2006). There has been much vehicle traffic across most of the project area, and as a result very little biological soil crusts were observed.

Desert pavement is characteristic of the region. Desert pavement consists of a surface crust of pebbles and rocks that have developed a coating of manganese oxide due to sun exposure, rendering the surface dark and shiny. Desert pavement protects fragile soils from further erosion. Once desert pavement is removed or disturbed, reestablishment could take several thousand years (Army, 2006). No desert pavement was observed within the project area.

The Tiefort City MOUT training area is located at the northern base of the Tiefort Mountains, within an alluvial basin stretching between mountain ranges. Desert soils that develop on alluvial fill at Fort Irwin are typically light in color, deficient in phosphorus and nitrogen, and lack organic matter (Army, 2006). The project area is composed of coarse gravels deposited from mountain slopes grading into loamy gravels toward the toe of the alluvial fan. Soils grade from sandy loams to finer loamy materials towards the northern end of the project area. A large portion of the soils within the project area have been disturbed from military training activities. The Natural Resources Conservation Service (NRCS) has mapped approximately 95 percent of Fort Irwin, including the project area. Table 3-1 shows all soil types that occur within the project area. The table includes a general description of each soil type, along with a rating of susceptibility to wind and water erosion.

TABLE 3-1
Soils Within the Project Area
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Soil Type	Area (acres)	Description	Wind Erodibility	Water Erodibility
Goldivide extremely gravelly-Granitepass-Goldivide complex, 2 to 8 percent slopes	223.7	Occurs on alluvial fans and fan aprons derived mainly from granite. Well drained.	Low susceptibility	Low susceptibility
Nellake-Arizo association, 4 to 15 percent slopes	79	Occurs on fan remnants and alluvial fans derived from granite and other mixed sources. Well drained to excessively drained.	Low susceptibility	Low susceptibility
Dalvord-Angelpoint-Rock outcrop association, 30 to 75 percent slopes	36.8	Occurs on mountain slopes derived mainly from granite. Somewhat excessively drained.	Low susceptibility	Low susceptibility
Arizo very gravelly sandy loam, 2 to 4 percent slopes	36.4	Occurs on alluvial fans derived from mixed sources. Excessively drained.	Slight susceptibility	Slight susceptibility
Rock outcrop-Paintrocks complex, 15 to 50 percent slopes	17.3	Occurs on mountain slopes and pediments derived from granite. Excessively drained.	Low susceptibility	Low to no susceptibility
Twobitter-Arizo association, 2 to 8 percent slopes	0.8	Occurs on fan remnants, alluvial fans, and fan aprons derived from mixed sources. Well drained to excessively drained.	Low susceptibility	Low susceptibility

Source: NRCS, 2015.

The predominant soil type within the Tiefort City MOUT project area consists of a Goldivide extremely gravelly-Granitepass-Goldivide complex, two to eight percent slopes. This soil type comprises 56.8 percent of the project area. Goldivide extremely gravelly-Granitepass-Goldivide complex soils typically occur on alluvial fans derived from granite. Undisturbed soils in the project area generally have a low susceptibility to wind and water erosion (Table 3-1). Arizo very gravelly sandy loam is slightly susceptible to wind and water erosion, which is 9.2 percent (36.4 acres) of the project area (NRCS, 2015).

3.2 Biological Resources

Biological resources include plants (flora) and animals (fauna) and the habitats in which they occur. Major vegetation communities are described in terms of the representative species present, with special attention placed on special-status species afforded some level of federal, state, or local protection. General wildlife species expected to occur are described, with emphasis placed on special-status species.

3.2.1 Regulatory Considerations

Regulations concerning biological resources are discussed as follows.

3.2.1.1 Endangered Species Act of 1973

The ESA (16 U.S.C. Section 1531 et. seq.) was established to protect and allow for recovery of species in danger of extinction and their associated habitat. Under the ESA, species may be listed as endangered or threatened. Endangered species includes those in danger of extinction throughout all or a part of its range. Threatened includes species likely to become endangered within the foreseeable future. The ESA also protects habitat considered critical to the existence and recovery of listed species. Section 7 of the ESA specifies that any agency that proposes a federal action that could jeopardize a listed species or

result in destruction or adverse modification of its habitat must participate in an interagency cooperation and consultation process with USFWS or the National Oceanic and Atmospheric Administration.

3.2.1.2 California Endangered Species Act

The purpose of the California Endangered Species Act (CESA) is to ensure all native species of flora and fauna, including their associated habitat, threatened by extinction, and/or significantly declining populations that could lead to a threatened or endangered designation, are protected. The CESA delegates the responsibility of maintaining a list of state threatened and endangered species to CDFW. The CESA encourages consultation with CDFW if a proposed action may affect a state-listed species.

3.2.1.3 Migratory Bird Treaty Act

The purpose of the MBTA (16 U.S.C. Section 703 et. seq.) is to allow for protection of bird species that migrate between the United States and other countries. The MBTA states that it is unlawful to pursue, hunt, take, capture, wound, or kill a migratory bird by any means, including any part, egg, or nest unless otherwise authorized, such as within legal hunting seasons. The list of bird species protected by the MBTA is included in 50 CFR Section 10.13.

3.2.2 Biological Resources Survey

The proposed project area was surveyed for biological resources on October 27, 2015 and on March 29, 2016. The 2015 survey was conducted in accordance with the *Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats* (USFWS, 2010) by walking throughout all accessible and appropriate habitat within the proposed project area. The biological survey report, which includes results from both surveys, is included in Appendix B. The 2016 biological survey of the project area focused on the Lane Mountain milkvetch (*Astragalus jaegerianus*) and burrowing owl (*Athene cunicularia*). The results of the surveys are presented below.

3.2.3 Flora

The project area lies within the central Mojave Desert region of the desert floristic province. The project survey area contains one vegetative community type: Mojave creosote bush (*Larrea tridentata*) scrub. A subassociation of this vegetation type is described as the creosote-white bursage (*Ambrosia dumosa*) association based on the widespread dominance of the creosote bush, which covers extensive areas in nearly pure stands, often in close association with white bursage. The project area is northeast of the developed cantonment in an area that is used for military training. Tank trails and other small dirt roads cross the project area at several locations.

Vegetation within the project area was sparse and there was evidence of off-road vehicle use throughout the project area. Vegetation cover was considered low to moderate. Tiefort Wash runs along the western side of the mock city and the edges and footprint of the wash are indistinguishable. Two moderate-sized washes and one larger wash are located in the project area south of Tiefort City. The washes lacked any riparian vegetation. Four nonnative plant species were observed, and determined to be relatively scarce; Saharan mustard (*Brassica tournefortii*), Mediterranean grass (*Schismus* sp.), redstem filaree (*Erodium cicutarium*), and Russian thistle (*Salsola tragus*). An entire list of species observed in the project area is included in Appendix B.

There are a few very small and disparate sand dunes in the western portion of the survey area where different plants were observed specific to that type of habitat, such as desert sand verbena (*Abronia villosa*). Also, there is a rocky habitat in the southeast corner of the site, which provides distinctive wildlife habitat (Appendix B).

3.2.3.1 Special-status Flora

Special-status flora species of interest include the following:

- Species listed as threatened, endangered, proposed for listing, or candidate for listing under the ESA

- Species designated by the Bureau of Land Management (BLM) as sensitive that require special management consideration
- Species designated by USFWS as Species of Concern, representing those species formerly designated as candidates for listing as endangered or threatened, but for which information is insufficient to make a determination
- Species listed as threatened or endangered under the CESA by CDFW
- Species designated by the California Native Plant Society (CNPS) as Category 1B (rare, threatened, or endangered in California and elsewhere) or Category 2 (rare, threatened, or endangered in California, but more common elsewhere)

No sensitive or rare native plant species were identified within the project area during the field survey.

3.2.3.2 Special-status Species Descriptions

One federally endangered plant species has been identified on Fort Irwin. USFWS listed the Lane Mountain milkvetch as endangered on October 6, 1998. The species is also designated as CNPS Category 1B. Lane Mountain milkvetch occurs in Joshua tree woodland, mixed Mojave scrub, and creosote bush scrub in poorly developed sandy or granitic gravely soils. Known populations of Lane Mountain milkvetch typically occur at elevations ranging from 3,100 to 4,200 feet above mean sea level (amsl) and generally occur in areas of small ridges, shallow bedrock, and granitic soils. Known occurrences are in Mojave creosote bush scrub and Mojave mixed woody scrub communities with diverse shrub assemblages. Lane Mountain milkvetch is weakly erect and almost exclusively occurs growing up through shrubs or occasionally through clumps of dead bunchgrass, including species such as turpentine broom (*Thamnosma montana*), bursage, Eastern Mojave buckwheat (*Eriogonum fasciculatum*), Cooper's goldenbush (*Ericameria cooperi*), and Nevada jointfir (*Ephedra nevadensis*) for support (Army, 2006).

Three major populations of Lane Mountain milkvetch have been mapped on Fort Irwin within a 21,000-acre area, mostly within the Western Expansion Area, which is in the western portion of Fort Irwin. All three populations are more than 10 miles from the proposed project area (Army, 2006). The highest elevation within and near the proposed project area is less than 2,950 feet amsl, which is lower than the typical elevations at which this species typically occurs. Lane Mountain milkvetch prefers a diverse assemblage of plants within its habitat, whereas the plant diversity within or near the project area is low, due to a high level of degradation and sparse vegetation cover. This species was not observed during the field surveys, and Lane Mountain milkvetch would not be expected to occur on or near the project area (Appendix B).

The alkali mariposa lily (*Calochortus striatus*) is a federal Species of Concern and is a CNPS Category 1B species. The alkali mariposa lily occurs in creosote brush scrub communities in the Mojave Desert and occurs in the California Mojave Desert in small scattered populations in Kern, Los Angeles, and San Bernardino counties. The Alkali mariposa lily grows in alkaline meadows and moist creosote bush scrub plant communities where it flowers in the spring from April to June at elevations ranging from 230 to 5,230 feet amsl. The alkali mariposa lily has been observed at Two Springs and at Paradise Springs, which are not near the project area (Army, 2006). This species was not observed during the field surveys and would not be expected to occur within the project area due to lack of habitat.

Populations of Clokey's cryptantha (*Cryptantha clokeyii*) are uncommon but occur in rocky areas surrounding Superior Valley and Paradise Valley, both outside of Fort Irwin. This species is a small annual in the Boraginaceae family and is designated as CNPS Category 1B. Plants typically occur in gravelly areas of course colluvium substrate, most frequently on upper slopes within creosote bush scrub communities in the Mojave Desert from elevations of 2,625 to 4,200 feet amsl. This plant was not observed during

field surveys, and is unlikely to occur due to the marginally suitable habitat in the project area. This species is not known to occur near the project area.

The desert cymopterus (*Cymopterus deserticola*) is BLM-designated as sensitive and a CNPS Category 1B species. This herbaceous perennial in the carrot family (Apiaceae) typically occurs on deep, loose, well-drained sandy soil in alluvial fans and basins. The desert cymopterus also occurs on stabilized low sand dune areas and occasionally on sandy slopes. A population of desert cymopterus has been documented in the Superior Valley, just south of the Naval Air Weapons Station (NAWS) China Lake boundary. Several additional populations, estimated to contain several thousand plants, have been observed in the Superior Valley (Army, 2006). A 346-acre area within the Western Expansion Area has been designated as Desert Cymopterus Conservation Area. This conservation area contains at least 366 individuals of the species and is more than 10 miles west of the project area (Army, 2006). This plant has a moderate potential to occur within the northwest region of the project where there are small sand dunes, but it was not observed during the field surveys. The survey conducted in March of 2016 was during the blooming period for desert cymopterus, but the species was not observed. Therefore, this plant is not expected to occur in the project area.

The Barstow woolly sunflower (*Eriophyllum mohavense*) is a federal Species of Concern, a BLM-designated sensitive species, and a CNPS Category 1B species. Barstow woolly sunflower is a small annual in the sunflower family (Asteraceae) and typically occurs in creosote bush scrub adjacent to, or within, an overstory of Joshua trees and saltbush scrub. The Barstow woolly sunflower occurs in open, flat, barren sites, most commonly on the sandy margins of alkali depressions distributed among the more common creosote bush plant community. The range of the Barstow woolly sunflower is limited to the west-central Mojave Desert. All known locations of Barstow woolly sunflower are south, southwest, and west of Fort Irwin, with the closest known population on Coolgardie Mesa, approximately 5 miles from Fort Irwin (Army, 2006). This species is not known or expected to occur on or near the project area due to a lack of habitat.

The Mojave monkeyflower (*Mimulus mohavensis*) is a federal Species of Concern and a CNPS Category 1B species. An annual plant, the Mojave monkeyflower is a member historically placed in the figwort family (Scrophulariaceae), although recent evidence indicates it should more correctly be placed in the lopseed family (Phrymaceae). Mojave monkeyflower occurs in Joshua tree woodland and creosote bush scrub, primarily in granitic soils on gravelly banks of desert washes, in sandy openings between creosote bushes and along badland slopes above washes (areas that are not subject to regular water flows). The species range is within the Mojave Desert of California, generally occurring south of Fort Irwin, with the highest density of occurrence in areas just south of Daggett and Barstow. There have been no recorded occurrences of the Mojave monkeyflower on or near Fort Irwin (Army, 2006). This species was not observed within the project area and would not be expected to occur within the project area due to lack of suitable habitat and because the habitat within the project area is degraded.

The small-flowered androstephium (*Androstephium breviflorum*) is a CNPS Category 2 species. Small-flowered androstephium is a white-flowered perennial herb of the lily family (Liliaceae). In California, small-flowered androstephium primarily occurs in open sandy flats and in bajadas at low to moderate elevations (Army, 2006). This species does not occur on the project area and is not known to occur in the vicinity.

3.2.3.3 Field Survey Results

None of the rare or endangered plants with a potential to occur in the project area were observed within the construction limits of the Proposed Action. The construction area is unlikely to provide suitable habitat for any of the rare or endangered plants species, due to the level of previous disturbance and the recurring disturbances from human activity.

3.2.4 Fauna

Wildlife typical of Fort Irwin includes a variety of species adapted to the xeric conditions and sparse cover characteristic of desert scrub habitats. Isolated seeps and springs provide perennial sources of water and support vegetative cover, leading to increased wildlife diversity in these areas. Rocky terrain provides additional cover and habitat for various reptile, rodent, bat, and bird species. Playas may support seasonal wetlands or pools with brine shrimp (*Artemia* sp.), which in turn may support migratory waterbirds. Lack of specialized aquatic habitat contributes to the absence of native amphibian and fish populations on the installation.

Game species include quail (*Callipepla* sp.), dove (*Zenaida macroura*), chukar (*Alectoris chukar*), desert cottontail rabbit (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), and coyote (*Canis latrans*). Larger mammals that may occur in the Fort Irwin area include badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), grey fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*).

Abandoned mines, natural caves, trees, and built structures throughout the installation provide potential roosting habitat for bats. Bats may use cliff faces and rocky ledges of mountain ranges as roosting sites, and bats also may use Joshua trees as night roosts. The western pipistrelle (*Pipistrellus hesperus*) and California myotis (*Myotis californicus*) are the most common bat species on Fort Irwin.

3.2.4.1 General Wildlife

Wildlife Habitat

The proposed project area would provide marginally suitable habitat for wildlife species. Several roads and tank trails cross the project area, which are used for military training activities. The amount of human activity would likely limit the use of the project area by wildlife, except for those adapted to human activity. The rocky terrain of the Tiefort Mountains provide habitat for many reptile, rodent, and bird species. Along with different vegetation communities that normally occur with increasing elevation in these ranges, differences in slope and aspect result in microhabitats that support different wildlife species. Notable species that occur in these areas include bats, which rely on rock outcrops for roosting sites, and raptors, which use cliff faces and rocky ledges for roosting or nesting.

Mammals

Small mammals potentially occurring within the cantonment and project area would include common species such as black-tailed jackrabbit, desert cottontail, and white-tailed antelope ground squirrel (*Ammospermophilus leucurus*), kangaroo rats (*Dipodomys* spp.), pocket mice (*Chaetodipus formosus*, *Chaetodipus penicillatus*, and *Perognathus* spp.), and field mice (*Peromyscus* spp.). Desert woodrat (*Neotoma lepida*) and Botta's pocket gopher (*Thomomys bottae*) are common on Fort Irwin and could occur in the project area. Wild burros (*Equus asinus*) were not observed in the project area, but could forage within the project area. Coyote are known to occur, as well as the kit fox. Coyote and kit fox that inhabit the area have most likely become acclimated to training activities. Nelson's desert bighorn sheep (*Ovis Canadensis nelson*) are known to occur in the northeastern portion of Fort Irwin. The western pipistrelle and California myotis could forage within the project area, but would be unlikely.

Birds

Common bird species potentially occurring in or near the project area include the American robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), house sparrow (*Passer domesticus*), black-throated sparrow (*Amphispiza bilineata*), rock wren (*Salpinctes obsoletus*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), and greater roadrunner (*Geococcyx californianus*). Habitat within and near the project area would provide suitable nesting and foraging habitat for common bird species adapted to arid conditions.

Additional species could occur as migrants within the project area. Some common species include the yellow-rumped warbler (*Dendroica coronata*), Hutton's vireo (*Vireo huttoni*), cliff swallow (*Hirundo pyrrhonata*), ruby-crowned kinglet (*Regulus calendula*), and white-crowned sparrow (*Zonotrichia leucophrys*). Raptors that have been observed on Fort Irwin include red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), golden eagles, and prairie falcons (*Falco mexicanus*); however, due to the lack of suitable habitat and degree of human presence, use of the project area would likely be limited to foraging activities. It is unlikely the barn owl (*Tyto alba*) would occur within the project area. Burrowing owl suitable habitat was observed in the southeast portion of the project area where there is rocky terrain suitable for nesting. However, no burrowing owl burrows, sign, or activity were observed during the field survey within or adjacent to the project area.

Reptiles and Amphibians

The project area consists of marginally suitable habitat for most reptile species. Some common species around the cantonment include common lizards, such as zebra-tailed lizards (*Callisaurus draconoides*), side-blotched lizards (*Uta stansburiana*), desert spiny lizard (*Sceloporus magister*), and western whiptails (*Cnemidophorus tigris*). Lesser common species include the desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*), and desert iguana (*Dipsosaurus dorsalis*).

Common snake species include the coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), western patch-nosed snake (*Salvadora hexalepis*), western shovel-nosed snake (*Chionactis occipitalis*), and Mojave sidewinder (*Crotalus cerastes*). Other species that could occur include the blind snake (*Leptotyphlops humulis*), ground snake (*Sonora semiannulata*), southwestern speckled rattlesnake (*Crotalus mitchellii pyrrhus*), and the northern Mojave rattlesnake (*Crotalus scutulatus*).

The desert tortoise occurs in varying densities throughout Fort Irwin and the surrounding area and have been known to occur within and around Tiefort City on occasion. One inactive desert tortoise burrow was observed within the project area during the field survey (Appendix B).

3.2.4.2 Special-status Fauna

Following are special-status faunal species considered:

- Species listed as threatened, endangered, proposed for listing, or candidate for listing under the ESA
- Species designated by BLM as sensitive that require special management consideration
- Species designated by USFWS as Species of Concern, representing those species formerly designated as candidates for listing as endangered or threatened, but for which information is insufficient to make a determination
- Species listed by CDFW as threatened or endangered under the CESA
- Species designated by CDFW as Species of Special Concern

The remainder of this section discusses special-status species that have potential to occur at Fort Irwin.

Birds

Peregrine Falcon (*Falco peregrinus anatum*)

This subspecies was delisted from federal endangered status in August 1999; however, it is state endangered. This subspecies of peregrine falcon occurs primarily in the western United States. During winter, they occur throughout most of California. Summer range is more restricted to northern California, along the coast from Santa Barbara northward, and in the Sierra Nevada Mountains. Peregrines typically nest on high cliffs or, less commonly, on buildings and structures in urban areas. The species forages over wetlands or other habitats with large concentrations of birds, which are their primary food source. Peregrines are uncommon winter migrants to the West Mojave. This subspecies

would not be expected to occur within the project area but could use the habitat within and adjacent to the project area for foraging.

Southwestern Willow Flycatcher *(Empidonax traillii extimus)*

This species was listed as federally endangered in 1995. Southwestern willow flycatcher breeds in riparian woodland habitats with willows (*Salix* sp.), cottonwoods (*Populus* spp.), and/or alders (*Alnus* spp.). Scattered records exist of this species occurring at various locations throughout Fort Irwin; however, in all cases, the observations represented transient birds detected during spring and fall migration at springs and along riparian areas. While the southwestern willow flycatcher is a summer resident in the region, the species is not expected to breed at Fort Irwin because of a lack of appropriate habitat. There is no suitable habitat for this species within the project area and it would be highly unlikely that this species would occur within the project area.

Least Bell's Vireo (*Vireo bellii pusillus*)

This species was listed as federally endangered in 1986. The least Bell's vireo is a summer resident in the region and breeds in riparian habitat, preferring areas of dense mulefat (*Baccharis salicifolia*) with an overstory of willows. In 1986, a least Bell's vireo was observed on Fort Irwin at Bitter Springs. This species is not expected to occur regularly at Fort Irwin because of the lack of suitable habitat; however, it may occur near springs for brief periods during migration. There are no springs located on or near the project area; therefore, it would be highly unlikely that this species would occur within the project area.

Burrowing Owl (*Athene cunicularia*)

Burrowing owl is a California Species of Special Concern and is protected under the MBTA. The burrowing owl's nesting habitat consists of open areas with mammal burrows. Habitats include dry, open, rolling hills, grasslands, fallow fields, sparsely vegetated desert scrub with gullies, washes, arroyos, and edges of human-disturbed lands. This species has been known to inhabit golf courses, airports, cemeteries, vacant lots, and road embankments, wherever there is sufficient friable soil for a nesting burrow. In addition to burrows, burrowing owls also require perching locations and frequently use fence posts or the top of mounds outside the burrow. Burrowing owls typically use burrows created by other animals, such as prairie dogs, kangaroo rats, ground squirrels—and especially burrows constructed by California ground squirrels, kit foxes, and desert tortoises. There is suitable habitat for this species in the far southeastern portion of the site; therefore, there is potential for it to occur within the project area. However, this species was not observed or flushed during field surveys, and no burrows were observed within or adjacent to the project area. The nearest siting of this species based on historical geographic information system (GIS) data collected by Fort Irwin is over three miles west of the project area during the summer of 2011 (Fort Irwin, 2016a). There is potential that this species could occur in the project area.

Golden Eagle (*Aquila chrysaetos*)

Golden eagle is classified as a fully protected species. This classification represents the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. This species is also protected by the Bald and Golden Eagle Protection Act and MBTA. The species is an uncommon permanent resident and migrant throughout California and ranges from sea level up to 11,500 feet. Suitable habitat includes rolling foothills, mountain areas, sage-juniper flats, and desert. Golden eagles nest on cliffs and steep escarpments in grassland, chaparral, shrubland, forest, and other vegetated areas. Golden eagle (*Aquila chrysaetos*) nests have been identified within three miles of the project area (Appendix B). This species was not observed during the natural resource survey. However, the project area offers suitable foraging habitat and golden eagle likely forage on the site and in the surrounding area, as two golden eagle nests (one active this year) were observed in spring 2016 in the Tiefort Mountains approximately three miles southwest (Appendix B). Therefore, this species could forage within the project area but there is no suitable nesting habitat.

Prairie Falcon (*Falco mexicanus*)

Prairie falcon is a USFWS Bird of Conservation Concern and is on the CDFW Watch List. This species is also protected by the MBTA. Prairie falcon is an uncommon permanent resident that ranges from southeastern deserts northwest throughout the Central Valley and along the inner Coast Ranges and Sierra Nevada. They are distributed in habitats from annual grasslands to alpine meadows, but primarily inhabit perennial grasslands, savannah, rangeland, and some agricultural fields. Prairie falcons are mostly absent from the coastal fog belt and are not found in upper elevations of the Sierra Nevada. They typically nest in a scrape on a sheltered ledge of a cliff overlooking a large, open area. The species would not be expected to nest within the proposed project area and was not observed during the natural resources survey. The site offers suitable foraging habitat and the prairie falcon likely uses the habitat within and adjacent to the project area for foraging. An active prairie falcon nest was observed in spring 2016 in the Tiefort Mountains approximately 4.4 miles southwest of the study area (Appendix B).

LeConte's Thrasher (*Toxostoma lecontei*)

LeConte's thrasher is a California Bird Species of Special Concern, as defined by CDFW, and is protected by the MBTA. Its home range is in saltbush-cholla scrub, where the majority of shrubs rarely exceed eight feet in height, except for isolated desert trees, yuccas, or tall, thin shrubs. Its preferred habitat generally consists of sparsely vegetated desert flats, dunes, alluvial fans, or gently rolling hills having a high proportion of one or more species of saltbush or shadscale and/or cylindrical cholla cactus. LeConte's thrasher rarely occurs in habitats consisting entirely of creosote bush. This species was not observed during the natural resource survey and is not expected to occur on the site, as the habitat is only marginally suitable (Appendix B).

Loggerhead Shrike (*Lanius ludovicianus*)

Loggerhead shrike is a California Species of Concern and is protected by the MBTA. This species is relatively common in lowland California and prefers open habitat with scattered shrubs and trees for nesting. A small amount of marginally suitable foraging habitat for this species occurs within the project area, mostly along the southeastern edge. Suitable nesting habitat is very rare. No loggerhead shrikes were observed onsite during the survey; however, there is a low potential for the species to occur, as minimal marginally suitable foraging habitat is present and loggerhead shrikes have been observed by Fort Irwin biologists in the nearby area (Appendix B).

California Black Rail (*Laterallus jamaicensis coturniculus*)

This species was listed as state threatened in 1971. The California black rail is an uncommon, local resident of marshes, swamps, and wet meadows. A black rail was observed at the wastewater treatment plant (WWTP) evaporation and percolation ponds at Fort Irwin during fall 1994, but it has not been observed on the installation since. The occurrence of this species in the central Mojave Desert is extremely unusual, and it would be highly unlikely to occur in the proposed project area because of the lack of suitable habitat.

Swainson's Hawk (*Buteo swainsoni*)

This species was listed as state threatened in 1983. Swainson's hawk was once a widespread breeder in the nonforested areas of northern California and the Central Valley. This species is migratory and is not expected to occur regularly at Fort Irwin or forage in the area for prolonged periods. Swainson's hawk has been observed at Bitter Springs, but it would be unlikely for the species to use the project area.

Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)

The yellow-headed blackbird (*Xanthocephalus xanthocephalus*) is a California Species of Concern and is protected by the MBTA. The species generally occurs in California as a migrant or summer resident, but small numbers winter in the southern deserts. Preferred breeding habitat includes marshes and wetlands with tall emergent vegetation, and the blackbird may forage in surrounding wetlands,

grasslands, and croplands. Yellow-headed blackbirds breed at scattered sites throughout the Mojave Desert. Small numbers breed regularly near Victorville, Barstow, and Newberry Springs in San Bernardino County. Marginally suitable foraging habitat for this species occurs within the project area, but no suitable nesting habitat occurs. The yellow-headed blackbird was not observed on the site during the survey; however, it has been observed on Fort Irwin so there is a moderate potential for the species to occur on the project site (Appendix B).

Reptiles

Mojave Fringe-toed Lizard (*Uma scoparia*)

The Mojave fringe-toed lizard is a CDFW-designated Species of Special Concern and a BLM-designated sensitive species. This species is endemic to southern California and a small area of western Arizona, where it is restricted to aeolian sand habitats in the deserts of Los Angeles, Riverside, and San Bernardino Counties in California and La Paz County in Arizona. Mojave fringe-toed lizards are restricted to areas with fine, aeolian sand, including both large and small dunes, margins of dry lakebeds and washes, and isolated pockets against hillsides. The loose wind-blown sand habitat upon which the Mojave fringe-toed lizard depends is a fragile ecosystem requiring protection against both direct and indirect disturbances. The Mojave fringe-toed lizard is known to occur near Bitter Springs, in the dunes just east of Red Pass Lake, and the sand sheets on the west side of a large rock formation known as the "whale" (Army, 2006). This species is not expected to occur within the project area due to a lack of suitable habitat (Appendix B).

Desert Tortoise (*Gopherus agassizii*)

This species was listed as federally threatened in 1990. USFWS determined that the Mojave population of the desert tortoise warranted listing in response to documented population declines over large portions of its range due to a number of reasons, including upper respiratory tract disease exacerbated by the stress of several drought seasons, loss of habitat, predation by ravens, livestock grazing, and direct disturbance by humans.

The Desert tortoise is a large, herbivorous reptile that occurs throughout much of the Mojave and Sonoran deserts; its range roughly approximates the distribution of creosote bush scrub. The desert tortoise is active in the spring, summer, and autumn when daytime temperatures are below 90 degrees Fahrenheit (°F). Most activity occurs during spring and early summer.

The desert tortoise is well studied at Fort Irwin, with the distribution and estimated sizes of populations documented throughout the installation. The desert tortoise occurs throughout Fort Irwin in low numbers, with the highest concentration, historically, along the southern boundary (Army, 2006). Historical Fort Irwin GIS data of live and dead desert tortoise occurrences ranging from 1994 to 2015 indicate that seven live and three dead desert tortoises were observed within a one-mile buffer of the proposed project area during this period (Fort Irwin, 2016b). The most recent siting of a desert tortoise within the one-mile buffer was on June 28, 2010, near the southeastern edge of the project area. One desert tortoise has been observed within the project area, which occurred on June 23, 2010 (Appendix B).

Surveys for desert tortoise were conducted at the project area in accordance with the *Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats* (USFWS, 2010). No recent sign of this species were observed during the field survey. The desert tortoise has been observed in low densities on land in and around the project area. With relatively low cover and density of preferred vegetation, and high degree of disturbance, the project area would provide marginally suitable habitat for the desert tortoise. During field surveys of the project area, one inactive desert tortoise burrow was observed. Because desert tortoise have historically been observed in and around the project area, and because the project would provide marginally suitable habitat, there is potential for the desert tortoise to occur in the project area.

Mammals

Mohave Ground Squirrel (*Xerospermophilus mohavensis*)

This species was listed as state threatened in 1971. Mohave ground squirrel generally occurs in habitat that consists of large alluvial-filled valleys with deep, fine- to medium-textured soils vegetated with creosote scrub, shadscale scrub, or alkali sink scrub with an absence of desert pavement and shallow eroded soils. Mohave ground squirrel populations at Fort Irwin are known from the Goldstone area and immediately east of the Gary Owen impact area (Army, 2006). Fort Irwin maintains a geospatial database of all known sightings of this species on the installation. Most sightings were from trapping surveys conducted on Fort Irwin.

This species is not known to occur in the project area. The nearest Mohave ground squirrel population is over 15 miles west of the project within the NASA/Goldstone complex. Populations of this species have not been observed east of this population since the 1980s (Fort Irwin, 2015b). An individual Mohave ground squirrel was observed approximately 3.4 miles west of the project area in 1977 northeast of Bicycle Lake (Fort Irwin, 2016c). The habitat and vegetation within and near the project area has been degraded from previous training activities and would not provide suitable habitat for the species. The landscape within the project area is not typically preferred by the Mohave ground squirrel. In addition, the habitat in and near the proposed project area does not include the presence of spiny hopsage (*Grayia spinosa*), winterfat (*Krascheninnikovia lanata*), or freckled milk-vetch (*Astragalus lentiginosus*), which are primary food sources for the species (Army, 2006; Appendix B). This species was not observed during the field survey and is not known to occur in or nearby to the project area. The Mohave ground squirrel is unlikely to occur within the project area due to there being low-quality habitat (Appendix B).

Desert Kit Fox (*Vulpes macrotis arsipus*)

This species is not currently listed, but the status of this species is currently under review in California and is considered vulnerable from habitat displacement due to the continued expansion of solar and wind projects into its preferred habitat. Kit fox generally prefer open desert, shrubby, or shrub-grass habitat. In the Mojave Desert it typically occurs in creosote bush. This nocturnal species forages at night and typically resides in a den/burrow during the day, which is where young are born (NatureServe, 2015). This species is known to occur in the vicinity of Tiefort City. No active burrows were observed during field surveys; however, it is likely that kit fox use the project area for foraging.

3.2.4.3 Field Survey Results

Wildlife observations were limited, likely due to the degree of human presence and previous disturbances. Commonly observed wildlife included species such as the antelope ground squirrel, black-tailed jackrabbit, horned lark, turkey vulture (*Cathartes aura*), California whiptail, and zebra-tailed lizard. Wildlife tracks were observed for coyote, desert kangaroo rat (*Dipodomys deserti*), and desert pocket mouse. A full list of faunal species observed is provided in Appendix B.

No sensitive faunal species were observed during the October 2015 and May 2016 field surveys. There is potential for the burrowing owl, golden eagle, prairie falcon, yellow-headed blackbird, desert tortoise and desert kit fox to occur in the project area. Use of the project area likely would be limited to foraging activity or transit due to lack of suitable nesting habitat and ongoing military training activities.

3.2.4.4 Pest Species

Common ravens (*Corvus corax*) are native in the Mojave Desert and were observed in the project area during the biological surveys. The number of ravens has increased substantially as a result of expanding human use of the desert. Raven populations have grown beyond the natural carrying capacity of the desert environment because of resources provided by humans. Because ravens are known to prey on juvenile desert tortoises, increased populations of ravens could have negative effects on desert tortoise populations at Fort Irwin (Army, 2006).

3.3 Water Resources

This section describes water resources, both surface and ground, within the project area.

3.3.1 Surface Water

Surface water resources are scarce at Fort Irwin and its surrounding region. Washes descending from mountains and other elevated landforms provide intermittent channels that route stormwater runoff into basins to store water until percolation or evaporation occurs. All streams are intermittent, and naturally occurring standing water is ephemeral, evident only during and immediately after heavy rains. Substantial water flow and accumulation takes place only during greater-than-normal storm events, which are expected to occur approximately once every 10 years (Army, 2006). Large storm events typically occur in the summer months in the form of monsoon thunderstorms, which can cause three to four inches of rain within 24 hours, and often within six hours (AFCCC, 2004).

Alluvial fans are a common landform in and around Fort Irwin. Bedload material composed of sand, gravel, cobbles, and rocks is deposited in alluvial fans during heavy rainfall events. Significant subsurface flows may occur in the unconsolidated sand and gravel channel deposits in washes and alluvial fans, even after surface flows have ceased. Water may pool along washes or in shallow ephemeral lakes, and either percolates to the groundwater or evaporates (Army, 2006).

Fort Irwin has six springs that produce small quantities of water and four intermittent springs that produce little to no water during the summer, depending on the seasonal amount of rainfall (Army, 2006). No springs are located in the immediate vicinity of the project area.

3.3.1.1 Project Area

The project area is on a broad alluvial fan within the Red Pass Lake-Salt Creek watershed. The watershed comprises large sub-basins with streams in long valleys and smaller drainages along the mountain slopes with steep flash flood topography. In general, the watershed drains to the east and south to Red Pass Lake. Red Pass Lake is an isolated, dry lake where runoff collects and either infiltrates to the groundwater or evaporates (USACE, 2014).

There are multiple drainages within the project area. The main drainage within the project area is Tiefort Wash. This wash extends approximately 2.4 miles south of Tiefort City and flows to the north along the western side of the mock city near the mock prison. The wash lacks riparian vegetation and has been impacted by military training activities. Evidence of off-road maneuvers within the wash was prevalent. Edges of the wash are indistinguishable throughout much of the project area (Appendix B).

A flood study was conducted on drainages with potential to directly affect Tiefort City. The flood study modeled 10-year, 25-year, 50-year, and 100-year flood events. The 100-year flood event is shown on Figure 2-1. Tiefort Wash collects runoff from the mountains south of Tiefort City and flows to the north. Runoff is concentrated along the western side of the mock city. Smaller drainages south of Tiefort City flow through the central and eastern portions of the mock city. The flow eventually fans out north of Tiefort City (Figure 2-1). The flood study indicates that flows from a 100-year flood event in Tiefort Wash and flows emanating from drainages to the south inundate and deposit sediments throughout Tiefort City.

Flood events deposit sediments from steep upland areas to where the grade of the wash or drainage substantially changes and/or flattens out. Bedrock formations along the western portion of Tiefort Wash confine runoff and increase the velocity of the flow. The largest sub-basin in the study area is estimated to yield approximately 116-acre feet of sediment and debris during a 100-year flood event (USACE, 2014).

The State of California regulates waters that may not be regulated by USACE. These are “Waters of the State of California” under the Porter-Cologne Water Quality Control Act (California Water Code,

Division 7), effective January 1, 2014. Tiefort Wash would be considered a state water under the Porter-Cologne Water Quality Control Act.

3.3.1.2 Waters of the United States Including Wetlands

Waters of the United States include rivers, streams, estuaries, and most ponds, lakes, and wetlands. The CWA delegates authority over Waters of the United States to USACE and the U.S. Environmental Protection Agency (EPA). Wetlands are transitional areas between terrestrial and aquatic systems. As defined by USACE and EPA, wetlands must have one or more of the following three attributes:

- At least periodically, the land supports predominantly hydrophytes.
- The substrate is predominantly undrained hydric soil.
- The substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

No wetlands or other Waters of the United States occur within or near the project area, as evidenced by the lack of hydrophytic vegetation, hydric soil, or standing shallow water.

Guidelines for arid regions state that the presence of native riparian species in a dry wash indicates that the stream channel usually exhibits surface flow during small and moderate storm events (Army, 2006). No washes that meet the conditions specified in the USACE guidelines were identified within the project area.

3.3.1.3 Jurisdictional Determination

There are no waters subject to regulation under Section 404 of the CWA in the project area.

3.3.2 Groundwater

The groundwater basin within the project area is not used by Fort Irwin and therefore there is no information available on the conditions of the groundwater in this area. Generalized groundwater conditions can be made based on the known distribution of rock units within the study area and the ability of these rock units to influence groundwater conditions. It is assumed that readily accessible groundwater would be contained mainly in deep alluviated basins. The capacity of these basins would depend on the depth of quaternary surficial deposits and the elevation of underlying basement rocks. The occurrence and orientation of faults extending from the basement rock to overlying deposits can create barriers to groundwater flow. Basement rock can act as buried ridges that create a barrier to groundwater as well. It is likely that the groundwater basin in the project area is isolated from other groundwater basins (USACE, 2014).

Fort Irwin monitors the quality of its groundwater because it is the only source for drinking water. Fort Irwin withdraws water from the Fort Irwin, Bicycle Lake, and Langford Lake groundwater basins. Water from wells in all three basins has high fluoride concentrations, with 90 percent of all wells sampled having fluoride above the California maximum contaminant level of two milligrams per liter. Arsenic has been detected at concentrations above the state maximum contaminant level of 10 micrograms per liter in 80 percent of the wells sampled. Potential sources of both fluoride and arsenic are the volcanic rocks common to the area. It is possible that the condition of groundwater in the project area would be similar to that found in the Fort Irwin, Bicycle Lake, and Langford Lake basins.

3.4 Air Quality

This section describes air quality at Fort Irwin and in the Mojave Desert region and discusses regulatory considerations.

3.4.1 Regulatory Setting

3.4.1.1 Federal

Federal air quality policies are regulated through the federal CAA. Pursuant to this act, EPA has established NAAQS for the following air pollutants (termed "criteria" pollutants): carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter defined as particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), fine particulate matter defined as particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), and lead (Table 3-2).

TABLE 3-2
Ambient Air Quality Standards
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Criteria Pollutant	Federal Standard (Averaging Period)[a]	Federal Attainment Status	State Standard (Averaging Period)[b]	State Attainment Status
CO	35 ppm (1 hour)	Attainment	20 ppm (1 hour)	Attainment
	9 ppm (8 hours)	Attainment	9 ppm (8 hours)	Attainment
NO_2	0.100 ppm (1 hour)	Attainment	0.18 ppm (1 hour)	Attainment
	0.053 ppm (annual arithmetic mean)		0.030 ppm (annual arithmetic mean)	
O_3	0.070 ppm (8 hours)	Attainment [c]	0.070 ppm (8 hours)	Nonattainment
			0.09 ppm (1 hour)	Nonattainment
$PM_{2.5}$	12 μg/m³ (annual arithmetic mean)	Unclassified/ Attainment	12 μg/m³ (annual arithmetic mean)	Nonattainment
	35 μg/m³ (24 hours)[d]	Unclassified/ Attainment	No separate standard (24 hours)	
PM_{10}	–	NA	20 μg/m³ (annual arithmetic mean)	Nonattainment
	150 μg/m³ (24 hours)	Nonattainment	50 μg/m³ (24 hours)	Nonattainment
SO_2	--	--	0.04 ppm (24 hours)	Attainment
	0.5 ppm (3 hours, secondary standard)	Unclassified/ Attainment	--	--
	0.075 ppm (1 hour) [d]	Unclassified	0.25 ppm (1 hour)	Attainment
Lead [e]	0.15 μg/m³ (rolling 3-month average)	Attainment	1.5 μg/m³ (30-day average)	Attainment
Sulfates	No federal standards		25 μg/m³ (24 hours)	Attainment
Hydrogen sulfide			0.03 ppm (1 hour)	Unclassified
Vinyl chloride[e]			0.01 ppm (24 hours)	Attainment
Visibility-reducing particles			Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent	Unclassified

Sources: ARB, 2013; EPA, 2015.

TABLE 3-2
Ambient Air Quality Standards
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Criteria Pollutant	Federal Standard (Averaging Period)[a]	Federal Attainment Status	State Standard (Averaging Period)[b]	State Attainment Status

$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million, by volume
NA = not applicable

Notes:
[a] National standards other than O_3, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, is equal to or less than the standard.
[b] California standards for O_3, CO, SO_2 (one-hour and 24-hour), NO_2, and suspended particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded.
[c] The southern portion of the installation (below the 90 Universal Transverse Mercator [UTM] grid line) is designated nonattainment for O_3 for federal standards.
[d] To attain this standard, the three-year average of the 99th percentile of the daily maximum one-hour average at each monitor within an area must not exceed 75 parts per billion.
[e] The California Air Resources Board (ARB) has identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure for adverse health effects determined. This determination was made following the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

The act was amended in 1977 to require each state to maintain a SIP for achieving compliance with the NAAQS. In 1990, the act was amended again to strengthen regulation of emissions from both stationary sources and motor vehicles. The CAA also requires EPA to designate areas (counties or air basins) as attainment or nonattainment with respect to each criteria pollutant, depending on whether the area meets NAAQS. An area that is designated nonattainment does not meet one or more NAAQS, and is subject to planning requirements to attain the standard. Conformity of a proposed action to the required planning documents or SIP is defined under the 1990 CAA amendments as conformity with the plan's purpose in eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of these standards.

Under the 1990 CAA amendments, EPA issued two types of SIP conformity guidelines: (1) transportation conformity rules that apply to transportation plans and projects and (2) general conformity rules that apply to all other federal actions. The following sections discuss general conformity and how these requirements apply to the Proposed Action.

General Conformity

EPA has issued regulations addressing the applicability and procedures for ensuring that federal activities comply with the amended CAA. The EPA Final Conformity Rule requires federal agencies to ensure that federal actions resulting in nonattainment or maintenance criteria pollutant emissions conform to an approved or promulgated state or federal implementation plan. This ensures that a federal action would not meet any of the following criteria:

- Cause a new violation of the NAAQS
- Contribute to any increase in the frequency or severity of violations of existing NAAQS
- Delay the timely attainment of any NAAQS interim or other attainment milestones

Applicability of General Conformity to the Proposed Action

The Proposed Action would include approval by a federal agency and would be in a federal nonattainment area for PM_{10}, so general conformity applies to the Proposed Action. If a project would result in a total net increase in direct and indirect emissions of nonattainment or maintenance pollutants and the emissions of those pollutants are less than the applicable *de minimis* thresholds established in 40 CFR 93.153(b), then detailed conformity analyses are not required pursuant to 40 CFR 93.153(c).

The net emissions increase includes evaluating stationary sources, area sources, and mobile sources that result from the federal action and are not covered by another permitting program. Revisions to the General Conformity Rule effective on July 6, 2010, removed the regionally significant emissions test from the applicability determination; therefore, this test was not included in the applicability determination for the Proposed Action.

3.4.1.2 State

California established air pollution control programs before federal requirements were enacted. Responsibility for air quality management programs in California is divided between the California Air Resources Board (ARB), as the primary state air quality management agency, and air pollution control districts, as the primary local air quality management agencies. The ARB oversees air quality policies in California and is responsible for preparing and submitting the SIP to EPA. California established state ambient air quality standards (California Ambient Air Quality Standards [CAAQS]) in 1969. These standards are generally more stringent and include more pollutants than the NAAQS. The California CAA was approved in 1988 and requires each local air district to prepare an air quality plan to achieve compliance with the CAAQS. Similar to EPA, the ARB designates counties in California as attainment or nonattainment with respect to the CAAQS. San Bernardino County, where the Proposed Action would occur, is designated as nonattainment for the state PM_{10}, $PM_{2.5}$, and O_3 ambient air quality standards.

3.4.1.3 Local

The Mojave Desert Air Quality Management District (MDAQMD) has local jurisdiction over the portion of San Bernardino County that includes Fort Irwin and primary responsibility for regulating stationary sources of air pollution within its jurisdictional boundaries. The MDAQMD implements air quality programs required by state and federal mandates, enforces rules and regulations based on air pollution laws, and educates business owners and residents about their role in protecting air quality. The MDAQMD air quality plan applicable to the Proposed Action is the *Federal Particulate Matter (PM_{10}) Attainment Plan* (MDAQMD, 1995). In addition, the Proposed Action must comply with the applicable MDAQMD Rules and Regulations. Construction of the Proposed Action would be subject to MDAQMD Rules 403 and 403.2.

3.4.2 Existing Conditions

San Bernardino County, where Fort Irwin is located, is designated nonattainment for PM_{10} for both federal and state standards. The southern portion of the installation (below the 90 UTM grid line) is designated nonattainment for O_3 for both federal and state standards. The Proposed Action is located north of the federal O_3 nonattainment area; therefore, the project is located in a federal attainment area for O_3.

Air quality at Fort Irwin is influenced by the local climate. The area experiences hot summers, mild winters, infrequent rainfall, and moderate afternoon winds. The average high and low temperatures during the summer at Fort Irwin are 100°F and 70°F, respectively. The average high and low temperatures during the winter are 62°F and 37°F, respectively. Average annual precipitation is approximately 2.5 inches, with most precipitation falling in the winter or during isolated summer thunderstorms.

High particulate matter concentrations in the Mojave Desert are typically the result of wind erosion from exposed or disturbed land areas. Activities at Fort Irwin, such as vehicle travel on unpaved roads and training maneuvers, create fugitive PM_{10} emissions. Fort Irwin has conducted PM_{10} monitoring since 1994 and operates eight PM_{10} monitoring sites within its boundary. Fort Irwin implements standard management practices to reduce particulate emissions, including but not limited to the following:

- Using water for short-term surface stabilization
- Minimizing tracking of dirt onto paved roads
- Covering haul trucks
- Stabilizing sites with chemicals or vegetation
- Paving parking lots
- Placing gravel to control windblown dust

3.4.3 Climate Change and Greenhouse Gases

This section discusses the existing conditions, regulatory background, and potential greenhouse gas (GHG) emissions from the Proposed Action.

3.4.3.1 Existing Conditions

Climate change refers to any significant change in measures of climate, such as temperature, precipitation, or wind, lasting for an extended period (decades or longer). Climate change may result from any of the following conditions (EPA, 2010):

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun
- Natural processes within the climate system (such as changes in ocean circulation)
- Human activities that change the atmosphere's composition (such as burning fossil fuels) and the land surface (such as deforestation, reforestation, urbanization, and desertification)

GHGs include the following pollutants (EPA, 2010):

- Carbon dioxide (CO_2) is a naturally occurring gas and a by-product of burning fossil fuels and biomass, land use changes, and other industrial processes. It is the principal anthropogenic GHG that affects the Earth's radiative balance.
- Methane (CH_4) has a global warming potential approximately 20 times that of CO_2. CH_4 is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
- Nitrous oxide (N_2O) has a global warming potential approximately 300 times that of CO_2. Major sources of N_2O include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
- Hydrofluorocarbons (HFCs) are compounds containing only hydrogen, fluorine, chlorine, and carbon. HFCs have been introduced as a replacement for the chlorofluorocarbons identified as ozone-depleting substances.
- Perfluorocarbons (PFCs) are compounds containing only fluorine and carbon. Similar to HFCs, PFCs have been introduced as a replacement for chlorofluorocarbons. PFCs are used in manufacturing and are emitted as by-products of industrial processes. PFCs are powerful GHGs.
- Sulfur hexafluoride (SF_6) is a colorless gas that is soluble in alcohol and ether and slightly soluble in water. This compound is a very powerful GHG used primarily in electrical transmission and distribution systems, as well as dielectrics in electronics.

3.4.3.2 Regulatory Background

Federal

The EPA Mandatory Reporting Rule became effective on December 29, 2009, and sources required to report were to begin collecting data on January 1, 2010. In general, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of carbon dioxide equivalent (CO_2e) emissions are required to submit annual reports to EPA. The EPA reporting requirements continue to be updated. On November 8, 2010, reporting requirements for petroleum and natural gas systems were finalized.

In addition, the Supreme Court decision in *Massachusetts et al. v. Environmental Protection Agency et al.* (Supreme Court Case 05-1120) found that EPA has the authority to list GHGs as pollutants and to regulate emissions of GHGs under the CAA. On April 17, 2009, EPA found that CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 may contribute to air pollution and may endanger public health and welfare.

State and Regional

In 2006, the California State Legislature signed the Global Warming Solutions Act of 2006 (AB 32), which provides the framework for regulating GHG emissions in California. This law requires the ARB to design and implement emission limits, regulations, and other measures such that statewide GHG emissions are reduced in a technologically feasible and cost-effective manner to 1990 levels by 2020. The statewide 2020 emissions limit is 427 million metric tons of CO_2e (ARB, 2007). CO_2 emissions account for approximately 90 percent of the statewide GHG emissions (ARB, 2007). CH_4, N_2O, HFCs, PFCs, and SF_6 emissions account for the remainder of the statewide GHG emissions (ARB, 2007).

The first regulation adopted by ARB pursuant to AB 32 was the regulation requiring reporting of GHG emissions. The regulation requires large industrial sources emitting more than 25,000 metric tons of CO_2 per year to report and verify their GHG emissions from combustion of both fossil fuels and biomass-derived fuels (ARB, 2008).

3.5 Cultural Resources

This section discusses cultural resources in relation to the proposed project area, which is defined as the area of potential effect (APE). The APE includes the project area. The full cultural survey report is included in Appendix C.

Cultural resources include prehistoric, Native American, and historic. Prehistoric resources are physical properties resulting from human activities that predate written records. Prehistoric resources are generally identified as isolated finds or sites and can include village sites, temporary camps, lithic (stone tool) scatters, roasting pits or hearths, milling features, pictographs or petroglyphs (rock art), rock features, and burial sites.

Native American resources are sites, areas, and materials important to Native Americans for religious, spiritual, or traditional reasons. These resources include villages, burial sites, rock art, rock features, or springs. The belief in the sacred character of physical places, such as mountain peaks, springs, or burial sites, is fundamental to Native American religion. Traditional rituals often prescribe the use of particular native plants, animals, or minerals. Thus, activities that might affect sacred areas, their accessibility, or the availability of materials used in traditional practices are of primary concern.

Historic resources consist of physical properties, structures, or built items resulting from human activities that occurred after European settlement. Historic resources can include archaeological remains and architectural structures. Historic archaeological site types include town sites, homesteads, agricultural or ranching features, mining-related features, refuse concentrations, and features or artifacts associated with early military use of the land. Historic architectural resources include houses, cabins, barns, bridges, and lighthouses; local structures such as churches, post offices, and meeting

halls; and early military structures such as hangars, administration buildings, barracks, officer quarters, warehouses, and guardhouses.

3.5.1 Regulatory Considerations

Cultural resources are protected primarily through the National Historic Preservation Act (NHPA) (16 U.S.C. Sections 470 through 470x-6) and its implementing regulations (found at 36 CFR Part 800). For a cultural site to be considered significant, the site must meet certain criteria that enable the site to be considered eligible for the National Register of Historic Places (NRHP). Section 106 of the NHPA and its implementing regulations require federal agencies to consider the effect of federal undertakings on historic properties that are listed on or eligible for the NRHP. The Section 106 process includes identifying and evaluating historic properties, assessing the effects of the undertaking on those properties, consulting with the State Historic Preservation Office (SHPO) regarding these effects and any actions that might be taken to address them, and providing the Advisory Council on Historic Preservation with an opportunity to comment. The following significance criteria are the basis for determining inclusion of a property on the NRHP (36 CFR 60.4):

- Association with events that have made a significant contribution to the broad patterns of our history
- Association with the lives of persons significant to our past
- Resources that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master or that possess high artistic values, or that represent a significant and distinguishable entity whose component might lack individual distinction
- Resources that have yielded or might be likely to yield information important in prehistory or history

Formerly section 101(d)(6)(B) of the NHPA, amended to chapter 3021 and 2023.01 of title 54, requires the agency official to consult with any Indian tribe that attaches religious and cultural significance to historic properties that may be affected by an undertaking. Significance is defined as the importance of a property to the history, architecture, archaeology, engineering, or culture of a community, a State, or the nation (NPS, 1995). Additionally, the act states that:

> *When Indian tribes and Native Hawaiian organizations attach religious and cultural significance to historic properties off tribal lands, section 101(d)(6)(B) of the act requires Federal agencies to consult with such Indian tribes and Native Hawaiian organizations in the section 106 process. Federal agencies should be aware that frequently historic properties of religious and cultural significance are located on ancestral, aboriginal, or ceded lands of Indian tribes and Native Hawaiian organizations and should consider that when complying with the procedures in this part.*

3.5.2 Project Area Conditions

The Proposed Action would occur in approximately 400 acres of land to the west and south of Tiefort City. An archival review was conducted for the proposed project area and included a search of the South Central Coastal Information Center, a review of historical maps, and consultation with the Fort Irwin Directorate of Public Works (DPW) to review Fort Irwin cultural resource records. The study area of the literature search included the APE, plus a one-mile buffer around the APE to provide context for known archaeological sites. The literature search showed that over 75 percent of the project area had been previously surveyed with the majority of previous study having been conducted over 10 years ago. There were five previously recorded sites and three isolated finds previously recorded within a one-mile buffer of the project area. No archaeological resources or isolated finds were previously documented within the APE (Appendix C).

The APE was surveyed for cultural resources by visually inspecting the ground surface and subsurface exposures on December 8 through 10, 2015, using a survey methodology for prehistoric and historic archaeological resources of pedestrian transects spaced at 10- to 15-meter intervals throughout the

APE. One isolated find was identified within the APE as a result of this survey. The isolated find does not constitute a historic property and no further cultural resources were observed (Appendix C).

As a result of the previous uses of the APE, the absence of known historic properties, the recent cultural resource surveys, and results from the pedestrian survey, no further archaeological studies are recommended. As a result of the cultural investigations conducted, a finding of "No Historic Properties Affected," is recommended in accordance with 36 CFR 800.4(d)(1).

3.6 Hazardous and Toxic Substances

This section describes hazardous and toxic substances in the region, at Fort Irwin, and within the footprint of the proposed project area.

3.6.1 Hazardous Waste Disposal

Fort Irwin has a RCRA permit as a large-quantity generator of hazardous waste. The installation does not operate any storage facilities, but it does operate 90-day accumulation points. The Fort Irwin DPW is responsible for managing hazardous wastes, which are placed temporarily in a number of accumulation points distributed throughout the cantonment area for less than 90 days prior to transport to an approved offsite hazardous waste disposal facility.

There are no hazardous waste accumulation points within the Tiefort City training complex. There are no known hazardous waste or toxic substances within the project area, except for the possibility of unexploded ordnance (UXO). UXO is further discussed below.

3.6.2 Special Hazards

3.6.2.1 Unexploded Ordnance

There has been no evidence of UXO in the project area. The project area is in a training area designated for non-dud producing munitions, meaning that they do not contain explosives (Army, 2006). The nearest live-fire range is approximately 2.5 miles north of the project area. It would be highly unlikely that UXO would be deposited into the project area from this range. Debris in runoff from the range would be deposited in the valley bottom, which is north of the project area. It would be unlikely that UXO would be in the project area. It would be likely that blanks and spent pyrotechnic items would be on the surface of the project area; however, these items would not present a hazard.

3.7 Human Health and Safety

Tiefort City is located in a remote area of Fort Irwin that is restricted from the public and designated for military training activities. As previously discussed, runoff from large storm events can undermine infrastructure and structures within the Tiefort City training complex. Infrastructure and structures damaged during such storms can render the mock city unsafe for training activities and can create unsafe conditions for maintenance crews.

Valley fever (*Coccidioides immitis*) is known to occur in San Bernardino County. Valley fever or *coccidioidomycosis* is a fungal infection that occurs in the southwestern states. The fungus occurs in soil and can be acquired by inhaling dust particles that contain the fungus. A study conducted at Fort Irwin found that the risk of a serious infection was low for military personnel training in the desert; however, the incidence of infection may vary depending on activities and geographic factors (Crum et al., 2004). There were 75 cases of valley fever in San Bernardino County in 2011, an incidence rate of 3.4 cases per 100,000 people (San Bernardino County, 2015).

UXO is a health and safety hazard to those working or training on Fort Irwin. However, UXO is not known to occur in the project area. Fort Irwin implements a training program for those working or training in areas with potential for UXO, including construction contractors.

3.8 Aesthetics

Aesthetics refers to the beauty in both form and appearance of visual resources, including natural and built components of the environment perceived by humans. Perceptions of what is beautiful or appealing vary between individuals based on personal preferences.

The proposed project area is in a remote area of Fort Irwin. The land on and around the project area is designated and used for military training purposes. The project area is on an alluvial fan that emanates from the Tiefort Mountains to the south. The Tiefort Mountains are a prominent feature in the landscape. The viewscape is dominated by degraded desert scrub in the valley, structures associated with the Tiefort City MOUT training area, and the surrounding mountains. Tiefort City is a mock city used for training purposes. The city includes a variety of structures to mimic a small village, including a mock prison. Power poles are distributed throughout the mock city and there are roads throughout the project area. There is evidence of training activities throughout the project area, including off-road vehicle maneuvers and manmade berms. A large pile of man-made debris is in the project area northwest of Tiefort City. Overhead military flights are a common occurrence within the project area. During training activities there is a large presence of military vehicles and personnel within the project area.

3.9 Transportation

3.9.1 Fort Irwin Transportation Roads and Conditions

The local transportation system at Fort Irwin consists of roadways, pedestrian walkways, and bicycle paths and is used for normal, on-post traffic demands for everyday working, living, or recreational trips. In addition, personnel living off-post commute daily to and from work, and retired military and family members use the service facilities at the installation. The existing cantonment roadway network adequately serves the transportation needs of the roughly 15,000 people living and working on the installation.

Due to its location, Fort Irwin has limited public transportation. The Fort Irwin express bus provides service between Barstow and Fort Irwin five times in the morning between 4:20 a.m. and 6:35 a.m., with five return routes between 3:45 p.m. and 6:00 p.m. Two additional early morning routes to Fort Irwin originate in the Victorville area, returning in the afternoon.

3.9.2 Regional Roads and Conditions

Fort Irwin Road provides public and military access to Fort Irwin from Interstate 15 (I-15), northeast of Barstow. Fort Irwin Road is a two-lane defense access road (DAR). The U.S. Department of Transportation (DOT) Federal Highway Administration (FHWA) administers the Federal Lands Highway Program, which surveys, designs, and constructs DARs and other roads for federal lands. The Federal Lands Highway Program was established for the military to fund the cost of public highway improvements necessary to mitigate effects of defense activity. Fort Irwin Road is a paved, San Bernardino County-maintained road that provides one lane in each direction with numerous sections containing passing lanes. Through the Federal Lands Highway Program, San Bernardino County and the Army have funded rehabilitation and other improvements on Fort Irwin Road (Army, 2008). Safety improvements along Fort Irwin Road were completed in November 2006 (Desert Dispatch, 2007).

Fort Irwin Road can be accessed by Irwin Road, which extends from Barstow, along I-15, northeast to Fort Irwin Road. Irwin Road has two lanes, one in each direction, and is maintained by San Bernardino County.

According to a study conducted in 2000, the average daily traffic for Fort Irwin Road was 5,182 vehicles. In 2014, the average daily traffic on Fort Irwin Road, east of Irwin Road, was 5,827 (San Bernardino County, 2014). Between October 1989 and September 1999 there were 178 crashes, in which 153 persons were injured and 13 persons were killed on Fort Irwin Road. From 2002 to 2005, 11 fatalities on

Fort Irwin Road were reported (Army, 2008). In Fiscal Year 2006, five fatalities were reported. Since road improvements were finalized in November 2006, traffic conditions have improved. No fatalities were reported along Fort Irwin Road during Fiscal Year 2007 (Desert Dispatch, 2007).

3.9.3 Traffic Flow and Safety at Fort Irwin and the Cantonment Area

A Fort Irwin traffic analysis found that major intersections are congested during morning and evening commutes and lunchtime, but upgrades were not warranted. An average of 102 accidents occurred per year on Fort Irwin from 2004 to 2008, but the locations of these accidents have not been recorded (Michael Baker, Jr., Inc., 2009). Recommendations in the traffic analysis included minor upgrades, such as installing yield signs or closing unused curb cuts that appear as driveways. By 2028, more substantial upgrades, such as traffic signals and turn lanes, were anticipated to be required. The existing 100 miles of paved roadways and 45 miles of graded roadways within the cantonment area serve the current needs and mission of the installation.

Fort Irwin generates all but a small amount of the traffic using Fort Irwin Road. The remainder of the traffic comes from ranches, mines, and homes in the area. With the recent growth of Fort Irwin, the amount of congestion on this two-lane highway has increased steadily. The highway experiences heavy traffic use (especially during the morning and evening peak hours), and safety problems exist. Dangerous conditions develop because heavy transport vehicles and privately owned automobiles share this road. With the exception of some congestion at the center of the installation during the morning, noontime, and evening rush hours, the Fort Irwin roadways appear to operate within their design capacities.

Community support facilities and concentrated housing areas are located along Goldstone Road, and these contribute to the higher amounts of traffic. Barstow Road is one of the main thoroughfares through the center of the cantonment and is the main access to many of the offices, dormitories, and light industrial areas that support the Fort Irwin mission. Traffic within the cantonment is highly dependent on rotations when units come to Fort Irwin to train and traffic can increase significantly during those rotations. However, all roads on Fort Irwin are considered sufficient to handle current and anticipated traffic loads (Michael Baker, Jr., Inc., 2009).

3.9.4 Aircraft Facilities

Fort Irwin is served by one on-post airfield—the Bicycle Lake Army Airfield. The main Fort Irwin helipad is located near the Weed Army Community Hospital within the cantonment. Various other helicopter and airstrip facilities are used in support of training areas. Bicycle Lake Army Airfield is on a dry lakebed approximately six miles southwest of the project area.

3.9.5 Project Area Conditions

The Tiefort City training complex is accessed through the Fort Irwin cantonment, either by Barstow Road or by Outer Loop Road and then Barstow Road. The transportation network within the project area consists of unpaved maneuver roads. One of the access roads to Tiefort City and to the monitoring facilities is south of the mock city, which crosses Tiefort Wash. There is another access point north of Tiefort City. There is a helicopter landing pad within the project area used for training purposes and medical evacuations. There are helicopter landing pads in the nearby vicinity, which also are used for training purposes and for medical evacuations.

SECTION 4

Environmental Consequences

This section assesses the environmental consequences associated with the Proposed Action and the No Action Alternative. Direct, indirect, and cumulative environmental effects are described for each resource. These effects are defined as follows:

- Direct effects are caused by the action and occur at the same time and place (40 CFR Section 1508.8).
- Indirect effects are caused by the action and occur later in time or farther removed in distance but are still reasonably foreseeable (40 CFR Section 1508.8).
- Cumulative effects are those that result from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR Section 1508.7).

Effects were analyzed for each of the resources identified in the previous section as potentially affected by implementation of the Proposed Action. Resources that would not be affected include land use; geology, seismicity, and mineral resources; noise; socioeconomics; environmental justice and protection of children; utilities and infrastructure; and recreation. These resource areas are not further discussed in this section.

4.1 Soils

This section addresses the potential effects to soils resulting from proposed construction and maintenance activities within the project area. The Proposed Action would have no potential to effect underlying geology as disturbance would be limited to surface grading and excavation of alluvial sediments.

Soil resource effects are considered significant if vehicular or other direct mechanical apparatus disturbs the upper dried clayey surface crust of dry lakebeds or playa deposits and exposes underlying fine sediment to wind erosion.

4.1.1 Proposed Action

4.1.1.1 Construction Phase

The Proposed Action would include the disturbance of up to 394 acres of ground. Approximately 358 acres of the soils within the project area have a low susceptibility to water and wind erosion, while approximately 36 acres are considered slightly susceptible to water and wind erosion (NRCS, 2015). There are no important soil resources present in the project area, such as biological crusts. The surface soils in the project area are highly disturbed from military training activities

Construction activities could temporarily increase soil erosion, especially wind erosion. Fine particulate matter found on the desert surface could become airborne and create adverse dust conditions. Heavy equipment would be used to grade the site, move and compact soils, and for excavation of the channels and basins. The effects would be temporary and could be reduced by using standard BMPs such as dust suppression techniques that could include spraying the ground with water (Section 4.1.4, *Project Design Measures*). Fort Irwin currently implements dust abatement programs that address problems associated with wind erosion and suspension of particles, including chemical stabilization and revegetation (Army, 2006). Additionally, the requirements set forth in Rules 403 and 403.2, Fugitive Dust Control for the MDPA, would be adhered to (MDAQMD, 1995). A dust control plan would be prepared for the Proposed Action and submitted to the MDAQMD for review, as required by Rule 403.2. Implementation of current practices and standard construction BMPs to reduce erosion and airborne dust would

minimize adverse effects to soils during construction; therefore, the effect to soils would be less than significant.

Erosion of soils due to stormwater would be reduced by implementing BMPs for prevention of runoff (Section 4.1.4). Implementation of standard engineering design and construction practices would minimize adverse effects to soils during construction; therefore, no significant adverse effects to soils would occur.

4.1.1.2 Operation and Maintenance Phase

Minor grading and excavation activities could occur an estimated 15 days per year to maintain the proposed stormwater control features. These activities could temporarily increase soil erosion. BMPs such as those mentioned for construction effects would be implemented for maintenance activities to reduce soil effects to less than significant. Dust suppression techniques, such as watering, would be implemented as needed for maintenance activities. Maintenance activities would adhere to requirements set forth in Rules 403 and 403.2 (MDAQMD, 1995). Effects to soils resulting from maintenance activities would be less than significant.

4.1.2 No Action Alternative

Under the No Action Alternative, no construction would occur; therefore, no effects on soil resources would occur.

4.1.3 Cumulative Effects

There could be cumulative effects on soils. Multiple construction projects could occur on Fort Irwin simultaneously and could include final construction of a new hospital and water treatment plant; current and planned construction for wastewater, water, and stormwater infrastructure improvements in the cantonment; construction related to an Energy Savings Performance Contract at the Fort Irwin landfill; construction of a new Unmanned Aircraft Systems hangar facility; construction of an approximately 250-acre solar facility; and expansion of the RV Park. If all projects were to occur at one time, windborne soil erosion due to construction activities could create a nuisance; however, dust suppression BMPs would be implemented on all Fort Irwin construction activities, and not all construction projects are expected to occur simultaneously. Soil effects from the Proposed Action would be short-term and would not contribute to any long-term cumulative effects.

4.1.4 Project Design Measures

Although no significant adverse effects to soils would be anticipated, a number of measures would be implemented to reduce potential adverse effects. To protect the soil during construction, erosion and sediment control measures and other BMPs would be implemented. A dust control plan that would describe all applicable dust control measures would be prepared. In addition, a SWPPP would be prepared, which would ensure that appropriate measures are taken to minimize soil erosion and protect the surrounding soils.

Erosion control measures that could be used during construction to protect exposed soil and minimize erosion include compost blankets, mulching, riprap, watering, seeding and sodding, geotextiles, and slope drains. Sediment control measures could include compost filter berms and socks; fiber rolls or berms; temporary sediment basins, rock dams, filters, chambers, or traps; silt fences; storm drain inlet protection; and hay bales. Staked fiber rolls would be placed at all drainages during construction and for two weeks after completion of construction activities. Wind erosion control measures would consist of wetting the ground with water, chemical stabilization; and, adherence to the measures described in the MDPA Rules 403 and 403.2.

The requirements of Rule 403.2 for a project over 100 acres are as follows:

a. Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions. For purposes of this rule, use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient to maintain compliance.

b. Take actions sufficient to prevent project related trackout onto paved surfaces.

c. Cover loaded haul vehicles while operating on publicly maintained paved surfaces.

d. Stabilize graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than thirty days, except when such a delay is due to precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions.

e. Clean up project-related trackout or spills on publicly maintained paved surfaces within 24 hours.

f. Reduce non-essential earth-moving activity under high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.

g. Prepare and submit to MDAQMD, prior to commencing earth-moving activity, a dust control plan that describes all applicable dust control measures that will be implemented for the Proposed Action.

h. Provide stabilized access route(s) to the project site as soon as is feasible. For purposes of this Rule, as soon as is feasible shall mean prior to the completion of construction and demolition activities.

i. Maintain natural topography to the extent possible.

j. Construct parking lots and paved roads first, where feasible.

k. Construct upwind portions of project first, where feasible.

4.2 Biological Resources

Potential effects to biological resources related to implementation of the Proposed Action would be associated with clearing up to 394 acres of degraded desert scrub habitat for construction of the proposed stormwater controls.

Effects to biological resources are considered significant if one or more of the following criteria are met with the implementation of the Proposed Action:

- Any loss of individuals or populations of a federally listed or proposed endangered or threatened species or its habitat
- Any loss of critical habitat and/or declining wildlife habitat that is sensitive or rare to the project region (such as wetlands, stabilized and partially stabilized desert sand fields, and stabilized and partially stabilized desert dunes)
- Any fill or alteration of wetland or waters of the United States regulated under the CWA
- Substantial loss of populations or habitat of a federal Species of Concern, California Special Species of Concern, or otherwise regionally rare or sensitive species that could jeopardize the continued existence of that species in the project region
- Substantial loss or long-term disruption of a major wildlife movement corridor
- Loss of at least 5 percent of undisturbed habitats within a biogeographic region, such as that found in a single valley, mountain range, or coastline

- Substantial loss of natural vegetation communities that are slow to recover
- Substantial loss of native plant or animal species or community diversity

4.2.1 Proposed Action

4.2.1.1 Construction Phase

Flora

Up to 394 acres of creosote bush-white bursage series vegetative community type habitat would be cleared for construction of the proposed stormwater controls. The effects on biological resources from clearing up to 394 acres would be minimal because the area has been substantially degraded from training activities occurring at the Tiefort City MOUT training area and expansive areas of less disturbed creosote bush-white bursage series vegetative community type occurs throughout Fort Irwin. Evidence of military training activities are prevalent throughout the project area, including evidence of off-road maneuvers. Vegetation would eventually return in areas cleared for construction of the proposed stormwater controls. There would be minor temporary effects to flora in the project area from the clearing of up to 394 acres of habitat for construction of the proposed stormwater controls.

Special-status Species

Federally or State-listed Species

No federally or state-listed plant species were observed during the field survey of the project area. The Lane Mountain milk-vetch would not be expected to occur within the project area. The highest elevation within the project area is less than 2,950 feet amsl, which is below the typical elevation at which the Lane Mountain milk-vetch typically occurs. No effects would occur to federally or state-listed plant species.

Other Special-status Species

No special-status plant species were observed during the survey of the project area. Due to the lack of habitat, degraded condition of habitat within the project area, and/or recurring human disturbance it would be unlikely that the alkali mariposa lily, Clokey's cryptantha, small-flowered androstephium, Barstow wooly sunflower, or Mojave monkeyflower would occur in the project; therefore, no effects to special-status plant species would be expected.

Fauna

The clearing of up to 394 acres of creosote bush-white bursage series vegetative community type habitat would not be expected to have a substantial adverse effect on common wildlife species that may occur in the project area. The habitat within the project area has been substantially degraded from previous training activities associated with the Tiefort City MOUT training area and training activities occur regularly in and around the project area that can include large-scale battle scenarios with mounted (in vehicles) and dismounted soldiers. In addition, most of the land in the western arm of the project area is on an alluvial fan of Tiefort Wash, which regularly deposits sediment and debris into the area. The regular deposition of sediments and debris would likely preclude the area from use by wildlife that rely on burrows and/or habitat conducive to long-term use of burrows. Fauna occurring within the project area would likely be acclimated to human activities and noise. Transient species would likely avoid the project area during construction due to human activities and noise.

Direct mortality of common wildlife could occur during construction. However, the effect on wildlife would be minor because the habitat within the project area is substantially degraded and would not support large populations of common wildlife species. In addition, there is extensive areas of similar and higher quality habitat for displaced wildlife adjacent to the project area and throughout Fort Irwin, which would be expected to continue to support common wildlife found on Fort Irwin and the project area. To the extent practicable, land-clearing activities would not begin during the nesting season, which

is from February 15 to August 31 in the Fort Irwin area, to avoid effects on MBTA species. If vegetation clearing is required during the breeding season, preconstruction surveys of breeding birds would be conducted. Identified active nests would be protected from disturbance by a 500-foot no disturbance buffer, which would remain in place until the young fledge and no new nests are initiated for the season.

Effects on the habitat within the project area would be temporary. Upon completion of construction the habitat within the project area would likely return to existing conditions, which consists of degraded creosote bush-white bursage vegetative community type habitat. Minor temporary effects on common wildlife would be anticipated as a result of clearing up to 394 acres of habitat.

Special-status Species

There are no wetland or riparian habitats within the project area. Special-status species that typically utilize these habitats, including the southwestern flycatcher, Least Bell's vireo, and California black rail would not occur on or in the vicinity of the project area and would not be affected by implementation of the Proposed Action.

Federally or State-listed Species

Peregrine Falcon and Swainson's Hawk. The peregrine falcon and Swainson's hawk would not be expected to be present at the project area except as an occasional transient or forager, which would be unlikely. These species would likely avoid the project area during construction activities. However, there is ample similar foraging habitat adjacent to the project area and throughout Fort Irwin. Effects on these species would be negligible.

Burrowing Owl. A majority of the project area does not provide suitable habitat for the burrowing owl. The southeast portion of the project area provides marginally suitable habitat for the burrowing owl. It is likely that burrowing owl would mainly use the project area for foraging, and would avoid the area during construction. There is ample similar foraging habitat adjacent to the project area and throughout Fort Irwin. To the extent practicable, land clearing activities would not begin during the nesting season, which is from February 15 to August 31 in the Fort Irwin area, to avoid effects to burrowing owl. If vegetation clearing is required during the breeding season, preconstruction surveys for burrowing owl would be conducted. Identified active burrows would be protected from disturbance by a 500-foot no disturbance buffer, which would remain in place until the young fledge and no new burrows are initiated for the season. Effects on burrowing owl would be negligible with the use of mitigation.

Golden Eagle and Prairie Falcon. These species are known to nest in the Tiefort Mountains and could forage within the project area. There is no suitable nesting habitat within the project area. These species would likely avoid the project area during construction activities. However, there is ample similar foraging habitat adjacent to the project area and throughout Fort Irwin. Effects on these species would be negligible.

LeConte's Thrasher and Loggerhead Shrike. These species have low potential to occur on the project area. There is no suitable nesting habitat for these species within the project area. Use of the project area would likely be limited to foraging activities. These species would likely avoid the project area during construction activities. However, there is ample similar foraging habitat adjacent to the project area and throughout Fort Irwin. Effects on these species would be negligible.

Yellow-headed Blackbird. This species has potential to occur in the project area, though there is no suitable nesting habitat. Use of the project area by this species would likely be limited to foraging activities. This species would likely avoid the project area during construction activities. However, there is ample similar foraging habitat adjacent to the project area and throughout Fort Irwin. Effects on this species would be negligible.

Mojave Fringe-toed Lizard. There is no suitable habitat for the Mojave fringe-toed lizard in the project area. This species would not be expected to occur in the project area; therefore, no effects would be expected.

Desert Tortoise. The degraded habitat within the project area provides marginally suitable habitat for desert tortoise. No recent signs of desert tortoise were identified within the project area during the field survey. One inactive desert tortoise was observed within the project area. However, desert tortoise has been observed in low numbers in and around the project area. Desert tortoises would be affected by clearing up to 394 acres of habitat and could be encountered during construction. The Fort Irwin Integrated Natural Resources Management Plan (INRMP) provides a management strategy for the desert tortoise to conserve and monitor populations, conserve habitat, educate the public, and minimize effects on the species with an adaptive ecosystem management approach.

Fort Irwin has determined that construction of the Proposed Action may affect, but is not likely to adversely affect the desert tortoise. No consultation with USFWS would be needed because the Proposed Action would be covered under a *Biological Opinion for Operations and Activities at Fort Irwin* (2014 BO; USFWS, 2014). Any actions involving desert tortoise would be conducted consistent with the August 8, 2014 programmatic BO for operations and activities at Fort Irwin (USFWS, 2014). Fort Irwin would comply with the mandatory and discretionary actions for conservation of desert tortoise identified in the BO, which are identified in Section 4.2.4 to avoid or minimize potential effects. Effects on desert tortoise as a result of clearing up to 394 acres of habitat would be minor and temporary with implementation of project mitigation.

There is ample similar habitat adjacent to the project area and throughout Fort Irwin available for potential relocation of desert tortoise found within the project area during preconstruction surveys or construction, if needed. Desert tortoises could be relocated to other areas with fewer disturbances, including established conservation areas on Fort Irwin, and away from military training areas that can include off-road maneuvers. Relocation of desert tortoise, if necessary, would be completed in accordance with the 2014 BO and established Fort Irwin protocols.

Mohave Ground Squirrel. This species was not observed during field surveys and is not known to occur on or near the project area according to the Fort Irwin Mohave ground squirrel sightings database (Fort Irwin, 2016c). Based on available information this species does not occur on or near the project area; therefore, no effect on this species would be expected.

Desert Kit Fox. Kit fox are known to occur in the vicinity of Tiefort City; however, no signs or burrows were identified within the project area during the field survey. Kit fox would likely only use the project area for foraging. Kit fox occurring on or near the project area are likely adapted to human activities, as the area is used for military training activities. Prior to construction a preconstruction survey would be conducted. The preconstruction survey would include an investigation for the presence of burrows within and adjacent to the project area. If individual active burrows are identified during the preconstruction survey, measures would be implemented to avoid potential effects. Negligible effects would be expected to kit fox with measures implemented, as described in Section 4.2.4.

4.2.1.2 Operation and Maintenance Phase

Flora

Periodic maintenance activities, estimated to be 15 days per year, would occur where needed. Maintenance activities would mainly occur in constructed channels, berms, and basins to remove excess sediment or repair damages caused by erosion. Berms would have access roads on top for easy access, limiting the amount of overland or off-road travel required to access areas to be repaired. It would be expected that little to no vegetation removal would be required for maintenance activities. Therefore, negligible effects on flora would be expected from maintenance activities.

Special-status Species

No special-status plant species are known to occur in the project area and up to 394 acres of the project area would have been cleared for construction of the stormwater controls. Little to no vegetation removal would be expected for maintenance activities. Maintenance activities would occur in previously disturbed areas at the proposed berms, channels, and basins. No effects on special-status flora would occur during maintenance activities.

Fauna

Maintenance activities and associated noise would temporarily disturb wildlife; however, as previously stated, wildlife within the project area is likely acclimated to human activities, as the area is used for military training activities. Transient species and other species that may forage in the project area would likely avoid the area until maintenance activities cease. No removal of habitat would be expected during maintenance activities. If the removal of vegetation is required, activities would be conducted outside of the breeding season for birds, which is February 15 to August 31, to the extent practicable. If the removal of vegetation is required during the bird nesting season, surveys such as those mentioned for construction effects, would be completed prior to initiation of maintenance activities. Effects on common wildlife from maintenance activities would be temporary and negligible.

Special-status Species

Habitat within the project area would be substantially degraded upon completion of construction; however, wildlife habitat would return over time. The chances for an encounter with desert tortoise, burrowing owl, or kit fox would increase as the quality of the habitat increases over time; however, the quality of the habitat would likely not surpass current conditions, as the area is regularly affected by military training activities. It would be unlikely that these species would be encountered during maintenance activities. To further reduce the potential to affect desert tortoise, burrowing owl, kit fox, and other special-status species previously mentioned, measures similar to those mentioned for construction effects would be implemented for maintenance activities.

No consultation with USFWS would be needed for maintenance activities because they would be covered by the 2014 BO. Maintenance activities would be conducted in accordance with the 2014 BO (USFWS, 2014). Preconstruction surveys would be completed in work areas and along potential access routes prior to initiation of maintenance activities. Measures to avoid or further minimize effects on special-status species are identified in Section 4.2.4. Effects on special-status species resulting from periodic maintenance activities would be temporary and negligible with implementation of mitigation measures.

4.2.1.3 Potential Effects from Pest Species

Construction and maintenance activities could attract pest species, including ravens, to the project area if not kept clean of trash and debris. This would be temporary, and pest species would disperse when construction or maintenance activities are complete. Good housekeeping during construction would minimize pest species on the active construction site. Additionally, any water applied to the project area during construction or maintenance activities would be applied so as to prevent pooling and providing a subsidy to pest species. No significant effects would be expected.

4.2.2 No Action Alternative

4.2.2.1 Flora

No construction would occur under the No Action Alternative; therefore, no effect would occur.

4.2.2.2 Fauna

No construction would occur under the No Action Alternative; therefore, no effect would occur.

4.2.3 Cumulative Effects

The Proposed Action would have a minor adverse effect on plant and wildlife habitat as the project area is substantially degraded. No long-term cumulative effect relating to clearing up to 394 acres would be expected, because most of the project area would become naturally vegetated over time. Direct effects on desert tortoise would be unlikely because the project area provides only marginally suitable habitat and mitigation measures would be implemented to prevent effects. Negligible cumulative effects on biological resources would be expected as a result of the Proposed Action.

4.2.4 Project Design Measures

4.2.4.1 Desert Tortoise

To avoid potential effects to this federally listed species, the following measures would be implemented during construction and maintenance of the Proposed Action to the extent practicable and would be consistent with USFWS guidelines and the 2014 BO:

- Before construction begins, personnel working on the site would receive a briefing on the desert tortoise, detailing the life history of a tortoise and the protocol to follow if a tortoise is encountered in the project area. An authorized biologist would conduct the briefing.
- Within two weeks of the onset of construction, 100 percent coverage ground surveys would be conducted of the project area for tortoises, signs of use, or burrows. If no tortoises or active burrows are identified, then construction would proceed without interruption.
- During land clearing and construction, a biological monitor would be available to observe construction activities and to verify that no tortoises wander into the construction area. If an active burrow or desert tortoise are identified during the survey appropriate measures as identified in the 2014 BO to avoid effects would be implemented.
- Desert tortoise exclusion fencing would be placed at staging and parking areas. Desert tortoise guards would be placed at entrances to the staging and parking areas. Fence installation would be overseen by an authorized biologist.
- Desert tortoise burrows located within 100 feet of the limits of construction would be marked and protected by conducting additional briefings on their location to insure avoidance. Desert tortoise burrows that cannot be avoided would be excavated by hand either by or under the direct supervision of an authorized biologist. Burrow excavation and subsequent handling of any desert tortoise would follow the most up-to-date guidelines that are acceptable to USFWS.
- Workers will be required to inspect the underside of all onsite parked vehicles before moving them (unless parked in staging or parking area protected by exclusion fencing). If a desert tortoise is detected, then an authorized biologist will remove the animal to a safe place or wait until the animal moves to safety on its own.
- Speed limits in and around the project area will be enforced throughout construction and maintenance activities. Vehicles shall not exceed 15 miles per hour (mph) on unpaved roads and the right-of-way accessing the construction sites or 10 mph during the night.
- To the extent possible, construction activities involving vegetation clearing and/or ground disturbances will be scheduled when tortoises are inactive (November 1 to March 15).
- Channels and basins would be designed so that desert tortoise can easily pass through these features unimpeded.

4.2.4.2 Other Special-status Species

Burrowing owl, golden eagle, prairie falcon Le Conte's thrasher, loggerhead shrike, and yellow-headed blackbird are unlikely to breed within the project area. A kit fox burrow could occur in the project area

though would be unlikely. To avoid potential effects on nesting birds, including birds protected under the MBTA, burrowing owl, and kit fox, if observed, the following measures would be implemented during construction and maintenance activities as part of the Proposed Action:

- Land and vegetation clearing would occur outside the breeding season for birds listed under the MBTA, defined as February 15 to August 31, where practicable. No land or vegetation clearing that would affect habitat for special-status species would be expected.
- If vegetation clearing is required during the breeding and nesting season, preconstruction surveys of breeding birds, including burrowing owl, would be conducted. Identified active nests or burrows would be protected from disturbance by a 500-foot nesting buffer, which would remain in place until the young have fledged from the nest or burrow and no new nests or burrows are initiated for the season.
- If a kit fox burrow is identified on or adjacent to the project area during the preconstruction survey, Fort Irwin natural resources staff will be contacted. Fort Irwin staff would determine the status of the burrow and establish an exclusion zone if necessary. Fort Irwin would decide if fencing or flagging would suffice to delineate the exclusion zone.

4.2.4.3 Pest Species

Construction and maintenance activities might attract pest species, including ravens, where additional food or trash is available. To avoid potential adverse effects, the following measures would be implemented at the project area:

- During construction and maintenance activities, all trash and debris would be placed in covered receptacles for delivery to approved landfill facilities.
- Daily cleanup of trash and debris would be required, including emptying and disposing of trash in receptacles.
- Any water applied during construction activities will be applied in such a manner as to avoid pooling to prevent subsidies for ravens and other pest species.

4.3 Water Resources

This section addresses potential effects on surface water and groundwater resources during construction and operation of the Proposed Action. Effects on water resources are considered significant if any of the following conditions are met:

- Groundwater levels are reduced to such an extent that spring flows are diminished or production at existing wells within the basin or adjacent interconnected basins falls below economically feasible or practical engineering limits
- Groundwater quality changes occur because of increasing salinity or mineral content that can negate the water's value for domestic, industrial, or agricultural consumption
- Existing surface water drainage patterns are altered such that the ultimate destination of the flow is changed
- The quality of ephemeral water resources available for wildlife at dry lakes, spring flows, or linear riparian systems with ephemeral flows is degraded
- Increases in water quality constituents could lead to a violation of specific state and federal standards

4.3.1 Proposed Action

4.3.1.1 Construction Phase

Surface Water

The Proposed Action would directly affect Tiefort Wash and three other drainages where the debris basins would be located. Earthen berms/drainage channel stormwater controls could be constructed along the eastern side of Tiefort Wash and within the wash. The berms/channels would prevent flows from Tiefort Wash from fanning out to the east, as shown on Figure 2-1, and would confine flows west of Tiefort City. However, the ultimate destination of flows in Tiefort Wash would remain unchanged, as flows would eventually reach Red Pass Lake, percolate to the groundwater, or evaporate. The debris basins would likely increase percolation and evaporation in those basins; however, it would be expected that flows from large storm events would overtop the basins through the spillways and flow into the proposed southern berm/channel. The southern channel would divert the flow to Tiefort Wash and the western side of the proposed earthen berms; and, the ultimate destination of flow would remain unchanged. Construction would require a general construction stormwater permit, Water Quality Order 2009-0009-DWQ. A Notice of Intent, SWPPP, and Notice of Termination would be filed in accordance with state requirements. Direct effects on surface waters in the project area would be long-term and less than significant.

The potential for indirect effects on surface waters would be minimized through implementing appropriate stormwater management BMPs (Section 4.3.4) during construction. Construction would not occur in drainages during rain events or if rain is expected. Staked fiber rolls would be placed at all drainage features for the duration of construction and left in place two weeks after completion of construction. Indirect effects on surface waters would be temporary and less than significant with the use of stormwater management BMPs.

No federally jurisdictional waters are present on or adjacent to the project area. No effects to jurisdictional waters would occur from construction of the proposed stormwater controls.

Groundwater

Treated groundwater would not be used for dust suppression purposes, and no effects on the Fort Irwin, Bicycle Lake, and Langford Lake basins would be expected. Water used for dust suppression would come from the Fort Irwin recycled water system, which consists of tertiary treated WWTP effluent.

The ultimate destination of surface water flows would not change as a result of the Proposed Action. Surface water flows would eventually reach Red Pass Lake, percolate to the groundwater, or evaporate. The destination of water that percolates due to the proposed stormwater controls would remain within the same groundwater basin. There could be an increase in evaporation due to water pooling in the debris basins; however, the amount of groundwater lost to evaporation because of the debris basins would be minimal, and would likely be offset by an increase in the amount of water that percolates to the groundwater in the proposed debris basins. Negligible effects on groundwater would be expected as a result of construction of the Proposed Action.

4.3.1.2 Operation and Maintenance Phase

Surface Water

Maintenance activities would generally consist of doing spot repairs and removing excess sediment from the constructed berms, channels, and debris basins. Work would not occur in drainages during rain events or if rain is expected. Stormwater management BMPs would be utilized as needed and would be the same as those described for construction. Effects on surface waters would be less than significant during maintenance of the Proposed Action.

Groundwater

Recycled water would be used for dust suppression during maintenance activities. No effects on groundwater would be expected during maintenance activities.

4.3.2 No Action Alternative

There would be no effects on groundwater under the No Action Alternative.

4.3.3 Cumulative Effects

The Proposed Action would result in less than significant effects to surface waters; therefore, significant cumulative effects would not be expected. Other ongoing or planned construction on Fort Irwin would utilize BMPs to reduce effects on surface waters. Cumulative effects on groundwater from new construction and increases in the Fort Irwin population could occur. However, Fort Irwin has constructed a new, more efficient water treatment plant (Irwin Water Works) and is planning to recycle more wastewater, which will further reduce demand on groundwater resources. Ongoing and planned construction on Fort Irwin would utilize recycled water for dust suppression. With recent improvements to water treatment and proposed water recycling projects, and because the Proposed Action would use recycled water, cumulative effects on groundwater due to the Proposed Action are not expected.

4.3.4 Project Design Measures

4.3.4.1 Surface Water

Potential surface water effects would be minimized during construction and maintenance activities by implementing appropriate BMPs for stormwater. Proper BMPs would be implemented prior to the start of land grading or trenching activities. Native vegetation would be preserved when possible. Erosion, runoff, and sediment control measures would be implemented in case of a storm event. Construction would not occur in drainages during rain events or if rain is expected. Erosion control measures such as compost blankets, mulching, riprap, geotextiles, and slope drains could be used to protect exposed soil and minimize erosion. BMPs, such as check dams, slope diversions, and temporary diversion dikes could be implemented for runoff control. Sediment control measures that could be implemented include compost filter berms and socks; fiber rolls or berms; sediment basins, rock dams, filters, chambers, or traps; silt fences; and weed-free hay bales. Staked fiber rolls would be placed at all drainage features for the duration of construction and left in place two weeks after completion of construction. Good housekeeping measures would be practiced during construction. Site-specific stormwater BMPs would be detailed in a construction SWPPP, which would be prepared before breaking ground.

4.3.4.2 Groundwater

The desert location of Fort Irwin and the scarcity of water resources make water conservation and resource management critical. In order to conserve water resources on Fort Irwin, recycled water would be used for dust suppression during construction and maintenance activities instead of treated groundwater that is used for domestic purposes. Recycled water at Fort Irwin is typically used for irrigation of green spaces and for dust suppression. Recycled water not used for these purposes is disposed of via percolation ponds near the Fort Irwin WWTP where the water either percolates to the groundwater or evaporates.

4.4 Air Quality

This section evaluates potential effects on air quality and provides project design measures in case adverse air quality effects were identified.

4.4.1 Significance Criteria

The effects of the project on air quality were evaluated by comparison of projected project emissions to the MDAQMD Significance Thresholds Rule 2002 and the general conformity *de minimis* thresholds.

The MDAQMD Significance Thresholds were used to evaluate the effects from construction and operation of the Proposed Action.

If the emissions are predicted to be less than the thresholds, it was assumed the Proposed Action would not violate an ambient air quality standard. The Proposed Action would be in a federal moderate nonattainment area for PM_{10}, so the general conformity *de minimis* threshold of 15 tons per year was used for the conformity applicability analysis. Other threshold values used in the analysis are provided in Sections 4.4.2.1 and 4.4.2.2.

4.4.2 Proposed Action

The Proposed Action would involve constructing the proposed stormwater controls, which would require clearing of up to 394 acres. Construction activities would generally consist of grading and excavation.

4.4.2.1 Construction Phase

Project construction would result in short-term emissions of CO, nitrogen oxides (NO_x), volatile organic compounds (VOCs), sulfur dioxide (SO_2), PM_{10}, and $PM_{2.5}$. Emissions would result from construction equipment, vehicles, and fugitive dust emissions. Fugitive dust emissions include emissions from soil-disturbing activities, unpaved roads, and paved roads. Detailed emission calculations are provided in Appendix D. Table 4-1 compares the peak construction emissions with the MDAQMD thresholds.

The annual construction emissions for 2017 would be less than the MDAQMD significance thresholds; therefore, construction of the Proposed Action would not have a significant adverse effect on air quality.

TABLE 4-1
Proposed Action Construction Emissions
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Emission Source	Emissions for 2017 (tons per year)					
	VOCs	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Construction Emissions	1.56	12.8	15.9	0.018	1.04	0.862
Vehicle Emissions	0.48	4.07	0.678	0.0086	0.080	0.055
Total Emissions	**2.04**	**16.9**	**16.5**	**0.026**	**1.12**	**0.916**
MDAQMD Thresholds (tons per year)	25	100	25	25	15	15
Thresholds Exceeded for Any Activity?	No	No	No	No	No	No

Source: Appendix D, *Record of Non-applicability and Air Quality Emissions Calculations*

4.4.2.2 Operation and Maintenance Phase

No new air emission sources would result from the Proposed Action once constructed. Maintenance activities would occur an estimated 15 days per year. Emissions from maintenance activities are shown in Table 4-2. Beginning in 2018, annual emissions resulting from maintenance activities would be well below MDAQMD thresholds; therefore, maintenance of the Proposed Action would not have a significant adverse effect on air quality.

TABLE 4-2
Proposed Action Operational Emissions
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Emission Source	Operational Emissions (tons per year)					
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Operational Emissions	0.0468	0.371	0.45	0.00050	0.0248	0.0233
Vehicle Emissions	0.00721	0.0604	0.0175	0.0001298	0.001368	0.000973
Total Emissions	**0.0540**	**0.431**	**0.468**	**0.00063**	**0.0262**	**0.0243**
MDAQMD Thresholds (tons per year)	25	100	25	25	15	15
Thresholds Exceeded for Any Activity?	No	No	No	No	No	No

Source: Appendix D, *Record of Non-applicability and Air Quality Emissions Calculations*

4.4.2.3 General Conformity

General conformity means compliance with the MDAQMD plan's (MDAQMD, 1995) purpose of attaining or maintaining the NAAQS. This means ensuring that a federal action would not cause a new violation of the NAAQS, contribute to any increase in the frequency or severity of violations of existing NAAQS, or delay the timely attainment of any NAAQS interim or other attainment milestones.

According to the MDAQMD *Federal Conformity Guidelines*, a project conforms if it meets he following conditions: (1) complies with all applicable district rules and regulations, (2) complies with all proposed control measures that are not yet adopted from the applicable plans, and (3) is consistent with the growth forecasts in the applicable plans (MDAQMD, 2011).

The Proposed Action would result in a short-term net increase in PM_{10} emissions from construction activities. Construction emissions were compared with the *de minimis* threshold to evaluate general conformity applicability. Analysis indicates that emissions would be 1.12 tons for 2017, well below the *de minimis* threshold of 15 tons per year. Therefore, the Proposed Action would not require a conformity determination. As required by the Army, a Record of Non-applicability (RONA) was prepared to document that the Proposed Action is exempt from general conformity requirements. The RONA and detailed emission calculations are provided in Appendix D.

The Proposed Action would comply with the applicable MDAQMD rules and regulations and would comply with proposed control measures presented in the *List and Implementation Schedule for District Measures to Reduce PM Pursuant to Health and Safety Code §39614(d)* (MDAQMD, 2005). This analysis demonstrates that the Proposed Action conforms to the MDAQMD's approved air quality plan because the emissions of the nonattainment pollutant, PM_{10}, would be less than the general conformity *de minimis* threshold.

4.4.3 No Action Alternative

Under the No Action Alternative, there would be no effects to air quality, because no construction would occur.

4.4.4 Cumulative Effects

Multiple construction projects could occur on Fort Irwin simultaneously and could include final construction of a new hospital and water treatment plant; current and planned construction for wastewater, water, and stormwater infrastructure improvements in the cantonment; construction related to an Energy Savings Performance Contract at the Fort Irwin landfill; construction of a new Unmanned Aircraft Systems hangar facility; construction of an approximately 250-acre solar facility; and

expansion of the RV Park. If all projects were to occur at one time, air quality issues related to dust created during construction could create a nuisance. However, dust suppression BMPs would be implemented on all Fort Irwin construction activities and these projects are spatially separated.

As shown in Table 4-1, construction emissions from the Proposed Action would be below the MDAQMD thresholds. Therefore, the Proposed Action would not be expected to have an adverse cumulative effect on air quality. Calculations of anticipated construction projects, where information is available, indicate that the combined emissions from upcoming or planned projects would be below MDAQMD thresholds as well (Appendix D).

4.4.5 Project Design Measures

Project design measures would be used during construction to reduce fugitive dust emissions. BMPs such as dust suppression techniques that could include spraying the ground with water would be implemented for construction and maintenance activities. Fort Irwin implements dust abatement programs that address problems associated with wind erosion and suspension of particles, including chemical stabilization and revegetation (Army, 2006). Additionally, the requirements set forth in Rule 403.2, Fugitive Dust Control for the MDPA, would be adhered to (MDAQMD, 1995). These requirements are listed in Section 4.1.4, *Project Design Measures*.

4.4.6 Climate Change and Greenhouse Gases

4.4.6.1 Proposed Action

The Proposed Action would generate GHG emissions from construction and maintenance related activities, including use of vehicles to and from the project area. Construction of the Proposed Action would result in a short-term insignificant increase in GHG emissions, while maintenance activities would result in short-term, periodic insignificant increases in GHG emissions. Based on the draft NEPA guidance for considering GHG emissions, a value of 25,000 metric tons of CO_2e would indicate whether a qualitative or quantitative assessment may be meaningful for decision makers under NEPA (Council on Environmental Quality [CEQ], 2014). Construction and maintenance emissions from the Proposed Action would be below this level. Estimated GHG emissions would be 2,503 tons CO_2e for construction in 2017 and 52.7 tons CO_2e annually for maintenance activities.

4.4.6.2 No Action Alternative

Under the No Action Alternative, no construction would occur. As there would be no change from existing activities, the No Action Alternative would not result in an increase in GHG emissions.

4.5 Cultural Resources

A significant effect on cultural resources (adverse effect) would occur if historic properties (NRHP-eligible resources) are destroyed, altered, or moved, or if their historical setting is altered.

4.5.1 Proposed Action

A literature and records search and a pedestrian survey indicated that there are no cultural resources in the APE of the proposed project area that would be affected by the Proposed Action. Therefore, no NRHP-eligible or listed cultural resources would be affected by the Proposed Action. If any previously undiscovered archaeological remains are uncovered during construction, any activity related to the Proposed Action must be halted and the Fort Irwin archaeologist contacted.

Consultation with affiliated federally recognized Native American tribes and the California SHPO has concluded. A copy of consultation letters provided to the SHPO and each affiliated federally recognized Native American tribe, along with responses received, is included in Appendix C.

4.5.2 No Action Alternative

The No Action Alternative would have no effects on cultural resources.

4.5.3 Cumulative Effects

One isolated find was discovered during the survey investigation; however, the find does not constitute a historic property and no further cultural resources were observed. No archaeological sites are present at or within the APE of the proposed project area; therefore, no cumulative effects would occur.

4.6 Hazardous and Toxic Substances

Materials that could pose a health risk to humans or a threat to the environment would be associated with activities during the construction and operation phases of the Proposed Action.

Hazardous and toxic substances effects are considered significant under either or both of the following conditions:

- The generation of hazardous substances and/or materials would expose the general public to health risks through direct exposure, groundwater contamination, and/or airborne contaminants.
- The generation of hazardous substances and/or materials would expose wildlife or vegetation outside of the project area in a manner that is detrimental to longevity or propagation.

4.6.1 Proposed Action

4.6.1.1 Construction Phase

The project area is within a training area designated for non-dud producing munitions, meaning that there are no explosives contained in the munitions. These munitions are considered non-toxic and do not present a hazard. It would be highly unlikely that UXO would be encountered during construction in the project area; therefore, no effect from UXO would be expected.

Project construction would require that petroleum, oil, and lubricant materials, and other potentially hazardous materials, be transported to and used in the project area. Equipment servicing and repair activities could temporarily generate oily and hazardous wastes, such as spent solvents, residual fuels, used oils, used batteries, antifreeze, and filters. Construction activities would be conducted consistent with hazardous waste and pollution use and storage regulations, with guidelines specified in a SWPPP. In addition, all military and civilian personnel and subcontractors working with potentially hazardous materials are required to attend a briefing on Fort Irwin's hazardous waste management protocol. An uncontrolled release of hazardous substances to the environment would not be anticipated during construction.

BMPs documented in a SWPPP and/or a project-specific site construction safety plan would be followed to avoid significant risks or health hazards associated with the use of hazardous materials and hazardous waste generation and disposal. Effects from the use of hazardous and toxic substances during construction would be negligible with the use of BMPs.

4.6.1.2 Operation and Maintenance Phase

It is highly unlikely that UXO would be encountered during maintenance activities in the project area; therefore, no effect from UXO would be expected.

The use and effects from hazardous and toxic substances would be the same as those described for construction effects. BMPs documented in a SWPPP and/or a project-specific site construction safety plan would be followed to avoid significant risks or health hazards associated with the use of hazardous materials and hazardous waste generation and disposal. Effects from the use of hazardous and toxic substances during maintenance activities would be negligible with the use of BMPs.

4.6.2 No Action Alternative

Under the No Action Alternative, current conditions would continue.

4.6.3 Cumulative Effects

The use of hazardous materials associated with additions of new facilities, and modifications to existing facilities and infrastructure, is ongoing at Fort Irwin. Fort Irwin maintains and implements a Hazardous Materials and Hazardous Waste Management Plan that prescribes responsibilities, policies, and procedures for storing and managing hazardous materials and wastes within the installation, and provides procedures for responding to hazardous material/waste spills (Army, 2008). Continued implementation of this plan for Fort Irwin activities would prevent or reduce the potential for cumulative effects. Adverse cumulative effects would not be anticipated.

4.6.4 Project Design Measures

Construction and maintenance mitigation measures would include one or more of the following:

- Implement a SWPPP consistent with hazardous waste and pollution regulations, which would include guidelines and BMPs to prevent a release of hazardous materials into the environment during construction.
- Implement a project-specific site construction safety plan to avoid significant risks and health hazards associated with the use of hazardous materials and hazardous waste generation and disposal.

4.7 Health and Human Safety

A significant effect on health and human safety would include:

- Conducting activities exposing workers to unsafe or hazardous conditions, such as contaminated soils or disease vectors.
- Conducting activities that create unsafe conditions for the long-term with potential to adversely affect the public or personnel on Fort Irwin.

4.7.1 Proposed Action

4.7.1.1 Construction Phase

No effects to health and human safety would be expected from UXO within the project area, as UXO is not known or expected to occur in the project area.

Individuals constructing the proposed stormwater controls would potentially be exposed to valley fever. Fort Irwin would use either a construction company or soldiers training at Fort Irwin for construction of the proposed stormwater controls. The potential exposure to valley fever would be reduced with the use of dust suppression measures, as described in the Section 4.1, *Soils*, and Section 4.4, *Air Quality*. In addition, if a construction company is used for construction, mitigation measures as described below in Section 4.7.4, *Project Design Measures*, would be implemented. If a construction company is used for construction, effects on construction workers would be less than significant with implementation of dust suppression measures and mitigation measures listed in Section 4.7.4.

There would be no change to health and human safety conditions from the potential exposure to valley fever if soldiers are used to construct the proposed stormwater controls. Soldiers training on Fort Irwin would be exposed to valley fever regardless of the training activity conducted during the rotation. Soldiers training on Fort Irwin do not wear respiratory protection and would likely not wear protection if construction of the Proposed Action were to be treated as a training exercise.

Away from the construction site, soldiers and civilians would not be exposed to valley fever as a result of construction activities. There are no receptors near Tiefort City. The nearest receptor would be in the Fort Irwin cantonment, which is approximately nine miles to the southwest. Because of the combination of the spatial separation and the very low incidence rate (less than 0.004 percent) in the area, and because of the use of appropriate BMPs to minimize fugitive dust, no effects from valley fever would be expected away from the construction site.

Construction workers would wear hearing protection and implement safety programs as required by Occupational Safety and Health Administration requirements.

There would be long-term beneficial effects to human safety by protecting the Tiefort City MOUT training area from a 100-year flood event. The Proposed Action would reduce the potential for a 100-year flood event to damage Tiefort City, which would limit the exposure to unsafe conditions for those training at the MOUT training area or those involved with maintaining and performing repairs after a damaging flood event.

4.7.1.2 Operation and Maintenance Phase

Soldiers or subcontractors could be utilized to complete maintenance activities. Effects on health and human safety and measures to reduce those effects would be the same as those described in construction effects; however, the potential for exposure to valley fever would be less because less area would be disturbed during maintenance.

4.7.2 No Action Alternative

Current conditions would persist under the No Action Alternative. Tiefort City would remain within a 100-year floodplain and would be at risk to be damaged by large flood events for the long-term. Training conditions within the MOUT city could be unsafe following large flood events, exposing those maintaining or training at the complex to unsafe conditions. Long-term adverse effects on human health and safety would occur under the No Action Alternative.

4.7.3 Cumulative Effects

No long-term adverse cumulative effects related to health and human safety would be expected as a result of the Proposed Action. The Proposed Action would have long-term beneficial effects to health and human safety by protecting Tiefort City from 100-year flood events that could damage infrastructure and structures, rendering the MOUT training area unsafe for training activities.

4.7.4 Project Design Measures

The following measures would be implemented during construction and maintenance activities to reduce the potential exposure to and effects from valley fever, which would not apply to military personnel that may be utilized for training purposes:

- A brochure detailing valley fever, its cause, and symptoms would be made available to those working in the project area. The brochure would include information on how to control the spread of the illness, such as changing clothes daily, using respiratory protection, applying water to the soil, and cleaning equipment and materials.
- Breathing protection gear would be made available to all workers, at their request and at no cost to the worker.
- Workers would be educated through briefings to recognize the symptoms of valley fever, and to quickly report suspected symptoms of work-related valley fever.
- Signs would be posted at the project site notifying visitors and workers to the threat of valley fever.

4.8 Aesthetics

Effects on aesthetics would be considered significant if there was a substantial adverse effect on a scenic vista or if the existing visual character or quality of a site and surroundings are substantially degraded.

4.8.1 Proposed Action

The Proposed Action would include the construction and maintenance of earthen berms, stormwater channels, and approximately three debris basins. The most prominent feature of the Proposed Action would be the earthen berms, which would be up to 15 feet tall. The earthen berms would not substantially change the viewshed of the project area. The project area and nearby vicinity has been extensively used for military training activities and the vegetation has been degraded from off-road vehicle maneuvers. Large amounts of ground have been disturbed and moved to create the training complex and roads. Man-made berms from training activities can be found in and near the project area.

The proposed stormwater management features would not substantially change the visual character of the Tiefort City training complex or surrounding area. The Proposed Action would have a negligible effect on aesthetics.

4.8.2 No Action Alternative

There would be no changes or effects on aesthetics under the No Action Alternative.

4.8.3 Cumulative Effects

No significant effects on aesthetics would be expected as a result of the Proposed Action. Other planned or ongoing construction projects on Fort Irwin mainly occur within the cantonment, which is not visible from the project area. Future or ongoing construction projects in the training areas of Fort Irwin are spaced far from the Proposed Action and would likely not interact with or compound the effects on aesthetics resulting from the Proposed Action. Cumulative effects on aesthetics resulting from the Proposed Action would be less than significant.

4.9 Transportation

Transportation effects are considered significant if emergency vehicles cannot perform their duties or if traffic routes are disrupted for the long term.

4.9.1 Proposed Action

4.9.1.1 Construction Phase

During the nine-month construction period, vehicle trips associated with workers and deliveries to the project area would occur. If a construction company is utilized, the estimated 100 construction workers needed to construct the proposed stormwater controls would reside off-post because no onsite accommodations would be available to the general public. It is likely that the Barstow and Victorville areas would contribute the largest share of workers. Construction workers likely would commute to the jobsite on a daily basis. If a sufficient number of workers are not available locally, workers from more distant locations could take up temporary residence in local hotels, motels, apartments, campgrounds, and RV parks for the duration of construction. If soldiers are used for construction, there would likely be no effect on transportation as the unit would be based in a bivouac site near the project area or in designated areas in the cantonment. If soldiers are used for construction transportation effects would be the same as conditions during a training rotation on Fort Irwin.

Fort Irwin generates most of the traffic using Fort Irwin Road. The rest of the traffic comes primarily from ranches, mines, and homes in the area. With the exception of some congestion at the center of the installation during the morning, noontime, and evening rush hours, the Fort Irwin roadways operate within their design capacities. Traffic associated with construction of the proposed stormwater controls would be limited to material delivery and worker access and would not result in a substantial increase in

traffic compared to the existing traffic load. Fort Irwin would utilize a quarry northeast of the cantonment and trucks transporting rock to the project area would not pass through the cantonment or any other public road. Therefore, the Proposed Action would not result in significant adverse traffic effects.

Fort Irwin Road has adequate capacity to accommodate the increase in daily trips. Vehicle trips destined for the project area would likely utilize Outer Loop Road to avoid high traffic areas within the cantonment. The increase in traffic that could result from the transport of workers and materials to the project area during construction would not be expected to result in a level of service change to the existing roadways or impede emergency vehicles. Parking, equipment, materials, and staging areas would be located within the project area. Traffic effects due to construction and construction worker commutes would be temporary and negligible.

4.9.1.2 Operation and Maintenance Phase

Maintenance activities would occur approximately 15 days per year. The amount of personnel and equipment needed to conduct maintenance activities would consist of six workers using two front-end loaders, one excavator, and two dump trucks. The additional traffic resulting from maintenance activities would be negligible and would have negligible effects on transportation.

4.9.2 No Action Alternative

There would be no change or effects on transportation under the No Action Alternative.

4.9.3 Cumulative Effects

Infrastructure projects and other planned or ongoing construction within the cantonment could occur simultaneously with the Proposed Action, which could lead to cumulative traffic effects. Other projects ongoing or planned for the future within the cantonment that could affect traffic within the cantonment would have traffic control plans to reduce effects. Temporary effects on traffic could occur during construction of the Proposed Action; however, these effects would be short-term and less than significant, and would not contribute to a long-term cumulative transportation effect.

4.10 Summary of Effects and Project Design Measures

The resources with potential effects and the project design measures implemented to reduce adverse environmental effects of construction and operation of the Preferred Alternative are summarized in Table 4-3.

TABLE 4-3
Summary of Project Design Measures
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Potential Effect	Construction and O&M Design Measures
Soils		
	Soil erosion	Construction and O&M Phases: Employ BMPs for control of erosion and sediment that could include: compost blankets, mulching, riprap, watering, seeding and sodding, geotextiles, and slope drains. Sediment control measures could include compost filter berms and socks; fiber rolls or berms; temporary sediment basins, rock dams, filters, chambers, or traps; silt fences; storm drain inlet protection; and hay bales. Staked fiber rolls would be placed at all drainages during construction and for two weeks after completion of construction activities. Work would not occur in drainages during rain events or if rain is expected. Wind erosion control measures would consist of wetting the ground with water, chemical stabilization; and, adherence to the measures described in the MDPA Rules 403 and 403.2.

TABLE 4-3
Summary of Project Design Measures
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Potential Effect	Construction and O&M Design Measures
		Prepare and implement a SWPPP.
Biological Resources		
	Desert tortoise (may affect, but not likely to adversely affect)	Construction and O&M Phases: Before construction begins, personnel working on the site would receive a briefing on the desert tortoise, detailing the life history of a tortoise and the protocol to follow if a tortoise is encountered in the project area. An authorized biologist would conduct the briefing. Within two weeks of the onset of construction, 100 percent coverage ground surveys would be conducted of the project area for tortoises, signs of use, or burrows. If no tortoises or active burrows are identified, then construction would proceed without interruption. During land clearing and construction, a biological monitor would be available to observe construction activities and to verify that no tortoises wander into the construction area. If a tortoise is present, construction in the immediate vicinity would be halted while the tortoise is relocated out of the construction area. Desert tortoise burrows located within 100 feet of the limits of construction would be marked and protected by conducting additional briefings on their location to ensure avoidance. Desert tortoise burrows that cannot be avoided would be excavated by hand either by or under the direct supervision of an authorized biologist. Burrow excavation and subsequent handling of any desert tortoise would follow the most up-to-date guidelines that are acceptable to USFWS. Desert tortoise exclusion fencing would be placed at staging and parking areas. Desert tortoise guards would be placed at entrances to the staging and parking areas. Fence installation would be overseen by an authorized biologist. Workers will be required to inspect the underside of all on-site parked vehicles before moving them (unless parked in staging or parking area protected by exclusion fencing). If a desert tortoise is detected, then an authorized biologist will remove the animal to a safe place or wait until the animal moves to safety on its own. Speed limits in and around the project area will be enforced throughout construction and maintenance activities. Vehicles shall not exceed 15 mph on unpaved roads and the right-of-way accessing the construction sites or 10 mph during the night. To the extent possible, construction activities involving vegetation clearing and/or ground disturbances will be scheduled when tortoises are inactive (November 1 to March 15). Channels and basins would be designed so that desert tortoise can easily pass through these features unimpeded.
	Special-status and avian species (potential disturbance)	Construction and O&M Phases: Land and vegetation clearing would occur outside the breeding season for birds of concern, defined as February 15 to August 31, where practicable. If vegetation clearing is required during the breeding and nesting season, preconstruction surveys of breeding birds, including burrowing owl, would be conducted. Identified active nests or burrows would be protected from disturbance by a 500-foot nesting buffer, which would remain in place until the young have fledged from the nest or burrow and no new nests or burrows are initiated for the season.

TABLE 4-3
Summary of Project Design Measures
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Potential Effect	Construction and O&M Design Measures
		If a kit fox burrow is identified on or adjacent to the project area during the preconstruction survey, Fort Irwin natural resources staff will be contacted. Fort Irwin staff would determine the status of the burrow and establish an exclusion zone if necessary. Fort Irwin staff would decide if fencing or flagging would suffice to delineate the exclusion zone.
	Pest species	Construction and O&M Phases: All trash and debris would be placed in covered receptacles for delivery to approved landfill facilities. Daily cleanup of trash and debris would be required, including emptying and disposing of trash in covered receptacles. Any water applied during construction activities will be applied in such a manner as to avoid pooling to prevent subsidies for ravens and other pest species.
Water Resources		
Surface Water	Soil erosion, runoff, and sedimentation	Construction and O&M Phases: Proper BMPs would be implemented prior to the start of land grading or trenching activities. Native vegetation would be preserved when possible. Erosion, runoff, and sediment control measures would be implemented in case of a storm event. Construction would not occur in drainages during rain events or if rain is expected. Erosion control measures such as compost blankets, mulching, riprap, geotextiles, and slope drains could be used to protect exposed soil and minimize erosion. BMPs such as check dams, slope diversions, and temporary diversion dikes could be implemented for runoff control. Sediment control measures that could be implemented include compost filter berms and socks; fiber rolls or berms; sediment basins, rock dams, filters, chambers, or traps; silt fences; and weed-free hay bales. Staked fiber rolls would be placed at all drainage features for the duration of construction and left in place two weeks after completion of construction. Good housekeeping measures would be practiced during construction. Site-specific stormwater BMPs would be detailed in a construction SWPPP, which would be prepared before breaking ground.
Groundwater	Water supply	Construction Phase: Use recycled water for dust suppression.
Air Quality	Fugitive dust	Construction and O&M Phases: BMPs such as dust suppression techniques that could include spraying the ground with water would be implemented for construction and maintenance activities. Fort Irwin currently implements dust abatement programs that address problems associated with wind erosion and suspension of particles, including chemical stabilization and revegetation. Additionally, the requirements set forth in Rule 403.2, Fugitive Dust Control for the MDPA, would be adhered to, and would include implementation of a dust control plan.
Hazardous and Toxic Substances	Releases from equipment maintenance	Construction and O&M Phases: Implement a SWPPP consistent with hazardous waste and pollution regulations, which would include guidelines and BMPs to prevent a release of hazardous materials into the environment. Implement a project-specific site safety plan to avoid significant risks and health hazards associated with the use of hazardous materials and hazardous waste generation and disposal.
Health and Human Safety		
	Potential exposure to valley fever (would	Construction and O&M Phases: A brochure detailing valley fever, its cause, and symptoms would be made available to those working in the project area. The brochure would include information on how to control the

TABLE 4-3
Summary of Project Design Measures
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Resource	Potential Effect	Construction and O&M Design Measures
	apply to non-military personnel)	spread of the illness, such as changing clothes daily, using respiratory protection, applying water to the soil, and cleaning equipment and materials. Breathing protection gear would be made available to all workers, at their request and at no cost to the worker. Workers would be educated through briefings to recognize the symptoms of valley fever, and to quickly report suspected symptoms of work-related valley fever. Signs would be posted at the project site notifying visitors and workers to the threat of valley fever.

BMP = best management practice
MDPA = Mojave Desert Planning Area
mph = miles per hour
SWPPP = stormwater pollution prevention plan

SECTION 5

List of Preparers

TABLE 5-1
List of Preparers
Tiefort City Stormwater Management Plan EA, Fort Irwin, California

Name	Degree(s)	Years of Work Experience
Josh Jamell	B.S. Ecology	15
Rich Reaves	Ph.D. Wetland and Wildlife Ecology	23
Ron Vaughn	B.S.E. Chemical Engineering, M.S.E. Environmental Engineering	22
Sara Vivas	B.A. Spanish Literature, M.A. Latin American Studies (Tropical Conservation and Development)	16

SECTION 6

References

Air Force Combat Climatology Center (AFCCC). 2004. AFCCC/CCD-04/006, *National Training Center (NTC), Fort Irwin, California–A Full-Year Climatology*. March 21.

California Air Resources Board (ARB). 2007. *California 1990 Greenhouse Gas Emissions Level and 2020 Limit, Staff Report*. December.

California Air Resources Board (ARB). 2008. *Scoping Plan*. December.

California Air Resources Board (ARB). 2013. Ambient Air Quality Standards (AAQS). Available online at: https://www.arb.ca.gov/research/aaqs/aaqs.htm. Accessed January 2016.

California Division of Mines and Geology (CDMG). 1999. *Fault-Rupture Hazard Zones in California*. Revised 1997, Supplements 1 and 2 added 1999.

Council on Environmental Quality (CEQ). 2014. *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*. Published for public review and comment. December.

Crum, Nancy F., M. Potter, and D. Pappagianis. 2004. "Seroincidence of Coccidioidomycosis during Military Desert Training Exercises." In *Journal of Clinical Microbiology*. 42(10): 4552-4555.

Desert Dispatch. 2007. "Fort Irwin Road goes one year without a driving death." October 4. Available online at: http://www.desertdispatch.com/article/20071004/NEWS/310049994/0/SEARCH. Accessed on April 25, 2014.

Fort Irwin. 2015a. Serving & Supporting, Population Estimates. Updated August.

Fort Irwin. 2015b. *Natural Resources Preconstruction Survey Report for the Ammunition Supply Point Water Pipeline Route*. June 1.

Fort Irwin. 2016a. Fort Irwin Burrowing Owl Sightings Database. Provided January 6, 2016.

Fort Irwin. 2016b. Fort Irwin Desert Tortoise Sightings Database. Provided January 6, 2016.

Fort Irwin. 2016c. Fort Irwin Mohave Ground Squirrel Sightings Database. Provided January 6, 2016.

Michael Baker, Jr., Inc. 2009. *Transportation Infrastructure Requirements Study, National Training Center and Fort Irwin, California*. April.

Mojave Desert Air Quality Management District (MDAQMD). 1995. *Federal Particulate Matter (PM_{10}) Attainment Plan*. July.

Mojave Desert Air Quality Management District (MDAQMD). 2005. *List and Implementation Schedule for District Measures to Reduce PM Pursuant to Health and Safety Code §39614(d)*. June 27.

Mojave Desert Air Quality Management District (MDAQMD). 2011. California Environmental Quality Act (CEQA) and Federal Conformity Guidelines. Available online at: http://www.mdaqmd.ca.gov/index.aspx?page=13. Accessed on October 27, 2015.

National Park Service (NPS). 1995 (revised 2002). National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation. Prepared by U.S. Department of the Interior, accessed on June 10, 2016 at: https://www.nps.gov/nr/publications/bulletins/nrb15/.

Natural Resources Conservation Service (NRCS). 2015. Soil Map—National Training Center, Fort Irwin, California (Tiefort City SWMP EA). Web Soil Survey, National Cooperative Soil Survey. December 9.

NatureServe. 2015. *Vulpes macrotis*. Available online at: http://explorer.natureserve.org/. Accessed on June 8, 2015.

San Bernardino County. 2014. Average Daily Traffic Counts. Available online at: http://www.sbcounty.gov/ dpw/trafficadt/AvgDailyTraffic.aspx. Accessed on April 25, 2014.

San Bernardino County. 2015. *Coccidioidomycosis*. Updated June. Available online at: http://www.sbcounty.gov/uploads/dph/dehs/Depts/EnvironmentalHealth/EHSDocuments/Coccidioidomycosis.pdf. Accessed on January 13, 2016.

U.S. Army (Army). 2006. *Integrated Natural Resources Management Plan and Environmental Assessment (INRMP&EA). 2006-2011*. National Training Center and Fort Irwin. Environmental Division, Directorate of Public Works.

U.S. Army (Army). 2008. *Brigade Combat Team Transformation Draft Programmatic Environmental Impact Statement*. June.

U.S. Army Corps of Engineers (USACE). 2003. *Draft Environmental Baseline Survey of Army Residential Communities Initiative Properties at Fort Irwin, California*. August.

U.S. Army Corps of Engineers (USACE). 2014. *Fort Irwin Stormwater Management Plan, Tiefort City*. Prepared by the USACE, Los Angeles District. September.

U.S. Environmental Protection Agency (EPA). 2010. *Glossary of Climate Change Terms*. Available online at: http://epa.gov/climatechange/glossary.html. Accessed on July 16, 2010.

U.S. Environmental Protection Agency (EPA). 2015. NAAQS Table. Available online at: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed January 2016.

U.S. Fish and Wildlife Service (USFWS). 2010. *Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats*. Available online at: http://www.fws.gov/ventura/docs/species/protocols/dt/DT%20Pre-project%20Survey%20Protocol_2010%20Field%20Season.pdf.

U.S. Fish and Wildlife Service (USFWS). 2014. *Biological Opinion for Operations and Activities at Fort Irwin, San Bernardino County, California*. August 8.

SECTION 7

Distribution List

Fort Irwin Directorate of Public Works
Environmental Division, Building 602
Attention: Clarence Everly
P.O. Box 105085
Fort Irwin, CA 92310-5085

Fort Irwin Post Library
Attn: Reference Department
P.O. Box 105091
Building 331, 2nd Street
Fort Irwin, CA 92310

Barstow Library
Attention: Reference Department
304 East Buena Vista
Barstow, CA 92311

Adams, Broadwell, Joseph & Cardozo
Attention: Janet M. Laurain
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

California Regional Water Quality
Control Board/Lahontan Region
15095 Amargosa Road
Building 2, Suite 210
Victorville, CA 92394

China Lake Naval Weapons Center
Attention: Tim Fox, RLA, Community Plans & Liaison Officer
429 East Bowen, Building 981
Mail Stop 4001
China Lake, CA 93555

Defenders of Wildlife
1303 “J” Street, Suite 270
Sacramento, CA 95814

California Department of Fish and Wildlife
Inland Deserts Region
3602 Inland Empire Boulevard, Suite C-220
Ontario, CA 91764

Mr. Dave Kessler
Environmental Specialist, Planning & Programming Branch, AWP-610.1
FAA Western-Pacific Regional Headquarters
P.O. Box 92007
Los Angeles, CA 90009

Lozeau Drury LLP
Attention: Michael Lozeau
410 12th Street, Suite 250
Oakland, CA 94607

Mojave Desert Air Quality Management District
Attention: Alan De Salvio
14306 Park Ave
Victorville, CA 92392

Stephanie Lucero
National Indian Justice Center and California
Indian Museum and Cultural center
5250 Aero Drive
Santa Rosa, CA 95403

NASA Management Office
Attention: Steve Slaten
Jet Propulsion Labs, M/S 180-801
4800 Oak Grove Avenue
Pasadena, CA 91109

Native American Heritage Commission
1550 Harbor Boulevard
West Sacramento, CA 95691

San Bernardino County Planning Department
385 North Arrowhead Avenue, 1st Floor
San Bernardino, CA 92415-0182

The Nature Conservancy
California Field Office
201 Mission Street, 4th Floor
San Francisco, CA 94105

U.S. Air Force
Western Region Environmental Officer
50 Fremont Street, Suite 2450
San Francisco, CA 94105-2230

U.S. Environmental Protection Agency
Region IX Office
75 Hawthorn Street
San Francisco, CA 94105

Appendix A
Correspondence

No correspondence has been received as of October 17, 2016.

Appendix B
Natural Resources Survey Report

Final
Natural Resources Report for the Tiefort City Military Operations in Urban Terrain (MOUT)
Fort Irwin, California

Department Of the Army

Installation Management Command

July 2016

Executive Summary

This report describes the existing biological resources associated with the Fort Irwin Stormwater Management Plan for the Tiefort City site. The proposed site is located within the boundaries of Fort Irwin, a U.S. Army installation located approximately 37 miles (59.54 kilometers) northeast of Barstow, California. Tiefort City is located approximately nine miles (14.48 kilometers) northeast of the Fort Irwin cantonment area. The cantonment area occupies approximately three square miles (7.8 square kilometers), and provides temporary and permanent living quarters for soldiers and their families along with support facilities. The Tiefort City facility is a mock desert town used to simulate urban warfare and train soldiers for military operations within a populated civilian environment.

Vegetation at the proposed site consists primarily of disturbed Mojave creosote (*Larrea tridentata*) scrub vegetation. The natural resources survey identified the vegetation communities, common species, and surveyed for special-status species and their habitat present within the site. The survey focused on desert tortoise (*Gopherus agassizii*) and included a protocol-level survey through all suitable habitat within the proposed project site. Historical desert tortoise sign (inactive desert tortoise burrow) was observed within the Tiefort City project area. No other sign of listed species inhabiting the proposed project site was observed.

Contents

Acronyms and Abbreviations

Army	U.S. Army
amsl	above mean sea level
CDFW	California Department of Fish and Wildlife
CH2M	CH2M HILL, Inc.
CNPS	California Native Plant Society
GIS	geographic information system
GPS	global positioning system
MBTA	Migratory Bird Treaty Act
MOUT	Military Operations in Urban Terrain
N	Not Listed
SWMP	Stormwater Management Plan
USFWS	U.S. Fish and Wildlife Service

SECTION 1

Introduction

This report presents the results of a natural resources survey and desert tortoise (*Gopherus agassizii*) protocol-level survey. The survey was conducted at the site proposed for the Tiefort City Stormwater Management Plan (SWMP) at Fort Irwin, California.

1.1 Project Description

Fort Irwin proposes to implement projects to construct cost-effective, low-maintenance stormwater management infrastructure for the Tiefort City site designed to the 100-year flood level to protect structures and infrastructure against damages from a future flood event.

1.2 Site Location

Fort Irwin, also known as the National Training Center, is located in southeast California 37 miles (59.54 kilometers) northeast of Barstow in the Mojave Desert in northern San Bernardino County. Fort Irwin was designated as a permanent installation in 1961 and encompasses approximately 753,537 acres (304,946 hectares). The installation is approximately 25 miles (40 kilometers) from Interstate 15, midway between Las Vegas and Los Angeles (Figure 1-1).

Fort Irwin serves as the U.S. Army (Army)'s premier training center. Approximately 80 percent of the land area of Fort Irwin is used for desert battlefield training. One of the key training opportunities on Fort Irwin includes the use of an Opposing Force, which provides force-on-force and live-fire training for ground and aviation units in a joint scenario.

The project area evaluated for the Tiefort Military Operations in Urban Terrain (MOUT) SWMP encompasses approximately 400 acres (162 hectares).

Legend

Fort Irwin Boundary

0 12.5 25 50
Miles

N

FIGURE 1-1
Vicinity Map
Tiefort City Stormwater Management Plan
Natural Resources Report
Fort Irwin, CA

ch2m:

SECTION 2

Methods

CH2M HILL, Inc. (CH2M) biologists conducted a natural resources survey to determine the presence of federally and state-listed species and their habitat within the Tiefort City MOUT SWMP project site on October 27, 2015 and March 22, 2016 (Figure 2-1).

2.1 Survey Methodology

The overall goal of the survey was to determine the presence or absence of desert tortoises or any other listed species within the proposed project area. The survey was conducted by a four-person team of CH2M biologists.

The survey was conducted according to the *Desert Tortoise Pre-project Survey Protocol 2010 Field Season* (U.S. Fish and Wildlife Service [USFWS], 2010) by walking transects at 33-foot (10-meter) spacing throughout all accessible, appropriate habitat on the site. Approximately 15 percent of the Tiefort City site was not given full coverage during the field surveys due to access issues posing a safety hazard. The area not fully surveyed was in the far southeastern corner of the project area where the terrain is very rocky, steep, and unsettled. The data collected were the following:

- Preliminary characterization of plant communities present on the site
- Photographs of the site
- Documentation of all sign of desert tortoises, including live tortoises, burrows, scat, carcasses, and shell-skeletal remains
- Documentation of all other sensitive species sightings or sign observed during the survey
- Documentation of common plant and animal species observations

Any tortoise or large mammal burrows encountered that could potentially be used by tortoises were visually inspected. Very small burrows that could be potentially used by juvenile tortoises but are more often rodent burrows were also visually checked when encountered. Only definitive tortoise sign was recorded.

A Trimble global positioning system (GPS) unit was used to orient and guide the survey. Transect routes were generated prior to conducting the field work and uploaded into the Trimble unit. The locations of any observed special status species sign were recorded using the GPS unit.

LEGEND

- Project Area
- Cantonment Area

N

0 0.125 0.25 Miles

1:15,840

FIGURE 2-1
Tiefort City Study Area
Tiefort City Stormwater Management Plan
Natural Resources Report
Fort Irwin, California

Source: Esri World Imagery

Z:\ISBG\MDeseo\FortIrwin\656419\Mapfiles\Project\Fig_Overview_TiefortCity.mxd

ch2m

SECTION 3
Results

This section provides the results of the natural resources and focused desert tortoise survey, including site characteristics, plants, wildlife, and sensitive species.

3.1 Site Characteristics

Much of the land within the Tiefort City MOUT site was disturbed historically by military training activities. There was evidence of previous all-terrain vehicle use within the site (see Appendix A, Photo 1). Nonetheless, landscape features that offer a diversity of wildlife habitat types were observed. These habitat types are defined by a number of distinct landscape features, such as wash, rock outcrops, cliffs, cave entrances, and sand dunes (see Appendix A, Photos 2 and 3). The Tiefort City survey area ranges in elevation from approximately 2,350 feet (716 meters) above mean sea level (amsl) on the northwestern end to approximately 2,950 feet (899 meters) amsl on the southeastern edge. The site contains a creosote bush (*Larrea tridentata*)-white bursage (*Ambrosia dumosa*) series vegetation community (Sawyer and Keeler-Wolf, 1995). Plant species cover and diversity were generally low-moderate (see Appendix A, Photo 4). Creosote bush and white bursage are the most common plant species throughout the site, while commonly associated plant species varied. Two other distinct habitat areas were found within the Tiefort City study area, with rugged boulder/rock outcrops of granite observed in the far southeastern portion, and several small sand dunes were observed within the western portion. Five non-native plant species were observed (Table 3-1), and occurred in small, disparate patches primarily where there is more vehicular traffic. All plant species observed are identified in Table 3-1.

A variety of invertebrates, reptiles, birds, and mammals occur within the area. Wildlife observed onsite was typical of that found in surrounding areas. No fish or amphibious species are likely to inhabit the site or the immediately surrounding areas because no water resources were observed within the project area. All wildlife and sign of wildlife observed onsite and in surrounding areas are identified in Table 3-1.

TABLE 3-1
Observed Fauna and Flora
Natural Resources Report, Tiefort City Military Operations in Urban Terrain, Fort Irwin, California

Common Name	Scientific Name	Federal Status	State Status
Reptiles			
California whiptail	*Aspidoscelis tigris munda*	N	N
Long-nosed leopard lizard	*Gambelia wislizenii*	N	N
Side-blotched lizard	*Uta stansburiana*	N	N
Zebra-tailed lizard	*Callisaurus draconoides*	N	N
Mammals			
Blacktail jackrabbit	*Lepus californicus*	N	N
Desert cottontail	*Sylvilagus audubonii*	N	N
Desert kangaroo rat	*Dipodomys deserti*	N	N
Desert pocket mouse	*Chaetodipus penicillatus*	N	N
Birds			
Brewers sparrow	*Spizella breweri*	N	N
Common raven	*Corvus corax*	N	N

TABLE 3-1
Observed Fauna and Flora
Natural Resources Report, Tiefort City Military Operations in Urban Terrain, Fort Irwin, California

Common Name	Scientific Name	Federal Status	State Status
Horned lark	*Eremophila alpestris*	N	N
Turkey vulture	*Cathartes aura*	N	N
White-crowned sparrow	*Zonotrichia leucophrys*	N	N
Plants			
Annual burrweed	*Ambrosia acanthicarpa*	N	N
Saharan mustard	*Brassica tournefortii**	N	N
Buckwheat	*Eriogonum fasciculatum*	N	N
Burrobush	*Ambrosia dumosa*	N	N
Cheesebush	*Ambrosia salsola*	N	N
Common Mediterranean grass	*Schismus barbatus**	N	N
Cooper's goldenbush	*Ericameria cooperi*	N	N
Creosote bush	*Larrea tridentata*	N	N
Desert pepperweed	*Lepidium fremontii*	N	N
Desert sand verbena	*Abronia villosa*	N	N
Desert straw	*Stephanomeria pauciflora*	N	N
Desert trumpet	*Eriogonum inflatum*	N	N
Flat topped buckwheat	*Eriogonum deflexum*	N	N
Goldenbush	*Ericameria linearifolia*	N	N
Jimsonweed	*Datura wrightii*	N	N
Mohave wild parsley	*Lomatium mohavense*	N	N
Mojave rabbitbrush	*Ericameria paniculata*	N	N
Mojave woodyaster	*Xylorhiza tortifolia*	N	N
Mormon tea	*Ephedra californica/nevadensis*	N	N
Pygmy poppy	*Eschscholzia parishii*	N	N
Rattlesnake weed	*Chamaesyce albomarginata*	N	N
Redstem filaree	*Erodium cicutarium**	N	N
Russian thistle	*Salsola tragus**	N	N
Showy gilia	*Gilia cana*	N	N
Wire lettuce	*Stephanomeria pauciflora*	N	N

N = Not Listed
* = Non-native
Source: Listing status derived from California Department of Fish and Wildlife (CDFW, 2016).

3.2 Sensitive Species

Six sensitive species (two plants and four animals) were specifically targeted during the natural resource survey due to historical records of their occurrence in the project vicinity (CDFW, 2016; California Native Plant Society [CNPS], 2016). One inactive burrow of a desert tortoise, which is federally listed as threatened,

was observed during the survey. No other federally or state-listed wildlife species or their sign were observed. Figure 3-1 shows the locations of historically observed sensitive species and desert tortoise sign found during the survey. The GPS location in the Universal Transverse Mercator Zone 11N coordinate system is provided for the desert tortoise sign data point (Table 3-2).

TABLE 3-2
Sensitive Species Sign Found within the Project Area
Natural Resources Report, Tiefort City Military Operations in Urban Terrain, Fort Irwin, California

GPS Location	Description of Sign	Northing	Easting
DT03	Inactive Desert Tortoise Burrow	3897076	521750.4

DT = Desert Tortoise

The sensitive plant species are the following:

Alkali Mariposa Lily

Alkali mariposa lily (*Calochortus striatus*) is a CNPS List 1B.2 bulbiferous herb that blooms from April to June. It is historically known to occur most commonly in open, flat, barren sites on the sandy margins of alkali depressions in creosote bush scrub and arid phase saltbush scrub communities at elevations ranging from 230 feet (70 meters) to 5,230 feet (1,594 meters) amsl. This plant was not observed during the natural resource survey and is not expected to occur due to the lack of suitable habitat on the site.

Clokey's Cryptantha

Clokey's cryptantha (*Cryptantha clokeyi*) is a CNPS List 1B.2 annual herb that blooms in April. It is known to occur in desert habitat generally including sandy or gravelly soils within creosote bush scrub communities in the Mojave Desert from elevations of 2,625 feet (800 meters) to 4,200 feet (1,280 meters) amsl. This plant was not observed during the natural resource survey, and is unlikely to occur due to the marginally suitable habitat on the site and because this species is not known to occur near the project area.

Lane Mountain Milk-vetch

Lane Mountain milk-vetch (*Astragalus jaegerianus*) is a perennial herb that is federally listed as endangered. It is most commonly found in Mojave mixed woody scrub or creosote bush scrub. Habitat for the species is found at elevations from 3,000 feet (914 meters) to 4,000 feet (1,219 meters) amsl with granite substrate, shallow soils with bedrock near the surface, relatively gentle slopes and areas of low ridges, and diverse shrub assemblages in Mojave creosote bush scrub and Mojave mixed woody scrub communities. It is almost exclusively found growing up through shrubs or occasionally through clumps of dead bunchgrass. The highest elevation within the project area is less than 2,950 feet (899 meters) amsl, which is below the typical elevation where Lane Mountain milk-vetch typically occurs. This plant was not observed during the natural resource survey and is not expected to occur due to the lack of suitable habitat on the site.

Desert Cymopterus

Desert cymopterus (*Cymopterus deserticola*) is a CNPS List 1B.2 perennial herb that grows on loose, sandy soils in Joshua tree woodland, saltbush scrub, and Mojavean desert scrub communities in the western Mojave Desert, at elevations between 2,000 feet (609 meters) and 3,000 feet (914 meters) amsl. This plant has a moderate potential to occur within the northwest region of the project area where there are small sand dunes, but it was not observed during either survey. The spring survey (March 2016) was conducted during its blooming period and surveyors were specifically looking for desert cymopterus during this survey; therefore, this plant is not expected to occur.

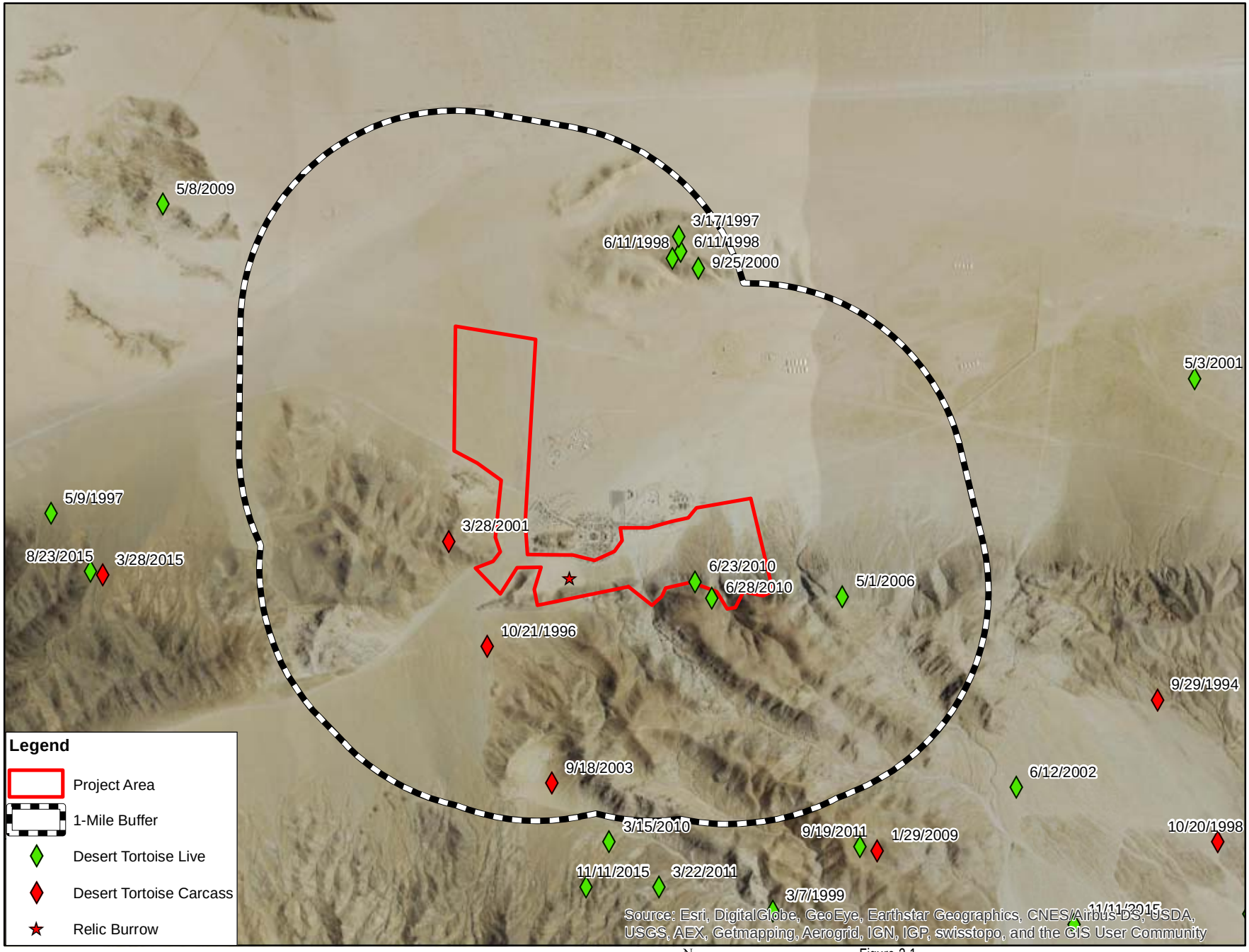

Figure 3-1
Natural Resources Survey Area with Sensitive Species Sign
Tiefort City Stormwater Management Plan Natural Resources Report
Fort Irwin, CA

ch2m

The sensitive wildlife species are the following:

Desert Tortoise

The description of desert tortoise is presented in Section 3.2.1.

Golden Eagle

Golden eagle (*Aquila chrysaetos*) is classified as a fully protected species. This classification represents the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. This species is also protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA). The species is an uncommon permanent resident and migrant throughout California and ranges from sea level up to 11,500 feet (3,505 meters) amsl. Suitable habitat includes rolling foothills, mountain areas, sage-juniper flats, and desert. Golden eagles nest on cliffs and steep escarpments in grassland, chaparral, shrubland, forest, and other vegetated areas (Grinnell and Miller, 1944). This species was not observed during the natural resource survey. However, the site offers suitable foraging habitat and golden eagle likely forage on the site and in the surrounding area, as two golden eagle nests (one active this year) were observed in spring 2016 in the Tiefort Mountains approximately 3 miles (4.83 kilometers) southwest (Tetra Tech, Inc. [Tetra Tech], 2016).

Prairie Falcon

Prairie falcon (*Falco mexicanus*) is a USFWS Bird of Conservation Concern and is on the CDFW Watch List. This species is also protected by the MBTA. Prairie falcon is an uncommon permanent resident that ranges from southeastern deserts northwest throughout the Central Valley and along the inner Coast Ranges and Sierra Nevada. They are distributed in habitats from annual grasslands to alpine meadows, but primarily inhabit perennial grasslands, savannah, rangeland, and some agricultural fields. Prairie falcons are mostly absent from the coastal fog belt and are not found in upper elevations of the Sierra Nevada. They typically nest in a scrape on a sheltered ledge of a cliff overlooking a large, open area (CDFW, 2005). The species would not be expected to nest within the proposed project area and was not observed during the natural resources survey. The site offers suitable foraging habitat and the prairie falcon likely uses the habitat within and adjacent to the project area for foraging. An active prairie falcon nest was observed in spring 2016 in the Tiefort Mountains approximately 4.4 miles (7.08 kilometers) southwest of the study area (Tetra Tech, 2016).

LeConte's Thrasher

LeConte's thrasher (*Toxostoma lecontei*) is a California Bird Species of Special Concern, as defined by CDFW because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. This species is also protected by the MBTA. Its home range is in saltbush-cholla scrub, where the majority of shrubs rarely exceed eight feet (2.4 meters) in height, except for isolated desert trees, yuccas, or tall, thin shrubs. Its preferred habitat generally consists of sparsely vegetated desert flats, dunes, alluvial fans, or gently rolling hills having a high proportion of one or more species of saltbush or shadscale and/or cylindrical cholla cactus. LeConte's thrasher rarely occurs in habitats consisting entirely of creosote bush. This species was not observed during the natural resource survey and is not expected to occur on the site, as the habitat is only marginally suitable.

Loggerhead Shrike

The loggerhead shrike (*Lanius ludovicianus*) is a California Species of Concern and is protected by the MBTA. This species is relatively common in lowland California and prefers open habitat with scattered shrubs and trees for nesting (Grinnell and Miller, 1944). A small amount of marginally suitable foraging habitat for this species occurs within the project area, mostly along the southeastern edge. Suitable nesting habitat is very rare. No loggerhead shrikes were observed onsite during the survey; however, there is a low potential for the species to occur, as minimal marginally suitable foraging habitat is present and loggerhead shrikes have been observed by Fort Irwin biologists in the nearby area.

Mohave Ground Squirrel

Mohave ground squirrel (*Spermophilus mohavensis*) is a California state-listed threatened species restricted to the Mojave Desert in San Bernardino, Los Angeles, Kern, and Inyo counties. This species favors open desert scrub, alkali desert scrub, and Joshua tree habitats at elevations ranging from 1,800 feet (549 meters) to 5,000 feet (1,524 meters) amsl. It is also known to feed in annual grasslands. The nearest Mohave ground squirrel population is over 15 miles (24 kilometers) west of the project area within the NASA/Goldstone complex. Populations of this species have not been observed east of this western-most population since the 1980s (Fort Irwin, 2016a). An individual Mohave ground squirrel was observed approximately 3.4 miles (5.5 kilometers) west of the project area in 1977 northeast of Bicycle Lake (Fort Irwin, 2016a). Figure 3-1 presents a depiction of where the nearest Mohave ground squirrel was observed. This species was not observed during the natural resource survey, and is unlikely to occur onsite due to there being low-quality habitat and this species is not known to occur in or nearby the project area.

Western Burrowing Owl

The western burrowing owl (*Athene cunicularia)* is a California Species of Concern and is protected by the MBTA. This ground-nesting raptor occupies burrows in annual grassland or ruderal habitats. It is historically known to occur in open, dry grasslands, agricultural and range lands, and desert habitats. This species has the potential to occur on the site; primarily in the southeastern portion of the site where there are rocky drainages. The nearest siting of this species, based on historical geographic information system (GIS) data collected by Fort Irwin, is over three miles (4.8 meters) west of the project area during the summer of 2011 (Fort Irwin, 2016b). Figure 3-1 presents a depiction of where the nearest burrowing owl has been observed.

Yellow-headed Blackbird

The yellow-headed blackbird (*Xanthocephalus xanthocephalus*) is a California Species of Concern and is protected by the MBTA. The species generally occurs in California as a migrant or summer resident, but small numbers winter in the southern deserts. Preferred breeding habitat includes marshes and wetlands with tall emergent vegetation, and the blackbird may forage in surrounding wetlands, grasslands, and croplands. Yellow-headed blackbirds breed at scattered sites throughout the Mojave Desert. Small numbers breed regularly near Victorville, Barstow, and Newberry Springs in San Bernardino County. Marginally suitable foraging habitat for this species occurs within the project area, but no suitable nesting habitat occurs. The yellow-headed blackbird was not observed on the site during the survey; however, it has been observed on Fort Irwin so there is a moderate potential for the species to occur on the project site.

Mojave Fringe-toed Lizard

The Mojave fringe-toed lizard *(Uma scoparia*) is a CDFW-designated Species of Special Concern and a Bureau of Land Management (BLM)-designated sensitive species. This species is endemic to southern California and a small area of western Arizona, where it is restricted to aeolian sand habitats in the deserts of Los Angeles, Riverside, and San Bernardino counties in California and La Paz County in Arizona. Mojave fringe-toed lizards are restricted to areas with fine, aeolian sand, including both large and small dunes, margins of dry lakebeds and washes, and isolated pockets against hillsides. The loose wind-blown sand habitat upon which the Mojave fringe-toed lizard depends is a fragile ecosystem requiring protection against both direct and indirect disturbances. The Mojave fringe-toed lizard is known to occur near Bitter Springs, in the dunes just east of Red Pass Lake, and the sand sheets on the west side of a large rock formation known as the “Whale” (Army, 2006). This species is not expected to occur within the project area due to a lack of suitable habitat.

3.2.1 Desert Tortoise

Desert tortoises were classified by USFWS as a threatened species in 1990. This listing occurred as a result of continued human-caused habitat destruction through urban expansion, off-road vehicle use, illegal collection for the pet trade, and raven predation on juvenile tortoises.

The desert tortoise is threatened in over 30 percent of its range. Desert tortoises occur in southeastern California, southern Nevada, southwestern Utah, and northwestern Arizona, often within desert scrub communities. Optimal habitat for the desert tortoise has been characterized as creosote bush scrub where annual precipitation ranges from two inches (five centimeters) to eight inches (20 centimeters), where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach, 1982; Turner, 1982; Turner and Brown, 1982). Soils must be friable enough for digging burrows, but firm enough so that burrows do not collapse. Desert tortoises occur from below sea level to an elevation of 7,300 feet (2,225 meters) amsl, but the most favorable habitat occurs at elevations of approximately 1,000 feet (304 meters) to 3,000 feet (914 meters) amsl (Luckenbach, 1982). Throughout most of the Mojave region, tortoises occur most commonly on gently sloping terrain with sandy-gravel soils, scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, tortoises can be found in steeper, rockier areas (Gardner and Brodie, 2000).

Historical Fort Irwin GIS data of live and dead desert tortoise occurrences ranging from 1994 to 2015 indicate that seven live and three dead desert tortoises were observed within a one-mile (1.6-kilometer) buffer of the proposed project area during this period (Fort Irwin, 2016c). The most recent siting of a desert tortoise within the one-mile (1.6-kilometer) buffer was on June 28, 2010, near the southeastern edge of the project area. During the protocol desert tortoise survey on October 27, 2015, one inactive desert tortoise burrow was observed in the southwestern portion of the Tiefort City study area (see Appendix A, Photo 5). Table 3-2 presents the location of all desert tortoise sign found and Figure 3-1 depicts the recent and historical desert tortoise sightings.

SECTION 4

Conclusions and Recommendations

This section identifies the biological resources on the site for which further surveys or permitting may be required. This section also presents recommendations for meeting the requirements for these resources.

4.1 Conclusions

One inactive desert tortoise burrow was observed during the field survey. No other federally or state-listed wildlife species were observed during the survey.

One federally threatened wildlife species, one wildlife California Species of Concern, one fully protected wildlife species, and a USFWS Bird of Conservation Concern have a moderate or higher potential to occur onsite:

- Desert tortoise
- Burrowing owl
- Golden eagle
- Prairie falcon

4.2 Recommendations

Preconstruction surveys will likely be required for desert tortoise. It is recommended that coordination with CDFW and USFWS be conducted so that no adverse effects occur to this species as a result of project construction.

The project may impact golden eagle and MBTA species due to direct construction activities. These impacts will be minimized, and violations avoided, by conducting pre-construction nesting surveys during the bird breeding season (February 1 through August 31) to avoid active nests in the project area. Pre-construction nesting surveys will be performed along with nest monitoring by a qualified biologist during the bird nesting season.

Pre-construction surveys will be required for burrowing owls within 30 days of the initiation of vegetation removal activities in the southeast portion of the site where there is suitable habitat. The pre-construction survey is typically required by CDFW and consists of walking 99-foot (30-meter) transects throughout the suitable habitat within the project area to identify any owls currently inhabiting areas where project activities may disturb their burrows (CDFW, 1993). During the non-breeding season (October-February) these owls may be passively relocated off the site pending completion of coordination with the Fort Irwin Environmental Division, Directorate of Public Works, and a relocation plan approved by CDFW.

SECTION 5

References

California Department of Fish and Wildlife (CDFW). 1993. *Burrowing Owl Survey Protocols and Mitigation Guidelines.*

California Department of Fish and Wildlife (CDFW). 2016. State and federally listed endangered, threatened, and rare plants and animals of California. Online Resource for plants and animal listings: http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp.

California Department of Fish and Wildlife (CDFW). 2005 (Updated). Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. *California's Wildlife*. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

California Native Plant Society (CNPS). 2016. *The California Native Plant Society's Inventory of Rare and Endangered Plants of California* (Online edition, version 7.7). Online: http://www.rareplants.cnps.org/.

Fort Irwin. 2016a. Fort Irwin Mohave Ground Squirrel Sightings Database. Provided January 6, 2016.

Fort Irwin. 2016b. Fort Irwin Burrowing Owl Sightings Database. Provided January 6, 2016.

Fort Irwin. 2016c. Fort Irwin Desert Tortoise Sightings Database. Provided January 6, 2016.

Gardner, T. J. and E. D. Brodie, Jr. 2000. *The occupation of steep slopes by desert tortoises (*Gopherus agassizii*) in the western Mojave Desert: A description of occupied habitats, habitat use, and desert tortoise density*. Final report.

Grinnell, J. and A. H. Miller. 1944. *The Distribution of the Birds of California*. Pacific Coast Avifauna. Vol. 27.

Luckenbach, R.A. 1982. Ecology and management of the desert tortoise *(Gopherus agassizii)* in California. *In* R.B. Bury (ed.). *North American Tortoises: Conservation and Ecology*.

Sawyer, J. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento.

Tetra Tech, Inc. (Tetra Tech). 2016. Nest surveys (helicopter) conducted for Fort Irwin in spring 2016.

Turner, R.M. 1982. Mohave desertscrub. In: *Biotic communities of the American southwest-United States and Mexico*. D. E. Brown, editor. Special issue of desert plants, volume 4. Pages 157-168.

Turner, R.M. and D.E. Brown. 1982. Sonoran desertscrub. In: *Biotic communities of the American southwest-United States and Mexico*. D. E. Brown, editor. Special issue of desert plants, volume 4. Pages 181-221.

U.S. Army. 2006. *Integrated Natural Resources Management Plan and Environmental Assessment (INRMP&EA)*. 2006-2011. National Training Center and Fort Irwin. Environmental Division, Directorate of Public Works.

U.S. Fish and Wildlife Service (USFWS). 2010. *Desert Tortoise Pre-project Survey Protocol 2010 Field Season: Preparing For Any Action That May Occur Within The Range of The Mojave Desert Tortoise (*Gopherus agassizii*)*.

Appendix A
Photographs of the Tiefort City Survey Area

Photograph 1: *View of the Tiefort City project area from approximately the middle of the site, looking north.*

Photograph 2: *View of a rocky outcrop on the southern side of Tiefort City project area, looking southwest.*

Photograph 3: *View of a large drainage in southeastern portion of Tiefort City MOUT site survey area looking north.*

Photograph 4: *View of the Tiefort City MOUT site survey area from the western boundary looking northeast at a biologist conducting the survey.*

Photograph 5: *View of an inactive desert tortoise burrow located in the Tiefort City MOUT site survey area looking northwest.*

Appendix C
Cultural Resources Inventory Report

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON
BLDG 237, B AVE, P.O. Box 105021
FORT IRWIN, CA 92310-5000

April 25, 2016

Subject: Tiefort City Stormwater Project (FY16-1005), Fort Irwin, California

Ms. Julianne Polanco
State Historic Preservation Officer
Office of Historic Preservation
Department of Parks and Recreation
1725 23rd Street, Suite 100
Sacramento, CA 95816-7100

Dear Ms. Polanco:

The purpose of this letter is to inform you of an Undertaking, as defined by the National Historic Preservation Act of 1966 (as amended) (NHPA) at Fort Irwin, located in San Bernardino County, California, as discussed in the enclosed report and supporting documents. The US Army proposes to construct and maintain stormwater controls to prevent flooding and to reduce the effects of a 100-year flood event at the Tiefort City Military Operations in Urban Terrain (MOUT) training complex. This project is necessary to prevent runoff and debris flows from inundating the structures and infrastructure within Tiefort City so that the MOUT site is available for future training exercises.

This undertaking consists of the construction of a 1,155.19 m (3,790 ft) long earthen protection berm on the western side of Tiefort City and a 1,524 m (5,000 ft) long by 3.05 m (10 ft) wide by 3.05 m (10 ft) deep diversion channel that will divert flows to the earthen protection berm. In addition, three debris basins will be constructed south of Tiefort City that will contain between 9,867.85 and 16,035.26 m^3 (8 and 13 acre-ft) of debris. These debris basins will disturb the ground up to a maximum depth of 3.05 m (10 ft). Sediments to construct the berms will come from the project area, and riprap will be installed to prevent erosion and to reduce velocities of flows. The total area of potential effects (APE) for this undertaking is 159.35 hectares (393.76 acres). Work will be completed using backhoes, dozers, and dump trucks. Access to the APE will be via existing paved and dirt roads.

A cultural resources records search was conducted by CH2MHILL on December 14, 2015, using the California Historical Resources Information System (CHRIS) at the South Central Coastal Information Center (SCCIC). In addition, a records search was conducted at the Fort Irwin Directorate of Public Works (DPW) Cultural Resources Library on December 16, 2015. These records searches included a review of all recorded prehistoric and historic archaeological sites and historic architectural resources as well as cultural resources survey and excavation reports within the APE and a one mile records search buffer around the APE. Staff also consulted databases at the websites for the California Office of Historic Preservation, California Historical Resources, California Historical Landmarks, California Points of Historical Interest, California Register of Historical Resources, and the National Register of Historic Places.

The records search revealed that the APE and the records search buffer had been previously surveyed for cultural resources through nine separate projects (see enclosed report). Five prehistoric archaeological sites and three prehistoric isolates were recorded within the

records search area during the previous surveys. None of these resources are within the APE for the current undertaking, and they will not be affected by construction activities.

On December 8-10, 2015, CH2MHILL conducted an intensive pedestrian survey of the entire APE. Fieldwork was conducted by a three-person team that walked a series of linear transects spaced 10-15 m apart. Ground visibility was generally excellent (80 to 100 percent) as sediments within the APE consisted of disturbed alluvial and aeolian sands. Impacts to the APE include paved and dirt roads, vehicle tracks, military debris, training buildings, utilities infrastructure, and alluvial erosion. One prehistoric isolate, consisting of a basalt flake fragment, was discovered during this survey.

CH2MHILL recommends the prehistoric isolate found within the APE not eligible for the National Register of Historic Places (NRHP). I accept this recommendation, and I request your concurrence with this finding. Based on the results of the cultural resources identification and evaluation efforts, I have determined that no properties listed in the NRHP, nor considered eligible for inclusion in the NRHP, exist within the APE of this undertaking. Therefore, a finding of "No Historic Properties Affected" is appropriate for this undertaking in accordance with 36 CFR 800.4(d)(1), and I request your concurrence with this finding.

If you have any questions, please contact Mr. Clarence Everly (Fort Irwin Natural and Cultural Resources Program Manager) at (760) 380-3740 or at clarence.a.everly.civ@mail.mil. Written correspondence regarding this undertaking should be addressed to:

Mr. Muhammad Bari
Directorate of Public Works
Environmental Division
ATTN: IMNT_PWE
PO Box 105085
Fort Irwin, CA 92310-5085

Sincerely,

Muhammad A. Bari, P.E.
Director of Public Works
USAG Fort Irwin, CA

Enclosure

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

June 15, 2016

Reply In Reference To: USA_2016_0513_001

Mr. Muhammad A. Bari
Directorate of Public Works
Environmental Division, ATTN: IMNT_PWE
P. O. Box 105085
Fort Irwin, CA 92310-5085

RE: Tiefort City Stormwater project (FY16-1005), Fort Irwin, California; (your letter of April 25, 2016)

Dear Mr. Bari:

Thank you for requesting my comments on the above cited undertaking, in accordance with Section 106 of the *National Historic Preservation Act*, as amended. The Department of the Army (Army) proposes to construct and maintain stormwater controls to prevent flooding and to reduce the effects of a 100-year flood event at the Tiefort City Military Operations in Urban Terrain (MOUT) training complex.

Specifically, the proposed undertaking will consist of the construction of a 3,790 feet long earthen protection berm on the western side of Tiefort City and a 5,500 feet long by 10 feet wide deep diversion channel that will divert flows to the earthen protection berm. In addition, three debris basins will be constructed south of Tiefort City that will contain between 9,867.85 and 16,035.26 square meters (8 and 13 acre-feet) of debris. These debris basins will disturb the ground down to a maximum depth of 10 feet. Sediments to construct the berms will come from the project area, and riprap will be installed to prevent erosion and to reduce the velocities of flows. The area of potential effects (APE) consists of 393.76 acres. Work will be completed using backhoes, dozers, and dump trucks. Access to the APE will be by existing paved and dirt roads.

As documentation for your finding of effect, you provided a cultural resources survey report prepared by Gloriella Cardenas, Natalie Lawson, and Kyle Parker-McGlynn of CH2M Hill and dated April 2016. A records review was conducted at the South Central Information Center at CSU-Fullerton on December 14, 2015. That records review revealed that no cultural resources were located within the APE. Five prehistoric sites and three prehistoric isolates were located within the search area, but outside of the APE and would not be affected by the proposed undertaking. A pedestrian survey of the APE was conducted, which identified only a single basalt flake (CH-IF-01) at being located within the APE.

On April 25, 2016, the Army sent request for comment letters to 17 tribes or tribal groups identified by the Army in regard to the proposed undertaking. As of today, the Army has not received any responses to those letters.

Based on the records review, the pedestrian survey, and the tribal consultations, the Army has determined that a finding of No Historic Properties Affected is appropriate for this proposed

undertaking, and has requested my concurrence with that determination and its identification of the APE. The Army has also determined that CH-IF-01 is not eligible for listing on the National Register of Historic Places (NRHP).

My staff has reviewed the documentation you provided and I would like to offer the following comments:

- I have no objections to your identification and delineation of the APE, pursuant to 36 CFR Parts 800.4(a)(1) and 800.16(d);
- I do not object to your determination that CH-IF-01 is not eligible for listing on the NRHP; and
- I do not object to your finding of No Historic Properties Affected and agree that it is appropriate for this proposed undertaking.

Be advised that under certain circumstances, such as an unanticipated discovery or a change in project description, you may have additional future responsibilities for this undertaking under 36 CFR Part 800. Should you encounter cultural artifacts during ground disturbing activities, please halt all work until a qualified archaeologist can be consulted on the nature and significance of such artifacts.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact the following member of my staff: Tristan Tozer at (916) 445-7027 or via e-mail at Tristan.Tozer@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer

Final
CULTURAL RESOURCES INVENTORY REPORT FOR THE TIEFORT CITY STORMWATER PROJECT
Fort Irwin, California

Department Of the Army

Installation Management Command

April 2016

Contents

Acronyms and Abbreviations

amsl	above mean sea level
APE	area of potential effects
B.A.	Bachelor of Arts
BLM	Bureau of Land Management
BP	before present
cal	calibrated years
CFR	*Code of Federal Regulations*
CH2M	CH2M HILL, Inc.
CHRIS	California Historical Resources Information System
CRHR	California Register of Historical Resources
DPR	Department of Parks and Recreation
DPW	Directorate of Public Works
EA	Environmental Assessment
ICRMP	Integrated Cultural Resources Management Plan
M.A.	Master of Arts
MOUT	Mobile Operations in Urban Terrain
n.d.	no date
NADB	National Archaeological Database
NAGPRA	Native American Graves Protection and Repatriation Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NPS	National Park Service
Project	Tiefort City Stormwater Project
RPA	Register of Professional Archaeologists
SCCIC	South Central Coastal Information Center
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

SECTION 1

Introduction

CH2M HILL, Inc. (CH2M) conducted a cultural resources assessment to analyze the potential effects to historic properties from the Tiefort City Stormwater Project (Project). Tiefort Wash passes along the western and southern edges of the Tiefort City Mobile Operations in Urban Terrain (MOUT) training complex. This area received flooding and flood damage from an August 2013 rainfall event. The Project is located at Fort Irwin in San Bernardino County, California, with an area of 393.76 acres (159.35 hectares). Figure 1-1 provides a view of the Project site and vicinity.

The purpose of the Project is to construct and maintain stormwater controls to prevent flooding and reduce the effects of a 100-year flood event in Tiefort City.

The Project is needed to accomplish the following:

- Prevent runoff as a result of 100-year storms or smaller storm events from inundating the structures and infrastructure within Tiefort City
- Manage debris flows to ensure proposed improvements have adequate capacity to control a 100-year flood event

Tiefort City is approximately 10 miles (16.09 kilometers) northeast of the Fort Irwin cantonment area. The MOUT facility is on a broad alluvial fan that originates from the mountains and hills to the south. Tiefort Wash passes through the western edge of the Tiefort City training complex. The Project is located within Township 15 North, Range 4 East, Section 35; Township 14 North, Range 4 East, Sections 1, 2; and unsectioned areas of the San Bernardino Base Meridian on the *Tiefort Mountains*, California, U.S. Geological Survey (USGS) 7.5-minute topographical quadrangle map. Additional details regarding the area of potential effects (APE) are provided in Section 3.1 of this report. Figure 1-2 shows the location of the APE within Fort Irwin.

The purpose of the survey was to determine the presence of historic properties within the APE, pursuant to Section 106 of the National Historic Preservation Act (NHPA) (36 *Code of Federal Regulations* [CFR] 800) as well as Department of Defense Instruction 4715.16 and Army Regulation 200-1.

This cultural resources survey and analysis work was undertaken by CH2M in support of an Environmental Assessment (EA) for the Project, which includes the construction of the Project. This report of the cultural resources investigation was prepared to document the results of a cultural resources study. Fieldwork for the cultural resources study was conducted from December 8 through 10, 2015. One isolated find, a basalt flake fragment, was discovered as a result of this investigation. This isolated find does not constitute a historic property and no other cultural resources were observed.

Due to the lack of identified cultural resources, CH2M recommends a finding of “No Historic Properties Affected” for this undertaking in accordance with 36 CFR 800.4(d)(1).

This report contains the following appendices:

- Appendix A contains representative photographs of the APE examined for this study.
- CONFIDENTIAL Appendix B contains the Department of Parks and Recreation (DPR) form.

This study was conducted by Gloriella Cardenas, M.A., RPA, of CH2M, who meets the qualifications for Archaeological Principal Investigator in the Secretary of the Interior’s Professional Qualification Standards. Natalie Lawson, M.A., RPA, and Kyle Parker-McGlynn, B.A., of CH2M assisted in the pedestrian survey.

A copy of this report will be filed with the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System (CHRIS) located at California State University in Fullerton, California.

Legend

Fort Irwin Boundary

0 12.5 25 50
Miles

0 12.5 25 50
Kilometers

N

FIGURE 1-1
Vicinity Map
Tiefort City Stormwater Management
Fort Irwin, CA

CH2MHILL

\\GALILEO\PROJ\FT_IRWIN_409662\MAPFILES\EA\IRWIN_PROJECTLOCATION.MXD SSMITH21 10/20/2010 10:55:44

LEGEND

- Area of Potential Effects/Survey
- Area of Potential Study Buffer (1.6 km Buffer)
- USGS Quad Boundary

N

0 3,000 Feet

0 1 Kilometers

1:36,000

FIGURE 1-2

Cultural Survey
Tierfort Stormwater Project
Ft. Irwin, California

PLSS: Township 15N, Range 4E;
Township 15N, Range 5E;
Township 14N, Range 4E;
Township 14N, Range 5E
USGS 7.5 Minute Quads:
Tiefort Mountains & West of Red Pass Lake

Source Information: National Geographic Society, i-cubed

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CH2MHILL

SECTION 2
Setting

2.1 Environmental Setting

The Project is located at Fort Irwin, California, which is approximately 15 miles (24 kilometers) north of Interstate 15 (Figure 1-1). This project is also located north of the Mojave River. The city of Barstow is approximately 30 miles (48 kilometers) southwest of Fort Irwin. Elevation within the project area is 2,378 feet (725 meters) above mean sea level (amsl).

2.1.1 Geology

Fort Irwin is in the north-central area of the Mojave Desert. The Mojave Desert is bound and defined by the San Andreas Fault in the west and the Garlock Fault in the north; this has given rise to the term "Mojave Block" to describe this area between the faults (Fort Irwin 2011b).

The Fort Irwin area land formations are composed of mountains, broad alluvial fans, and flat valleys. The geology of Fort Irwin ranges in age from Precambrian to Holocene, which translates to 600 million years ago to present. Soils consist of metasedimentary and metavolcanic sediments; unconsolidated alluvium of clay, silt, sand, and gravel; aeolian sands; and playa sediments (Fort Irwin 2011b).

The Project site is located within an alluvial basin; sediments in the Project area are composed of highly permeable unconsolidated alluvium and aeolian sands. The topography is generally flat with alluvial drainages creating the only topographical elevation differences. The immediate area is subject to alluvial impacts in the form of channeling and erosion, which is typical of basin environments in the Mojave Desert and within Fort Irwin.

Ten identified springs occur within Fort Irwin (Fort Irwin 2011b). The water availability of the springs is dependent on rainfall amounts and duration. Precipitation at Fort Irwin occurs primarily in the winter months, and it averages less than four inches annually (Fort Irwin 2004).

2.1.2 Biology

The flora and fauna of Fort Irwin is described in the *Integrated Natural Resources Management Plan and Environmental Assessment* (USACE 2006). One specific vegetation community (Mojave creosote bush scrub) was identified within the APE. Species typically associated with Mojave Desert wash scrub are also present in some of the dry washes near the APE with typical species dominating within the Project area. Generally, dry washes have upland species associated with Mojave creosote bush scrub present (USACE 2006).

Mojave creosote bush scrub, an association dominated by the large shrub creosote bush (*Larrea tridentata*), is the most widespread community at Fort Irwin, occurring throughout the range below 3,610 feet (1,100.33 meters) on alluvial slopes, valley floors, and mountain slopes. A subassociation of this vegetation type is described as the creosote-bursage association based on the codominance between creosote bush and bursage (*Ambrosia dumosa*). Many subdominant shrubs typically occur in creosote bush scrub, including range rhatany (*Krameria erecta*), silver cholla (*Opuntia echinocarpa*), Anderson's boxthorn (*Lycium andersonii*), desert straw (*Stephanomeria pauciflora*), wishbone bush (*Mirabilis bigelovii*), and cheesebush (*Hymenoclea salsola*). At higher elevations, subdominants include California buckwheat (*Eriogonum fasciculatum*), hopsage (*Grayia spinosa*), winter fat (*Krascheninnikovia lanata*), and bladdersage (*Salazaria mexicana*) (USACE 2006).

Mojave Desert wash scrub is a low, shrubby, diverse community occurring in open washes, arroyos, and canyons throughout the desert. Representative shrubs include spiny senna (*Senna armata*), honey mesquite (*Prosopis glandulosa*), rayless encelia (*Encelia frutescens*), cheesebush, desert almond (*Prunus fasciculata*), indigo bush (*Psorothamnus arborescens*), and sandpaper plant (*Petalonyx thurberi*). In some areas, this community may have scattered small tree species (USACE 2006).

Wildlife present at Fort Irwin consists of a variety of species adapted to desert scrub habitats that provide little cover and xeric conditions. Small mammals found at Fort Irwin include blacktail jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), and white-tailed antelope squirrel (*Ammospermophilus leucurus*). Small rodent species include kangaroo rats (*Dipodomys* spp.), pocket mice (*Chaetodipus formosus*; *Perognathus* spp.), and field mice (*Peromyscus* sp.). Desert woodrat (*Neotoma lepida*) and Botta's pocket gopher (*Thomomys bottae*) are also common. Larger mammals include badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), grey fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*). Kit fox and coyote are common throughout the area, whereas the others listed above are localized and rare. Common bird species include the blackthroated sparrow (*Amphispiza bilineata*), rock wren (*Salpinctes obsoletus*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), and greater roadrunner (*Geococcyx californianus*). Additional species occur as migrants that may winter on the Project site.

The Mojave creosote bush scrub supports a diverse assemblage of reptiles, including common lizards such as zebra-tailed lizards (*Callisaurus draconoides*), side-blotched lizards (*Uta stansburiana*), desert spiny lizard (*Sceloporus magister*), and western whiptails (*Cnemidophorus tigris*). Less common lizards might include the desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislezenii*), and desert iguana (*Dipsosaurus dorsalis*). Desert tortoise (*Gopherus agassizii*) occurs in varying densities throughout Fort Irwin and the surrounding area.

2.1.3 Current Land Use

Fort Irwin encompasses approximately 761,405 acres (1,190 square miles or 308,130.10 hectares). Approximately half of Fort Irwin's land area is used for desert battlefield training. A cantonment area occupies approximately 1,920 acres (three square miles or 777 hectares) and provides temporary and permanent living quarters for soldiers and their families along with the support facilities of Fort Irwin. The cantonment area consists of residential neighborhoods, support facilities, retail centers, restaurants, and healthcare facilities.

Fort Irwin's population includes approximately 5,000 assigned soldiers and 6,934 family members. In addition, approximately 6,300 soldiers visit Fort Irwin during training rotations, which occur 10 times a year (Fort Irwin 2011b).

2.2 Cultural Context

Linguistic and genetic studies suggest that human colonization of North America may have occurred 20,000 to 40,000 years ago. Abundant archaeological evidence exists that humans were present in North America for at least the past 11,500 years. In addition, fragmentary, but growing, records exist that humans were present before that date. Evidence of this earlier occupation is not yet conclusive but is beginning to be accepted by archaeologists.

In the western United States, documented early sites include the Paisley Caves in Oregon with a date of 12,450 years before present (BP) (Jenkins et al. 2012) and Arlington Spring on Santa Rosa Island with dates as early as 13,000 years BP (NPS no date [n.d]). In the eastern United States, the Meadowcroft Rockshelter in Pennsylvania, Saltville and Cactus Hill in Virginia, and the Topper site in South Carolina are examples of sites that have produced apparently reliable dates documenting human occupation at greater than 12,500 years BP (Goodyear 2005, 2009, and n.d.). Investigations at the Buttermilk Creek Site in central Texas have produced dates of human occupation as early as 15,500 years BP as well (Waters et al. 2011).

More sites in North and South America are beginning to be accepted as dating to earlier times, and, although the Sutton et al. (2007) chronology (Table 2-1) acknowledges this fact by the inclusion of the hypothetical Pre-Clovis Complex, no sites from this period are currently documented in the Mojave Desert. Evidence for Paleoindian occupation in California exists, particularly along the coast of southern California (Erlandson et al. 2011); elsewhere in southern California, Paleoindian remains are inconclusive (Byrd and Raab 2007). A small faction of the archaeological community has proposed Pre-Clovis sites within the

Mojave Desert, but much of these data remain currently unpublished and unsubstantiated (Sutton et al. 2007).

2.2.1 Mojave Desert Cultural Chronologies

Generally, cultural developments in southern California have occurred gradually and have shown long-term stability, making the synthesis of chronologies and applying them to specific locales problematic. Of the many chronological sequences proposed for southern California, two primary regional syntheses have been commonly used for the southern California deserts: William Wallace (1955, 1962, and 1978) and Claude Warren (1968 and 1984). Wallace first presented a chronology of southern California in 1955; by 1962, Wallace modified this chronology specifically for the high desert; by 1978, the chronological syntheses for southern California were finalized by Wallace. Wallace uses major cultural developments to define four cultural horizons, each with characteristic local variations: Early Period (Early Man Horizon), Milling Stone, Intermediate, and Late Period. Warren first presented a chronological synthesis of southern California deserts in 1968; in 1984, Warren published a chronological synthesis for coastal southern California. Warren defines five periods in southern California prehistory: Lake Mojave, Pinto, Gypsum, Saratoga Springs, and Protohistoric. Until recent times, and in some cases, to date, chronologies based on Warren and Wallace syntheses have been in use. In 2007, however, a synthesis of cultural prehistory in the Mojave was presented by Sutton et al. (2007), which includes results from 20 years of extensive fieldwork conducted in the Mojave Desert by various individuals and groups. Sutton et al. (2007) divides Mojave Desert prehistory into four periods: Pleistocene, Early Holocene, Middle Holocene, and Late Holocene; each period is further subdivided into complexes that are based on the work from Warren and Wallace in conjunction with the region-specific results of over 20 years of Mojave Desert archaeological analysis (Sutton et al. 2007). Table 2-1 provides a brief comparison of these three chronologies. Neither the Warren nor Wallace chronologies begin prior to Terminal Pleistocene, circa 12,000 years BP. No sites from the Pre-Clovis Complex are currently documented in the Mojave Desert.

TABLE 2-1
Cultural Chronologies Proposed for the Mojave Desert

	Sutton et al. (2007)		Warren (1984)	Wallace (1962)	
Approximate Date	**Temporal Period**	**Cultural Complex**	**Cultural Period**	**Cultural Horizons**	**Associated Artifacts**
Up to 10000 BC	Pleistocene	Pre-Clovis (Hypothetical)			Unknown
10000–8000 BC		Paleo-Indian	Clovis	Early Man	Fluted points
8000–6000 BC	Early Holocene	Lake Mojave	Lake Mojave	Millingstone	Stemmed points
7000–3000 BC	Middle Holocene	Pinto	Pinto		Pinto points
		Deadman Lake (currently 29 Palms only)			Contracting stem and leaf shaped points
2000 BC to AD 200	Late Holocene	Gypsum	Gypsum	Intermediate	Gypsum and Elko Series points
AD 200–1100		Rose Spring	Saratoga Springs		Rose Spring and Eastgate Series points
AD 1100–Contact		Late Prehistoric	Protohistoric	Late Prehistoric	Desert Series points, ceramics

2.2.1.1 Paleoindian Period (10000 to 8000 BC)

The Paleoindian Period covers the interval from the first accepted presence of humans in southern California in the late Pleistocene until approximately 8,000 cal B.C. Artifacts and cultural activities from this period represent a predominantly big game hunting culture; diagnostic artifacts include extremely large, often fluted bifaces associated with use of the spear and the atlatl. Populations appeared to have been relatively small and highly mobile, living in temporary camps near readily available water. Evidence for Clovis occupation in the Mojave Desert is currently limited to scattered isolated points and a single site at Lake China that is presumed to be an occupation site (Sutton et. al 2007:234). Additionally, a single Clovis-like point fragment was found in the Tehachapi Mountains and other points resembling Clovis have been found in the Tiefort Basin, Searles Lake, and other locations within the region (Moratto 2004:87).

2.2.1.2 Lake Mojave Complex (8000 to 6000 BC)

In the deserts of southern California, the earliest substantive remains of human occupation are found along the shoreline of ancient Lake Mojave in San Bernardino County, for which this period is termed, and in ancient Lake Cahuilla of Riverside and Imperial counties. The Lake Mojave Period is associated with now-dry pluvial (also called paleo) lakes found throughout the Mojave Desert. Artifacts observed at Lake Mojave Period sites include stylized dart points of the Lake Mojave and Silver Lake series, well-made bifacial knives and other cutting tools, large domed scrapers or scraping planes, crescents, occasional cobble core tools, and ground stone implements (Moratto 2004:96; Wallace 1962; Sutton et al. 2007:237). Flaked stone artifacts, which make up the largest part of the toolkit, are often formal tools, while ground stone tools, present in far smaller numbers, generally show ephemeral wear, thus suggesting long-term curation of more easily ported items and less reliance on floral resources. Site types include extensive habitation sites, small camps, and workshops (Sutton et al. 2007). In addition to sites known in the Lake Mojave and Lake Cahuilla area, there are sites with artifact assemblages from this period at Fort Irwin (Nelson Lake sites), Twenty-nine Palms, and China Lake. Archaeofaunal remains recovered from Lake Mojave sites at Fort Irwin indicate a higher reliance on smaller game, such as rabbits, rodents, and some reptiles, and less hunting of large game (Sutton et al. 2007). Rogers (1939) describes several sites of the same time period situated along desiccated lakes, or playas, from the Colorado Desert through inland San Diego County. The final lacustrine phase for the pluvial lakes, such as Lake Mojave and Lake Manix within this region of the Mojave Desert, occurred during this period.

2.2.1.3 Pinto Complex (7000 to 3000 BC)

The Pinto Complex is the most widely distributed of the early complexes in the Mojave Desert and occurs in a wide variety of topographic and environmental zones, including near remnant pluvial lake basins, near fossil stream channels, near springs or seeps, and in upland areas. Large Pinto Complex sites with deep middens and a wide range of artifact types appear to correlate with stable water sources. In some parts of the Mojave Desert, a temporal overlap is noted between the Lake Mojave Complex and the Pinto Complex.

Radiocarbon dates from the Fort Irwin and Twenty-nine Palms areas, and also the Garlock Fault site in Kern County, range from 8340 BC to 6300 BC, indicating the development of the Pinto Complex in the early Holocene and corresponding to the end of the Lake Mojave Complex. There appears to be good continuity of flaked stone technologies from one complex to the next, including the material selection of locally available stone as well as use of bifacial and unifacial tool forms. The main distinction between the two periods appears to be the number of ground stone tools found at Pinto sites in comparison to the relative paucity of ground stone tools found at Lake Mojave sites. High levels of ground stone found at Pinto sites indicate that the emergence of intensive plant resource exploitation began by approximately 7000 cal BC, before the Altithermal dry climatic episode (Sutton et al. 2007:238-239).

Pinto sites are found in a wide range of environments, and the flourishing of new economies including greater plant resource exploitation is seen both in the desert and along the Pacific coast during the Pinto Complex. *Olivella* shell beads have been found with Pinto sites, indicating the beginnings of trade with the coast. Diagnostic artifacts recovered from Pinto Period archaeological sites include heavy keeled scrapers,

flat millingstones, manos, and Pinto series projectile points, which are large, coarsely made points, indicating the continued use of darts and atlatls (Warren 1984). By the end of the middle Holocene, conditions in the Mojave Desert became much warmer and much drier. Currently, few sites are known to date to the period between 3000 and 2000 cal BC, and it appears that parts of the Mojave may have been abandoned (Sutton et al. 2007).

2.2.1.4 Gypsum Complex (2000 BC to AD 200)

The start of the Gypsum Complex coincides with the beginning of the Little Pluvial wetter climatic episode at approximately 2000 BC and continues into the drier period following the Little Pluvial. At Fort Irwin, eight sites date from this period. Despite the paucity of sites dating to this period in the Mojave Desert, the first reliable evidence for contact between the desert and the coast dates to the Gypsum Period, and Southwestern influence in the California deserts is also observed (Warren 1984; Sutton et al. 2007).

Olivella shell beads and *Haliotis* rings from the coast and split twig figures from the Southwest are found at Gypsum sites. Gypsum Complex toolkits include the diagnostic Elko and Elko-eared points, leaf-shaped points, rectangular-based knives, flake scrapers, T-shaped drills, the occasional large scraper plane, and hammerstones. Elko series points are associated by Moratto (2004) with the spread of Uto-Aztecan speakers throughout the Mojave during this period. A shift in food procurement strategies also marks this period in that grinding implements, including manos and millingstones, became common and mortars and pestles were introduced (Warren 1984).

People living in the deserts had adapted to the more arid conditions of the southern California deserts by the end of the Gypsum Complex. New procurement strategies and regular trade contact with peoples living on the coast provided stability to desert dwellers and, despite the return to a warmer, drier climate at the end of the Little Pluvial, populations did not decrease in the deserts at the end of the Gypsum Complex as they had at the end of the Pinto Complex (Sutton et al. 2007).

2.2.1.5 Rose Spring Complex (AD 200 to AD 1100)

During this period, a strong coastal influence extends into the western Mojave Desert (Warren 1984) and the eastern Mojave experiences an influx from Colorado River groups. The bow and arrow moved into the Mojave Desert at this time. Evidence for a significant population increase and rather dramatic changes in artifact assemblages characterize the Rose Spring Complex in the eastern Mojave (Sutton et al. 2007). Generally, the Rose Spring Complex appears to be in strong continuity with the Gypsum Complex. Similar artifacts, such as millingstones, manos, mortars, pestles, and incised stones were still used. Desert populations continued a successful hunting and gathering adaptation to the desert environment through increasingly complex subsistence strategies, including the development of the bow and arrow. The sites from this period contain a variety of trade items, including southern California shell beads, steatite items, and other coastal artifacts. Eastgate and Rose Spring projectile points are the diagnostic artifacts (Sutton et al. 2007).

Rose Spring sites are found near springs, washes, and occasionally lakeshores. Architectural evidence of pit houses, wickiups, and other types of structures indicate an increase in sedentism during this period; however, the Medieval Climatic Anomaly began during the Rose Spring Complex. The resulting desiccation of existing lakes and other water sources in the Mojave Desert appears to have significantly changed settlement patterns, resulting in a shift in dependence upon permanent water sources to more ephemeral ones. The Rose Spring Complex ended by approximately AD 1100.

2.2.1.6 Late Prehistoric Complex (AD 1100 to Historic Times)

During this period, there was a strong reliance on plant food gathering and hunting of small game, and a decreased reliance on large game (Warren 1984). Separate complexes emerged that appear to represent historically known Native American linguistic/cultural ethnic groups. Anasazi turquoise mining, Hakatayan influence from the Colorado River, and the spread of the Numic Paiute and Shoshone cultures east from the western Mojave Desert occurred during this period (Sutton et al. 2007:242). Seasonal movement was

common and resulted in a diverse array of site types. For the populations in the Project region within the Mojave, large village sites remain marked by a paucity of pottery. Characteristic artifacts include Desert series and Cottonwood projectile points, buffware and brownware ceramics, shell and steatite beads, and milling tools. Trade continues to develop and expand with groups on the coast (Sutton et al. 2007:242). Late during the Late Prehistoric Complex, there appears to be an abandonment of village sites in the desert region (Moratto 2004:391; Thomas 2011:17-18).

2.2.2 Ethnohistory

Fort Irwin is prehistorically and historically within the territory of Native Americans. The Project area is located within the traditional territories of the Vanyume, Southern Paiute, and the Chemehuevi. Prehistoric and historic trails are found throughout this portion of the Mojave Desert, including areas within Fort Irwin.

2.2.2.1 Southern Paiute and Chemehuevi

The Southern Paiute peoples and the Chemehuevi, a closely related people, belong to the Southern Numic branch of the Uto-Aztecan language family. There is historical documentation of both the Chemehuevi and the Southern Paiute having hunted deer and bighorn sheep. Sixteen identifiable groups of the Southern Paiute, sometimes called “bands,” formerly occupied a broad strip of territory from southern Utah and southern Nevada, and along the west side of the Colorado River into southern California. The first historical observations of the Southern Paiute were made by fathers Escalante and Dominguez in 1776. The fathers observed Paiute homesteads and farms along the Colorado, as well as small maize fields watered with river water that flowed through irrigation ditches. Subsequent expeditions through the traditional territories resulted in similar observations regarding Paiute agriculture, adding that melon and squash were also cultivated (Stoffle and Zedeno 2001).

The Southern Paiute are very similar culturally and linguistically to the adjacent Western and Southern Ute, except that the Ute took on some superficial Plains Indians traits during the Protohistoric period. The Chemehuevi were strongly influenced culturally by the Mojave, who lived to the east across the Colorado River (Kelly and Fowler 1986:368). The nineteenth-century territories of the Southern Paiute and Chemehuevi groups reflect the adaptation of each to their unique physical and political environments subsequent to the apparent entry of Numic speakers into the region in approximately AD 1200. Overall, the Chemehuevi territory was one of the largest areas in California with a uniform dialect (Kroeber 1925). The Chemehuevi recognized local divisions among themselves. Within the eastern Mojave, the Chemehuevi were known as the Hokwait. The sociopolitical organization of the Southern Paiute groups, including the Chemehuevi, did not include organs of central political control. The boundary for each group appears to have been relatively fluid and permeable. Groups were essentially clusters of individual households that variously coalesced and dispersed during the year to facilitate different economic pursuits. Favored residence locations adjacent to springs or agricultural plots were held as private property and subject to inheritance. Large household clusters often had a headman, whose authority was more advisory than authoritative (Kelly and Fowler 1986:380).

The Chemehuevi appeared to be in the process of moving or expanding their territory in the early Historic period, and apparently without the influence or pressure from white incursions (Kroeber 1925:594), which is not surprising considering the great expanse and inhospitality of the territory attributed to them.

Chemehuevi beliefs were closer to those of groups found east of Chemehuevi territory, rather than those of the geographically closer southern or central California groups. Many Chemehuevi songs are similar, if not the same, as Mojave songs, including their Shaman and Doctoring songs (Kroeber 1925).

Although many of the 16 Southern Paiute groups alternately visited, hunted, and gathered on each other’s territories throughout the year, almost all of the 1,920 individual Chemehuevi would gather for the annual Mourning Ceremony. All groups were not, however, on friendly terms as there were intergroup feuds involving alleged kidnappings of women and children for slavery. Additionally, the Chemehuevi had external relationships with the Mojave, Navajo, and Ute that were sometimes friendly and sometimes hostile. The

Southern Paiute often accused the Ute and Navajo of kidnapping raids. Relations with the Western Shoshone to the north and northwest were generally friendly and often involved intermarriage. The Paiute also had generally amicable relations with other Mojave Desert groups including the Serrano and Vanyume, Kawaiisu, Cahuilla, and Diegueño. Although the Chemehuevi borrowed heavily from Mojave culture (Kelly and Fowler 1986:369-370), Kroeber (1925:596) asserts that the Chemehuevi generally tried to avoid the frequent warfare that involved many of their more powerful and populous regional neighbors to the east.

Both the Chemehuevi and the Southern Paiute practiced some limited agriculture, as well as a hunting and gathering subsistence. Hunted animals included rabbits, quail, small rodents, and chuckwalla, a large lizard of rocky habitats. The piñon nut, which is harvested in October from the woodland that occurs in the larger mountains at altitudes of 6,000 to 8,000 feet amsl, comprised a large portion of consumed starch. Cones were beaten from the trees in early fall and sun-dried. Large quantities were collected and cached in dry places, and the nuts were roasted before eating. Seeds were collected from a number of sources. Sand grass provided seeds that were gathered with a basket and a large paddle. The berries from the *Lycium* bush also were collected. Seeds were collected from cacti, such as the Devil's pincushion, and the paddles, buds, and immature fruit of one type of prickly pear were collected and dried. These were cooked in hot stones, grass, and earth and then salted for consumption. Historical miners reported that when food was scarce among the Panamint, a village group of the Southern Paiute, almost any green plant was eaten after boiling.

Mesquite beans were dried and pounded into flour to make small cakes or loaves. Among the Panamint, Joshua trees were consumed in a manner similar to agave or mescal. The buds were removed in early spring and roasted. Similarly, the Southern Paiute consumed mescal, after steaming in grass-covered and rock-lined pits. They were thought to cultivate corn, squash and gourds, pumpkins, sunflowers, and winter wheat wherever feasible, particularly on floodplains. The adoption of farming did not appear to have significantly altered the seasonally mobile way of life; the elderly generally stayed to tend crops while most of the population undertook its seasonal hunting and gathering forays (Kelly and Fowler 1986:371).

The Chemehuevi and Southern Paiute made both twined and coiled basketry items, including vessels, hats, and cradles (Kelly and Fowler 1986:375). Kroeber (1925:597) attributes some artistic designs as having been painted rather than woven patterns on basketry items. The Chemehuevi and Southern Paiute groups made pottery that seems to have mimicked Mojave styles. Chemehuevi pottery technology was more developed than among other Southern Paiute groups and was used to create cooking and storage vessels, water jars, scoops or spoons, and large pots for ferrying children across the river. They also constructed log rafts and reed balsas for river transport (Kelly and Fowler 1986:377). Houses were simple frames with reeds, constructed to function only as shelters. Sweathouses were not constructed at Chemehuevi villages (Kroeber 1925).

Contact with the Spanish occurred relatively late, but by the early nineteenth century, Southern Paiute were enslaved in Santa Fe, New Mexico. The Ute may have served as agents to the Spanish for capturing slaves. Slave raiding and communicable diseases introduced by Europeans depleted the Paiute population and left some ecologically favorable localities depopulated. The Mormons, who entered the region in the 1840s, halted slave trading by the mid-1850s. However, the Mormons displaced the Southern Paiute from some of their most productive gathering and horticultural areas. The Paiute, particularly those with horses, sporadically retaliated for these incursions by raiding white settlers and travelers during the 1850s to the 1870s (Kelly and Fowler 1986:386-390).

Eventually, survivors of white contact were confined to reservations on largely marginal lands in the late nineteenth and early twentieth centuries. Termination of the reservations by the federal government in the 1950s left most of the Southern Paiute in even worse conditions. Subsequent settlements of suits for compensating the Indians for their lands provided little more than temporary windfalls. Some reservations were restored and have established various business enterprises with mixed success. Some vestiges of aboriginal culture have survived, but the language has largely died out. In 1980, it was recorded that only 124 Chemehuevi remained in California (Kelly and Fowler 1986:391-392).

2.2.2.2 Vanyume

The Vanyume, a desert subdivision of the Serrano, are classified as belonging to the Takic linguistic branch, a subdivision of the Uto-Aztecan language family, and are considered to be a part of the Shoshonean or Takic migration into California (Byrd 1996; Moratto 2004; Sutton 2005). Other Takic groups are the Kitanemuk, Gabrieleño, Luiseño, Cahuilla, Chemehuevi, and Cupeño. Reliable data are sparse for the Vanyume as they are often categorized as a desert-dwelling branch of the Serrano. The Vanyume were a small cultural group whose territory was along the Mojave River, located south of Fort Irwin. By the time of Spanish exploration, the entire population of the Vanyume may have ranged from 500 to 1,000 members. In addition to its occupation of the upper Mojave River drainage, the Vanyume or Desert branch of the Serrano appear to have occupied a substantial area within the western Mojave region. Vanyume territory extended from the eastern Mojave Desert through modern day Victorville, and as far west as the city of Palmdale in the Antelope Valley (Bean and Smith 1978; Earle et al. 1998; O'Rourke 2005).

The subsistence practices of the Serrano were primarily composed of hunting and gathering within diverse ecological zones. The Vanyume practiced the same subsistence strategies as the Serrano and exploited the same resources; foods consumed included acorns and piñon nuts and other seeds from the foothills of the San Bernardino Mountains, yucca, mesquite, and cactus from desert environs, game (deer, rabbit, antelope, and other small mammals), and fish. The primarily desert-occupying Vanyume had resources available to them from outside of their territories through trade and networking with other Serrano groups who occupied areas in both the San Gabriel and San Bernardino Mountains (Bean and Smith 1978).

Settlement locations were dictated by water resources and villages tended to be based near streams, springs, and rivers, with village sizes ranging from 50 up to 100 people (Earle et al. 1998). Family dwellings were of the style encountered with many groups in southern California, constructed in a circular-domed fashion made of willow and tule. A central fire was located in each dwelling for heat and minor cooking; however, most domestic activities occurred out of doors. Other structures found in a Vanyume village would be composed of armadas, an unenclosed structure roofed with brush and a ceremonial house occupied by a village leader (Bean and Smith 1978).

The annual cycle of social, ceremonial, and economic activities of the Serrano was dictated by the seasonal availability of important subsistence resources (Earle et al. 1998). They engaged particularly in hunting, craft activities, and visiting during the winter months after the fall piñon and acorn harvests. Early spring was the period of greatest food scarcity during the year.

By the 1920s, the largest presence of the region's Native American inhabitants consisted of a small village near Victorville within traditional Vanyume territory. Census records indicate that the majority of individuals in this village identified themselves as "Pi Ute," while the remainder identified themselves as "Chimawaya," or not at all. Many Native Americans living in the vicinity of the village were not included in the census (Bloomberg 1987). In 2004, excavations at a village site near Palmdale unearthed several graves. Mitochondrial DNA matching established a direct link between one of these individuals to present day Vanyume still living in the Antelope Valley (O'Rourke 2005). Neighboring groups of the Vanyume were the Tataviam in the Santa Clarita Valley to the southwest, the Kitanemuk and Kawaiisu to the northwest near the Tehachapi Mountains, the Chemehuevi to the east, the Cahuilla to the south, other Serrano groups to the south-southwest, and the Gabrieliño to the west.

2.3 History

Generally, the Historic Period begins with the first documented entrance by a European into a specific region; however, as a result of known contact in other parts of California by Russians, Chinese, Spanish, and Portuguese, some chronologies terminate the late prehistoric for all California in 1542, when the first documented European entered the territory now known as California; this period, from first European emergence into "California" and the official documented entrance into a region, is termed the Protohistoric Period. In 1542, Juan Rodriguez Cabrillo explored the California coast by ship, entering San Diego Bay and

claiming Alta California for Spain. Cabrillo landed near Point Magu in the same year. Sixty years later, Sebastian Vizcaino sailed into the San Diego Bay. Exploration of the land was slower to come. Don Gaspar de Portolá searched Alta California for suitable mission sites in 1769. Captain Juan Bautista de Anza traveled a desert route to the Mission San Gabriel Arcangel from Mexico in 1774.

In California, the Historic era is generally divided into three periods: the Spanish or Mission Period (1769 to 1834), the Mexican or Rancho Period (1821 to 1848), and the American Period (1848 to present).

2.3.1 Spanish/Mission Period (1769 to 1834)

The Historic Period in California began with the establishment of Spanish colonial military outposts, the first of which was Mission San Diego de Alcalá, built in 1769 by Junípero Serra. That same year, Gaspar de Portolá led an expedition through the coastal areas of southern California. The 1770s saw a number of expeditions and surveys travel across the desert areas of southern California. The Old Spanish Trail, which connected Villa Real de Santa Fé de San Francisco, now Santa Fe, and El Pueblo de Nuestra Señora La Reina de Los Ángeles, now Los Angeles, traversed within the Fort Irwin area. In 1772, Pedro Fages led a group across the western Mojave Desert along what would become the Old Spanish Trail while pursuing deserters from the San Diego Presidio (Beattie and Beattie 1939). The first recorded contact with Native Americans occupying the north-central Mojave Desert was in 1776 by Father Garcés during an exploration with Anza of the area along the Mojave Trail (Feller n.d.; Coombs et al. 1979:20-21). Father Zalvidea crossed the trail in the early 1800s (Beattie and Beattie 1939) as he traveled the desert and baptized Native Americans. The Armijo expedition traveled from New Mexico to California, on what would later be termed the Old Spanish Trail, in 1829 searching for a suitable supply route.

During this period, 21 missions would be built in California, lined up from south to north along the El Camino Real. This period also introduced the era of Missionization, a period of forced conversion of the Native Americans who occupied the region. The Franciscans viewed the local populations to be composed of child-like individuals who would benefit from their European instruction and Christianization (We Are California 2008). Captured and removed from their villages, the indigenous peoples were brought to the missions and into servitude. Many perished from ill treatment, but more died because of the introduction of European diseases, ultimately devastating the Native American populations.

The last mission to be founded was San Francisco Solano in 1823; further attempts to construct additional missions were thwarted by Spain itself because of the costly endeavor each new mission posed. Later, as Spain lost its rule over New Spain and secularization was sought by the new government, the mission system was disbanded (Weber 2006).

2.3.2 Rancho Period (1821 to 1848)

Mexico became independent of Spain in 1821 and the Decree of Secularization, passed in 1834, effectively ended the Mission Period in California. The following years were marked by the proliferation of cattle ranching throughout the region, as the Mexican governor, Pío Pico, granted vast tracts of land to Mexican (and some American) settlers. The mission lands were then opened for grants by the Mexican government to citizens who would colonize the area and develop the land, generally for grazing cattle and sheep (Lech 2004). Travel along the Old Spanish Trail continued during this period and additional land surveys were conducted by explorers such as Kit Carson, Ewing Young, and Jedediah Smith (Beattie and Beattie 1939).

2.3.3 American Period (1848 to Present)

Following the signing of the Treaty of Guadalupe Hidalgo in 1848, the United States took possession of California. The treaty bound the United States to honor the legitimate land claims of Mexican citizens residing in captured territories. The Land Act of 1851 established a board of Land Commissioners to review these records and adjudicate claims, and it charged the Surveyor General with surveying confirmed land grants. In order to investigate and confirm titles of California, American officials acquired the provincial records of the Spanish and Mexican governments that were located in Monterey. Those records, most of

which were transferred to the United States Surveyor General's Office in San Francisco, included land deeds and sketch maps (Gutiérrez and Orsi 1998).

From 1852 to 1856, a board of Land Commissioners determined the validity of grant claims. The commissioners rejected many of the original rancho claims, which then became public domain and fair game for squatters. Ranch titles represented little as collateral. Although the claims of some owners were eventually substantiated, many of the owners lost their land through bankruptcy or the inability to meet the exorbitant interest on their legal debts. Many of the original rancho owners eventually lost their land to the United States. Unsurveyed land boundaries created a loophole through which squatters could occupy plots on the fringes of land grants, and eventually come to own those plots through squatters' rights (Gutiérrez and Orsi 1998).

2.3.4 Fort Irwin Project Vicinity

This section presents a brief summary of the history of the Fort Irwin area.

2.3.4.1 Trails and Roads

Bitter Springs and numerous other seasonal water sources are located within Fort Irwin. Because of the presence of Bitter Springs and other springs, the mostly undeveloped and open desert of the Fort Irwin region has been a thoroughfare to many prehistoric and historic travelers. Many trails traverse the area, segments of which were sometimes marked with rock cairns or creosote timbers. The majority of the trails, however, have no specific markers as most trails existed as routes between water sources. One significant prehistoric trail is located to the south of Fort Irwin, and that is the Mojave Trail, one of the most important of the Native American trail networks.

It was not until the discovery of the prehistoric trail systems, specifically the Mojave Trail, that Spanish exploration really began in the Mojave Desert. As a result of the travels of Father Garcés through the region, road systems were developed. With that, the once unexplored region became connected to the rest of southern California.

The Spanish used the Mojave Trail alignment extensively and developed new corridors to new destinations from it. The trail network became an integral element as a trade route that connected Los Angeles to as far away as New Mexico; during this period, this road was known as the Santa Fe Road. In 1826, Jedediah Strong Smith, a fur trapper, traveled on the trail from east to west in and out of Utah (Fort Irwin n.d.). Early pioneers needing to travel through the area followed Smith; the area of Bitter Springs, located in the eastern boundary of Fort Irwin, has been documented as a regular stop by these travelers (Fort Irwin n.d.). This trail became a route for Mormon migration to and from Utah. It became known as the Mormon Road as well as the Salt Lake Road; this road connected Salt Lake City, Utah, with the San Bernardino Valley in California (BLM 2009; Smart 1988).

During the American period, the United States Topographical Corps, guided by Kit Carson, traversed the Old Spanish trail segment in the eastern Mojave and named it the Spanish Trail to acknowledge the use of the travel corridor since the first explorations of 1776 (Warren 2004). In 1844, Captain John C. Fremont and Kit Carson were traveling on the Spanish Trail in the Fort Irwin region as part of the first contingent of the Army to visit the area (Vredenburgh 1994). In modern times, Interstate 15 incorporated much of what was the Mojave/Spanish/Mormon trail as did other modern freeways, highways, and roads found in San Bernardino County, including Fort Irwin.

2.3.4.2 Mining

This era was hallmarked by the first occupation of the region by the Americans. Mineral miners began to occupy areas of the Mojave after the California Gold Rush of 1849 (Earle et al. 1998). This era was also marked by military surveys of the American Southwest, and the beginning of geographical and ethnological studies (Powers 1877; Wheeler 1879). Gold was found in San Bernardino County in the early 1850s and heralded an intensified use of the eastern Mojave for prospecting (Vredenburgh 1995). The 1860s found

mining success in the Mojave, but problems with the Native Americans and the isolation of the mines made it difficult for the mining industry to take hold.

Discovery of valuable ores in the mountains around the Project area prompted several waves of miners, settlers, and merchants to move into the area, and communities such as Daggett, the transportation center for the Calico mines, were founded. Silver and other valuable ores were discovered in the Fort Irwin region in 1882, specifically in Calico, which lies 32 miles south of Fort Irwin. Borax was discovered in nearby Death Valley, turning the area that spans from Fort Irwin, south into Daggett and southwest to Barstow, into an important mining center (City of Barstow 2009; Vredenburgh, Shumway and Hartill n.d.).

From the 1860s, mining activities have been conducted in pursuit of gold, silver, and minerals. Mining has survived as an economic practice in this part of the Mojave Desert well into modern times.

2.3.4.3 Railroad

In the late 1800s, railroad construction flourished. The Santa Fe and the San Francisco and Los Angeles railroads crossed at Barstow, formerly Waterman's Junction, by 1885 (Historical Marker Project 2015; Rollings-McDonald and Tuerpe 2008:3). The Santa Fe and Salt Lake Railroad crosses through the town of Daggett, which was originally established during the heyday of the silver mines of the town of Calico.

It was not until early in the twentieth century that Southern California was connected to Salt Lake City by rails. Montana Senator William A. Clark intended to provide such a service, organizing the San Pedro, Los Angeles, and Salt Lake City Railroad in 1901 (Online Nevada Encyclopedia n.d.). That same year, he began buying local lines in the Los Angeles area and began surveying for new lines toward Utah. Clark was not the only one who wanted to build a railroad. Stiff competition raged during most of 1901 and 1902 between Clark and the Oregon Short Line, owned by Edward Henry Harriman. In January 1905, the Utah and California tracks were joined 23 miles south of Las Vegas (Las Vegas Railroad Society 2007; Utah Rails.net 2016).

Developments in transportation and mining were primary factors in the founding of the nearby town of Barstow. Since its creation, Barstow has been part of an important railroad network that webs into other regions of the United States.

2.3.4.4 Fort Irwin

The desert landscape of current Fort Irwin was designated for military training by President Franklin Roosevelt in 1940 as the Mojave Anti-Aircraft Range. This training facility occupied 1,000 square miles (640,000 acres or 258,999.20 hectares) and was a sub-post of Camp Haan in Riverside County. In 1942, Roosevelt renamed the facility Camp Irwin in honor of Major General George Leroy Irwin, who was the commander of the 57th Field Artillery Brigade in World War I (Fort Irwin, n.d.). By 1944, Camp Irwin was deactivated and placed on surplus status. Camp Irwin remained on surplus status until the Korean War. Training resumed at Camp Irwin in 1951 as the Armored Combat Training Area. In 1961, Camp Irwin was named a permanent installation and the post was renamed Fort Irwin. Troops trained at Fort Irwin during the Vietnam conflict, but in 1971, the post was deactivated again. This time, however, the post was placed on maintenance status rather than surplus status, under the control of Fort MacArthur. During this period, it was used for training by units of the California National Guard. Fort Irwin was chosen as the site for the National Training Center in 1979 and was returned to active status in 1981 (Fort Irwin n.d.).

SECTION 3

Study Methods and Results

This section provides the methods used by CH2M to guide the study. The methods were planned to meet or exceed the local, state, and federal requirements as well as *California Archaeological Resource Management Report* reporting guidelines and the Fort Irwin *Integrated Cultural Resources Management Plan* (ICRMP; Fort Irwin 2011a).

3.1 Area of Potential Effects

As defined in 36 CFR 800.16(d) (Advisory Council for Historic Preservation 1966 [amended 2004]), the APE is the geographic area or areas within which an undertaking may directly or indirectly have an effect on historic properties, if any such properties exist.

The construction limits/APE would encompass 393.76 acres (159.35 hectares) and would include the following components, as shown on Figure 1-2:

- A 3,790-foot (1155.19-meter) earthen protection berm on the western side of Tiefort City along the eastern side of Tiefort Wash that would protect the training complex from flood flows
- An approximately 5,000-foot (1,524-meter) long, 10-foot (3.05-meter) wide, 10-foot (3.05 meter) deep diversion channel that would divert flows originating from south of the MOUT facility to the west to the earthen protection berm
- Three debris basins constructed on three drainages south of Tiefort City would contain between eight and 13 acre-feet (9,867.85 and 16,035.26 cubic meters) of debris and not exceed 10-feet (3.05-meters) in depth

Construction of these components would impact approximately 393.76 acres (159.35 hectares) of land to the west and south of Tiefort City. The components would be designed and constructed to control a 100-year flood event. Sediments to construct the berms would come from the project area. Riprap would be used extensively to prevent erosion and to reduce velocities of flows. Annual maintenance of the stormwater control features would be required. Sediment would be removed from the south channel and debris basins annually and after very large flood events. Maintenance activities to clear all channels and basins would likely take up to 15 days. Routine inspections would be conducted every 12 months and after every large flood event.

All ground-disturbing activities would be confined within the construction limits. No overland travel outside of the construction limits would be permissible.

The Project is located within Fort Irwin, adjacent to the existing Tiefort City MOUT footprint, and is within mission use areas, rubble dumping, and other activities; it also contains paved and dirt roads, utilities, and various installation features. The APE is in an alluvial plain with numerous drainages and channels meandering from upslope/hillside in the south, to the flatter plain north. The APE is under continuous use and exhibits vehicular disturbance both on established roads and off-road as well as other construction and maintenance to facilities.

3.2 Literature Search

CH2M conducted a literature search of the CHRIS at the SCCIC on December 14, 2015. In addition, a records search at the Fort Irwin Directorate of Public Works (DPW) Cultural Resources Library was conducted on December 16, 2015. The records search included a review of all recorded prehistoric and historic archaeological sites and historic architectural resources, as well as all known cultural resource survey and excavation reports of the study area that consisted of the Project APE and a one-mile (1,609.34-meter)

radius around the Project area. Additionally, the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), California Historical Landmarks, and California Points of Historic Interest were all examined.

The following maps were reviewed to identify known historical land uses pertinent to the Project site.

- 1856 *General Land Office Plat*, Department of the Interior
- 1892 *Official Map of San Bernardino County, California,* T.D. Beasley
- 1922 *Map of Southern California*, Scobey and Bowen
- 1957 *Trona, California* 15-minute USGS topographic quadrangle map
- 1960 *Trona, California* 15-minute USGS topographic quadrangle map

3.3 Literature Search Results

Review of the mapped data provided by the SCCIC revealed that three previous cultural resources studies have been conducted within one mile (1,609.34 meters) of the Project area and one study had been previously conducted within the Project's APE (SCCIC 2015).

Table 3-1 lists the CHRIS data results of previous investigations conducted within the study area, which is composed of the APE and a one-mile radius.

TABLE 3-1
Cultural Resources Reports within One Mile of the Project Area, CHRIS Results

Authors and Date	Report Name	CHRIS Catalogue NADB Numbers
	Surveys within One Mile	
Kaye, Newman and McArdle – 2010	J4 Training area culvert Installation (FY10-268, 269, 270)	1067175
Kaye – 2010	J4 Demo Range	1067177
Belcourt and Sutton – 2009	Forward Operating Base Denver Entry control Point Construction, REC#FY10-005	1067178
	Surveys within APE	
Robarchek, Breece, Bergin and Warren – 1984	An Archaeological Survey of the 1982 Gallant Exercise Area, Fort Irwin, San Bernardino County, California	1061436

Source: SCCIC of CHRIS, 2015
NADB = National Archaeological Database
CHRIS = California Historical Resources Information System
SCCIC = South Central Coastal Information Center

The Fort Irwin DPW Cultural Resources Library provided additional results of the investigations conducted within the APE. Table 3-2 lists the results of additional previous investigations.

TABLE 3-2
Cultural Resources Reports within the APE, Fort Irwin DPW Cultural Library

Author/Year	Title	DPW Report No.
Redhorse Corp. – 2014	Cultural Resources Inventory and Evaluation for the John Wayne Pass Trail Improvements Project (FY15-059), Fort Irwin, San Bernardino County, California. On file, Environmental Division, DPW, Fort Irwin, California.	FY15-059
Statistical Research, Inc. – 2012	Cultural Resources Inventory for the G3 Culverts Installation Project (FY12-081), Fort Irwin, San Bernardino County, California. On file, Environmental Division, DPW, Fort Irwin, California.	FY12-081

TABLE 3-2
Cultural Resources Reports within the APE, Fort Irwin DPW Cultural Library

Author/Year	Title	DPW Report No.
Chambers, Inc. – 2011	Cultural Resources Status Report for 11th ACR Shower Leach Fields Project (FY11-324). On file, Environmental Division, DPW, Fort Irwin, California.	FY11-324
GeoMarine, Inc. – 2004	Cultural Resources Inventory and Evaluation Including Geomorphic and Paleontological Characterization of the 210-km (130.5 mi) Central Corridor, Fiber Optic Network for Fort Irwin, National Training Center, California. On file, Environmental Division, DPW, Fort Irwin, California.	R-127
Versar, Inc. – 2003	Cultural Resources Inventory and Evaluation for the Fort Irwin & National Training Center (NTC) – Large City Military Operations on Urban Terrain Project, San Bernardino County, California. On file, Environmental Division, DPW, Fort Irwin, California.	DPW-040

Source: Fort Irwin DPW, 2015
DPW = Directorate of Public Works

Five previously recorded sites and three isolated finds are previously recorded within the one-mile buffer. No cultural resources have been previously recorded within the APE. All but one of the previously recorded resources within the buffer have been found ineligible, as recommended by the cultural investigator, for inclusion to the NRHP; one site has not been evaluated (Table 3-3). There are no historic districts or cultural landscapes within the study area. No known cultural resources are within the area that may be affected by Project activities (SCCIC 2015; Fort Irwin DPW 2015).

Table 3-3 lists all the previously recorded sites within the study area.

TABLE 3-3
Cultural Sites within One Mile of the Project Area

Sites within a One-Mile Radius			
Site Number	**Site Type**	**Site Description**	**Evaluation CRHR/NRHP Year**
P-36-004992	Prehistoric	Lithic scatter	Not eligible/2003
P-36-011527	Prehistoric	Temporary Campsite	Not eligible/2003
P-36-011528	Prehistoric	Lithic scatter	Not eligible/2003
P-36-011529	Prehistoric	Lithic scatter	Not eligible/2003
P-36-025438	Prehistoric	Lithic scatter	Not evaluated
Isolates			
P-36-024524	Prehistoric	Isolate	Not eligible/2012
P-36-025436	Prehistoric	Isolate	Not eligible/2012
P-36-025437	Prehistoric	Isolate	Not eligible/2012

Source: SCCIC of CHRIS, 2015
NADB = National Archaeological Database
CHRIS = California Historical Resources Information System
SCCIC = South Central Coastal Information Center

3.4 Native American Consultation

The record search conducted at the SCCIC and the Fort Irwin DPW did not indicate the presence of Native American traditional cultural properties. Fort Irwin is conducting government-to-government consultation with affiliated tribes on the possible effects of the proposed Project.

3.5 Field Inventory Methodology

The fundamental goals of a pedestrian survey are to identify and document previously unrecorded cultural resources and to analyze cultural materials, not only to better characterize potential Project effects, but also to attempt to confirm or elaborate on our current understanding of the prehistory and history of the region. From a management perspective, the ability of specific resources to address research questions provides a basis to evaluate CRHR and NRHP eligibility. CH2M archaeologists Gloriella Cardenas, Natalie Lawson, and Kyle Parker-McGlynn completed the intensive pedestrian survey of the APE.

Survey methodology for prehistoric and historic archaeological resources was performed using pedestrian transects spaced at 32.8- to 49.2-foot (10- to 15-meter) intervals throughout the APE. The APE was surveyed for cultural resources by visually inspecting the ground surface and subsurface exposures, including rodent burrows and cut banks. The survey was conducted by navigating via a Geo XH global positioning system, which contained survey area shape files.

For Fort Irwin site identification and recordation, the ICRMP states (Appendix C, Section 3.1):

> *Fort Irwin will record archaeological sites based on the presence of midden or significant features, or at least three classes of prehistoric artifacts, e.g., flakes, modified flakes, bifaces, projectile points, cores, ceramics, and/or historic artifact classes, e.g., domestic, military, and architecture, or the presence of at least 20 cultural items within a 10 meter radius. Isolates are those occurrences of artifacts totaling less than 30 items in a 20 meter radius. All sites will be recorded on California Department of Parks and Recreation forms. Small sites or isolates within close proximity (30 meters) of a site may be loci within a larger site and so recorded under the judgment of the person in charge in the field. Site record forms will include information on vicinity isolates. Isolates are individual cultural items such as unmodified or modified flakes, bifaces, or potsherds.*

3.6 Field Inventory Results

The general geomorphologic environment for the Project area is alluvial, as the Project is primarily located within an alluvial basin. Sediment in the majority of the Project area was composed of highly permeable unconsolidated alluvium and aeolian sand. Ground surface visibility was generally excellent at 80 to 100 percent throughout the Project site except where paved roads were encountered. Overall, the Project site has a low archaeological sensitivity, and subsurface deposits are not expected because of the geomorphology of the APE consisting of a deflationary environment, not a depositional one. Additionally, active alluvial channeling, vehicle traffic, military training activities, utilities, and maintenance of roads and facilities have disturbed large portions of the APE.

One isolated artifact was discovered within the APE as a result of this investigation. Temporary CH-IF-01 is a single basalt flake. Isolates by their definition lack the data potential for eligibility to the NRHP. Therefore, the isolate is not significant and is not a historic property for the purposes of Section 106.

3.7 Management Considerations

No archaeological or historic sites were discovered as a result of this investigation. With regard to the Proposed Action, no further work is recommended and CH2M recommends a finding of “No Historic Properties Affected” in accordance with 36 CFR 800.4(d)(1). As with any ground-disturbing project, there remains some theoretical potential for the discovery of buried cultural resources not detected through a surface inventory. If cultural resources or archaeological materials are discovered during ground-disturbing activities, the work near the discovery should cease, and the area should be protected until the find can be evaluated by a qualified archaeologist.

All human remains shall be treated with respect and dignity upon discovery. The Fort Irwin Installation Archaeologist must be notified immediately upon discovery of human remains. In accordance with the ICRMP (Fort Irwin 2011a), all activities near the discovery must cease and a reasonable effort to protect the

human remains must be made. If the remains are prehistoric, the Fort Irwin installation archaeologist will initiate the proper procedures under the Archaeological Resources Protection Act and/or the Native American Graves Protection and Repatriation Act (NAGPRA) to determine the disposition of the materials in consultation with the State Historic Preservation Officer and Native American tribes. If the remains are determined to be Native American, the steps as outlined in NAGPRA, 43 CFR 10.6 (Inadvertent discoveries) must be followed.

SECTION 4

References

Advisory Council for Historic Preservation. 1966 (amended 2004). 36 CFR Part 800 -- Protection of Historic Properties: Section 106. Digital Document accessed on November 9, 2011 at: http://www.achp.gov/regs-rev04.pdf.

Bean, Lowell John and Charles R. Smith. 1978. "Serrano." In *Handbook of North American Indians*, Vol. 8 California. Edited by Robert F. Heizer. Smithsonian Institute, Washington.

Beasley, T.D. 1892. Official Map of San Bernardino County California. Ms. on file with the South Coastal Central Information Center, California State University, Fullerton.

Beattie, George William and Hellen Pruitt Beattie. 1939. *Heritage of the Valley: San Bernardino's First Century*. San Pascual Press, Pasadena, California.

Bloomberg, Nancy J. 1987. "A Historic Indian Community at Victorville, California." In *Journal of California and Great Basin Anthropology* 9(1), pp. 35-45.

Bureau of Land Management (BLM). 2009. *Historic Salt Creek Mining District*. Digital document accessed on February 18, 2016 at: http://www.blm.gov/ca/st/en/fo/barstow/salt_creek.html.

Byrd, Brian F. 1996. *Camping in the Dunes: Archaeological and Geomorphological Investigations of Late Holocene Settlements West of Rogers Dry Lake*. Prepared by ASM Affiliates, Encinitas, California. Prepared for USACE, Los Angeles District, Los Angeles, California.

Byrd, Brian F. and L. Mark Raab. 2007. *Prehistory of the Southern Bight: Models for a New Millennium. In California Prehistory, Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 215-227. AltaMira Press, Lanham.

City of Barstow. 2009. "History." Internet website accessed on June 13, 2012 at: http://www.barstowca.org/site/index.php/about-barstow/history.

Coombs, Gary B., Richard McCarty, Tara Shepperson, and Sharon Dean. 1979. *The Archaeology of the Western Mojave*. Prepared by Archaeological Research, Inc., for the Bureau of Land Management.

Department of the Interior. 1856. General Land Office Plat: Township 14 North, Range 3 East, San Bernardino Meridian. Ms. on file with the South Central Coastal Information Center, California State University, Fullerton.

Earle, D.D., B. Boyer, R.A. Bryson, R.U. Bryson, M.M. Campbell, J.J. Johannesmeyer, K.A. Lark, C.J. Parker, M.D. Pittman, L.M. Ramirez, M.R. Ronning, and J. Underwood. 1998. *Cultural Resources Overview and Management Plan for Edwards AFB, California, Volume 1: Overview of Prehistoric Cultural Resources*. Computer Sciences Corporation, Edwards Air Force Base, California. Submitted to the Air Force Flight Test Center, Base Historic Preservation Office, Edwards Air Force Base, California, Contract No. F04611-92-C-0045. On file at the Base Historic Preservation Office, Edwards Air Force Base, California.

Erlandson, Jon M., Torben C. Rick, Todd J. Braje, Molly Casperson, Brenden Culleton, Brian Fulfrost, Tracy Garcia, Daniel A, Guthrie, Nicholas Jew, Douglas J. Kennett, Madonna L. Moss, Leslie Reeder, Craig Skinner, Jack Watts, and Lauren Willis. 2011. "Paleoindian Seafaring, Maritime Technologies, and Coastal Foraging on California's Channel Islands." In *Science*, Volume 331, March 4, 2011: 1181-1185.

Feller, Walter. n.d. *First Visitors to Bitter Springs*. Digital document accessed on February 19, 2015 at: http://mojavedesert.net/military/fort-irwin-02.html.

Fort Irwin. 2004. *Supplemental Draft Environmental Statement, National Training Center Fort Irwin, California*. Digital document accessed online on June 12, 2012 at: http://www.fortirwinlandexpansion.com/SDEIS_Docs/Section%203/Section%203.4.pdf.

Fort Irwin. 2011a. *Integrated Cultural Resources Management Plan*. National Training Center and Fort Irwin. Environmental Division, Directorate of Public Works.

Fort Irwin. 2011b. *Draft Environmental Assessment/Initial Study: Construction and Operation of the New Weed Army Community Hospital, Fort Irwin, California*. Digital document accessed online on June 12, 2012 at: http://www.irwin.army.mil/Community/Environment/Documents/SUPL_EA_DRAFT.pdf.

Fort Irwin. n.d. "Fort Irwin History." Internet website accessed on June 13, 2012 at: http://www.irwin.army.mil/Visitors/Info/Pages/FortIrwinHistory.aspx.

Fort Irwin Directorate of Public Works (DPW). 2015. Cultural Resources Literature Search Results. Department of Public Works Environmental Division, Bldg 602, 5th St, Fort Irwin, California.

Goodyear, Albert C. 2005. "Evidence for Pre-Clovis Sites in the Eastern United States." In *Paleoamerican Origins: Beyond Clovis*, ed. R. Bonnischen et al. College Station: Texas A&M University. pp. 103-112.

Goodyear, Albert C. 2009. "Update on Research at the Topper Site." In *Legacy*, Vol. 13, No. 1, March 2009.

Goodyear, Albert C. n.d. *Evidence for Pre-Clovis Sites in the Eastern United States*. Digital document accessed on October 3, 2014 at: http://www.allendale- expedition.net/publications/AL_ORIGN1.PDF.

Gutiérrez, R. A., and R. J. Orsi. 1998. *Contested Eden: California before the Gold Rush*. Berkley, California: University of California Press.

Historical Marker Project. 2015. *Waterman Junction Becomes Barstow 1886*. Digital document accessed on February 16, 2016 at: http://www.historicalmarkerproject.com/markers/HMY3W_waterman-junction-becomes-barstow-1886_Barstow-CA.html.

Jenkins, Dennis L., Loren G. Davis, Thomas W. Stafford Jr., Paula F. Campos, Bryan Hockett, George T. Jones, Linda Scott Cummings, Chad Yost, Thomas J. Connolly, Robert M Yohe II, Summer C. Gibbons, Maanasa Raghavan, Morten Rasmussen, Johanna L. A. Paijmans, Michaeol Hofreiter, Brian M Kemp, Jodi Lynn, Barta, Cara Monroe, M. Thomas P. Gilbert, and Eske Willerslev. 2012. "Clovis Age Western Stemmed Projectile Points and Human Coprolites at the Paisley Caves." *Science*, Volume 337, July 13, 2012: 223-228.

Kelly, Isabel T. and Catherine Fowler. 1986. "Southern Paiute." In *Handbook of North American Indians*, Vol. 11 Great Basin. Edited by Warren L. D'Azevedo. Smithsonian Institute, Washington.

Kroeber, A. L. 1925. "Handbook of the Indians of California." In *Bureau of American Ethnology Bulletin* 78, Smithsonian Institution, Washington, D.C.

Las Vegas Railroad Society. 2007. *Overview of Las Vegas' Humble Beginnings*. Digital document accessed on February 16, 2016 at: http://www.lasvegasrailroadsociety.org/History_LV.php.

Lech, Steve. 2004. *Along the Old Roads, A History of the Portion of Southern California that Became Riverside County 1772-1893*. Publisher: Steve Lech.

Moratto, Michael J. 2004 (revised). *California Archaeology*. Academic Press, San Diego.

National Park Service (NPS). n.d. *Arlington Man*. Digital document accessed online on April 26, 2012 at: http://www.nps.gov/chis/historyculture/arlington.htm.

Online Nevada Encyclopedia. n.d. *San Pedro, Los Angeles and Salt Lake Railroad*. Digital document accessed on February 16, 2016 at http://www.onlinenevada.org/articles/san-pedro-los-angeles-and-salt-lake-railroad.

O'Rourke, Judy. 2005. "DNA Links Ancient, Modern Indians." In *The Signal*. May 22, 2005.

Powers, Stephen. 1877. “Tribes of California.” In *Contributions to North American Ethnology*, Vol. 3. U.S. Department of the Interior, Washington, D.C.

Rogers, Malcolm. 1939. “Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas.” In *San Diego Museum Papers* 3.

Rollings-McDonald, Kathleen and Michael Tuerpe. 2008. Agenda Item #10: Municipal Service Reviews and Sphere of Influence Updates for the Agencies within the Barstow Community. Ms. on file with the Local Agency Information Commission, County of San Bernardino, San Bernardino, California.

Scobey, Fred C. and Lot Bowen. 1922. *Map of Southern California.* U.S. Department of Agriculture – Bureau of Public Roads: Irrigation Investigations.

Smart, William B. 1988. *Utah Historic Trails*. Digital document accessed on February 18, 2016 at: http://historytogo.utah.gov/places/historical_places/utahhistorictrails.html.

South Central Coastal Information Center (SCCIC). 2015. Cultural Resources Literature Search Results. On file with the SCCIC, California State University, Fullerton, and with CH2M, Santa Ana, California.

Stoffle, Richard W. and Maria Nieves Zedeno. 2001. “Historical Memory and Ethnographic Perspectives on the Southern Paiute Homeland.” In *Journal of California and Great Basin Anthropology* 23(2). Pp. 229-248.

Sutton, Mark Q. 2005. “People and Language: Defining the Takic Expansion Into Southern California.” In *Pacific Coast Archaeological Society Quarterly,* Vol. 41, No. 2 & 3.

Sutton, Mark Q., Mark E. Basgall, Jill K. Gardner, and Mark W. Allen. 2007. “Advances in Understanding Mojave Desert Prehistory.” In *California Prehistory, Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 229-246. AltaMira Press, Lanham.

Thomas, Tiffany Ann. 2011. “A Landscape Approach to Late Prehistoric Settlement and Subsistence Patterns in the Mojave Sink.” Master’s Thesis, University of Nevada, Las Vegas.

U.S. Army Corps of Engineers (USACE). 2006. *Integrated Natural Resources Management Plan and Environmental Assessment (INRMP&EA)*. 2006-2011. National Training Center and Fort Irwin. Environmental Division, Directorate of Public Works.

U.S. Geological Survey (USGS). 1957. *Trona,* California 15-Minute Topographic Map.

U.S. Geological Survey (USGS). 1960. *Trona,* California 15-Minute Topographic Map.

Utah Rails.net. 2016. *San Pedro, Los Angeles and Salk Lake Railroad (1901 – 1916) Los Angeles and Salt Lake Railroad (1916 – 1936)*. Digital document accessed on February 16, 2016 at: http://utahrails.net/up/splasl-lasl-1901-1936.php.

Vrendenburgh, Larry M. 1994. *Fort Irwin and Vicinity: History of Mining Development*. Digital document accessed on February 15, 2016 at http://vredenburgh.org/mining_history/pages/fort_Irwin.html.

Vredenburgh, Larry M. 1995. “The East Mojave Desert: A Brief Summary of the History of Mining, 1863-1947.” Internet website accessed on October 27, 2010 at: http://vredenburgh.org/mining_history/pages/east_mojave.html.

Vredenburgh, Larry M., Gary L. Shumway and Russell D. Hartill. n.d. *Desert Fever: An Overview of Mining History of the California Desert Conservation Area, San Bernardino County*. Digital document accessed on February 18, 2016 at: http://vredenburgh.org/desert_fever/pages/san_bernardino_17.htm.

Wallace, William J. 1955. “A Suggested Chronology for Southern California Coastal Archaeology.” In *Southwestern Journal of Anthropology* 11 (3): 214-230.

Wallace, William J. 1962. “Prehistoric Cultural Development in the Southern California Deserts.” In *American Antiquity* 28(2):172-180.

Wallace, W. J. 1978. “Post-Pleistocene Archaeology, 9000 to 2000 B.C.” In *Handbook of North American Indians*, Volume 8 California. R. F. Heizer (ed.): 25-36. Washington, D.C.: Smithsonian Institute Press.

Warren, Claude N. 1968. “Cultural Tradition and Ecological Adaptation on the Southern California Coast.” In *Archaic Prehistory in the Western United States*, Symposium of the Society for American Archaeology, Santa Fe. In Eastern New Mexico University Contributions in Anthropology. C. Irwin-Williams (ed.): 1(3).

Warren, Claude N. 1984. “The Desert Region.” In *California Archaeology*, Academic Press, Inc., San Diego. pp. 339-430.

Warren, Elizabeth von Till. 2004. *The Old Spanish National Historic Trail*. Online document accessed on February 10, 2016 at: http://www.oldspanishtrail.org/learn/trail_history.php.

Waters, Michael R., Steven L. Forman, Thomas A. Jennings, Lee C. Nordt, Steven G. Driese, Joshua M. Feinberg, Joshua L. Keene, Jessi Halligan, Anna Lindquist, James Peterson, Charles T. Hallmark, Michael B. Collins, and James E. Wiederhold. 2011. “The Buttermilk Creek Complex and the Origins of Clovis at the Debra L. Friedkin Site, Texas.” In *Science*, Volume 331, March 25, 2011: 1599-1603.

We Are California. 2008. *Conquest and Colonization: Spanish Missionaries*. Digital document accessed online on August 2, 2011 at: http://www.weareca.org/index.php/en/era/1540s-1830s/spanish_missionaries.html.

Weber, Tricia. 2006. “Mission Santa Barbara.” Internet website accessed on August 2, 2011 at: http://californias-missions.org/individual/mission_santa_barbara.htm.

Wheeler, George M., First Lieutenant. 1879. *Report Upon United States Geographical Surveys West of the One Hundredth Meridian*, Vol. III: Archaeology. Government Printing Office, Washington, D.C. for USACE.

Appendix A
Project Photographs

Photograph 1: *Survey area, view to the north*

Photograph 2: *Survey area, view to the east*

Photograph 3: *Survey area overview, view to the north*

Photograph 4: *Survey area with modern rubble, view to the northeast*

Photograph 5: *Survey area with intersecting roads, southwest of Tiefort City, view north east.*

Appendix B
CONFIDENTIAL DPR Forms

The site record is confidential and has been removed from this EA.

Appendix D
Record of Non-applicability and Air Quality Emissions Calculations

RECORD OF NON-APPLICABILITY (RONA) FOR GENERAL CONFORMITY

NAME OF PROJECT: Construction and Maintenance of Stormwater Controls at Tiefort City Ft. Irwin, CA

PROJECT ID NUMBER: _____

POINT OF CONTACT: Mark Burns

PHONE/EMAIL: (760) 380-3737

START DATE: 2017

General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the project described above according to the requirements of 40 CFR 93, Subpart B. The requirements of the rule are not applicable to this project/action because:

The project/action qualifies as an exempt action under. The applicable exemption citation is 40 CFR 93.153: _____.

OR

Total direct and indirect emissions from this project/action have been estimated at *(only include information for the applicable pollutants):*

16.5 tons/yr of NOx

2.04 tons/yr of VOC

1.12 tons/yr of PM10

16.9 tons/yr of Carbon Monoxide (CO) *(specify pollutant)*

0.026 tons/yr of Sulfur Dioxide (SO_2) *(specify pollutant)*

These levels are below the conformity threshold values established at the 40 CFR 93.153 (b), **AND** this project/action is not considered regionally significant under 40 CFR 93.153 (i).

Supporting documentation and emission estimates are:

Attached — Environmental Assessment for the Construction and Maintenance of Stormwater Controls at Tiefort City

Appear in NEPA Documentation _____ *(cite reference)*

Other _____ *(cite reference)*

Environmental Coordinator *(Title and Signature)* Air Program Manager Date 10/11/16

CFR 93.153 BURNS.MARK.A.1079354380 Digitally signed by BURNS.MARK.A.1079354380 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BURNS.MARK.A.1079354380 Date: 2016.10.11 13:10:07 -07'00'

Fort Irwin - Tiefort City

San Bernardino-Mojave Desert County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	17,163.00	1000sqft	394.01	17,163,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Phase 1 - Site Preparation and Grading, Construction Phase - Operational

Off-road Equipment - Phase 2 - Construction of Channels

Trips and VMT - Construction Phase 2

Grading - Phase 1

Construction Off-road Equipment Mitigation - Assumed value

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	90
tblConstructionPhase	NumDays	620.00	195.00
tblConstructionPhase	NumDays	240.00	195.00
tblConstructionPhase	PhaseEndDate	6/29/2018	9/29/2017
tblConstructionPhase	PhaseEndDate	10/20/2017	1/19/2018
tblConstructionPhase	PhaseEndDate	6/29/2018	9/29/2017
tblConstructionPhase	PhaseStartDate	9/30/2017	1/1/2017
tblConstructionPhase	PhaseStartDate	9/30/2017	1/1/2018
tblConstructionPhase	PhaseStartDate	9/30/2017	1/1/2017
tblGrading	AcresOfGrading	487.50	394.00
tblGrading	MaterialImported	0.00	102,400.00
tblProjectCharacteristics	OperationalYear	2014	2019
tblTripsAndVMT	WorkerTripNumber	38.00	4.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	1.5647	15.8597	12.8375	0.0178	2.7246	0.8195	3.5440	1.3581	0.7572	2.1153	0.0000	1,616.5134	1,616.5134	0.3494	0.0000	1,623.8497
2018	0.0468	0.4509	0.3710	5.0000e-004	2.4000e-004	0.0248	0.0250	6.0000e-005	0.0232	0.0232	0.0000	45.0550	45.0550	0.0119	0.0000	45.3039
Total	**1.6115**	**16.3106**	**13.2085**	**0.0183**	**2.7248**	**0.8442**	**3.5690**	**1.3582**	**0.7804**	**2.1386**	**0.0000**	**1,661.5684**	**1,661.5684**	**0.3612**	**0.0000**	**1,669.1536**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	1.5647	15.8597	12.8375	0.0178	0.2199	0.8195	1.0393	0.1045	0.7572	0.8617	0.0000	1,616.5120	1,616.5120	0.3494	0.0000	1,623.8483
2018	0.0468	0.4509	0.3710	5.0000e-004	5.0000e-005	0.0248	0.0248	2.0000e-005	0.0232	0.0232	0.0000	45.0549	45.0549	0.0119	0.0000	45.3038
Total	**1.6115**	**16.3106**	**13.2085**	**0.0183**	**0.2199**	**0.8442**	**1.0642**	**0.1045**	**0.7804**	**0.8849**	**0.0000**	**1,661.5669**	**1,661.5669**	**0.3612**	**0.0000**	**1,669.1521**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**91.93**	**0.00**	**70.18**	**92.31**	**0.00**	**58.62**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	86.9328	1.4800e-003	0.1593	1.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	0.3067	0.3067	8.3000e-004	0.0000	0.3241
Energy	3.0808	28.0077	23.5264	0.1681		2.1286	2.1286		2.1286	2.1286	0.0000	84,859.8559	84,859.8559	3.0836	1.0761	85,258.1899
Mobile	68.4603	204.5897	973.8654	1.5565	100.2115	3.5631	103.7746	26.7982	3.2803	30.0785	0.0000	114,983.0227	114,983.0227	4.3135	0.0000	115,073.6070
Waste						0.0000	0.0000		0.0000	0.0000	4,320.0780	0.0000	4,320.0780	255.3093	0.0000	9,681.5733
Water						0.0000	0.0000		0.0000	0.0000	1,259.1628	14,788.9952	16,048.1579	130.0079	3.1944	19,768.5769
Total	**158.4739**	**232.5988**	**997.5511**	**1.7245**	**100.2115**	**5.6922**	**105.9037**	**26.7982**	**5.4094**	**32.2076**	**5,579.2408**	**214,632.1805**	**220,211.4212**	**392.7152**	**4.2704**	**229,782.2712**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	86.9328	1.4800e-003	0.1593	1.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	0.3067	0.3067	8.3000e-004	0.0000	0.3241
Energy	3.0808	28.0077	23.5264	0.1681		2.1286	2.1286		2.1286	2.1286	0.0000	84,859.8559	84,859.8559	3.0836	1.0761	85,258.1899
Mobile	68.4603	204.5897	973.8654	1.5565	100.2115	3.5631	103.7746	26.7982	3.2803	30.0785	0.0000	114,983.0227	114,983.0227	4.3135	0.0000	115,073.6070
Waste						0.0000	0.0000		0.0000	0.0000	4,320.0780	0.0000	4,320.0780	255.3093	0.0000	9,681.5733
Water						0.0000	0.0000		0.0000	0.0000	1,259.1628	14,788.9952	16,048.1579	129.9843	3.1895	19,766.5681
Total	**158.4739**	**232.5988**	**997.5511**	**1.7245**	**100.2115**	**5.6922**	**105.9037**	**26.7982**	**5.4094**	**32.2076**	**5,579.2408**	**214,632.1805**	**220,211.4212**	**392.6916**	**4.2655**	**229,780.2624**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.11**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2017	9/29/2017	5	195	Phase 1
2	Grading	Grading	1/1/2017	9/29/2017	5	195	Phase 1
3	Construction Phase 1	Trenching	1/1/2017	9/29/2017	5	195	Phase 1
4	Construction Phase 2	Trenching	1/1/2018	1/19/2018	5	15	Phase 2

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 394

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Construction Phase 1	Cranes	1	7.00	226	0.29
Construction Phase 1	Forklifts	3	8.00	89	0.20
Construction Phase 1	Generator Sets	1	8.00	84	0.74
Construction Phase 1	Tractors/Loaders/Backhoes	4	7.00	97	0.37
Construction Phase 1	Welders	1	8.00	46	0.45
Construction Phase 2	Concrete/Industrial Saws	1	8.00	81	0.73
Construction Phase 2	Cranes	1	7.00	226	0.29
Construction Phase 2	Excavators	3	8.00	162	0.38
Construction Phase 2	Forklifts	3	8.00	89	0.20
Construction Phase 2	Generator Sets	1	8.00	84	0.74
Construction Phase 2	Rubber Tired Dozers	2	8.00	255	0.40
Construction Phase 2	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Construction Phase 2	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	12,800.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction Phase 1	10	25.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Construction Phase 2	15	4.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Clean Paved Roads

3.2 Site Preparation - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.7687	0.0000	1.7687	0.9693	0.0000	0.9693	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4717	5.0460	3.8412	3.8100e-003		0.2685	0.2685		0.2471	0.2471	0.0000	354.0750	354.0750	0.1085	0.0000	356.3532
Total	**0.4717**	**5.0460**	**3.8412**	**3.8100e-003**	**1.7687**	**0.2685**	**2.0372**	**0.9693**	**0.2471**	**1.2164**	**0.0000**	**354.0750**	**354.0750**	**0.1085**	**0.0000**	**356.3532**

3.2 Site Preparation - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.1480	1.1550	2.1063	4.5100e-003	0.1103	0.0340	0.1443	0.0303	0.0312	0.0616	0.0000	404.3681	404.3681	2.0700e-003	0.0000	404.4116
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.9500e-003	0.0112	0.1013	1.6000e-004	0.0141	1.0000e-004	0.0142	3.7600e-003	9.0000e-005	3.8500e-003	0.0000	11.8644	11.8644	7.7000e-004	0.0000	11.8805
Total	**0.1539**	**1.1662**	**2.2077**	**4.6700e-003**	**0.1245**	**0.0341**	**0.1585**	**0.0341**	**0.0313**	**0.0654**	**0.0000**	**416.2326**	**416.2326**	**2.8400e-003**	**0.0000**	**416.2921**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1194	0.0000	0.1194	0.0654	0.0000	0.0654	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4717	5.0460	3.8412	3.8100e-003		0.2685	0.2685		0.2471	0.2471	0.0000	354.0746	354.0746	0.1085	0.0000	356.3528
Total	**0.4717**	**5.0460**	**3.8412**	**3.8100e-003**	**0.1194**	**0.2685**	**0.3879**	**0.0654**	**0.2471**	**0.3125**	**0.0000**	**354.0746**	**354.0746**	**0.1085**	**0.0000**	**356.3528**

3.2 Site Preparation - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.1480	1.1550	2.1063	4.5100e-003	0.0359	0.0340	0.0698	0.0120	0.0312	0.0433	0.0000	404.3681	404.3681	2.0700e-003	0.0000	404.4116
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.9500e-003	0.0112	0.1013	1.6000e-004	3.1100e-003	1.0000e-004	3.2100e-003	1.0500e-003	9.0000e-005	1.1400e-003	0.0000	11.8644	11.8644	7.7000e-004	0.0000	11.8805
Total	**0.1539**	**1.1662**	**2.2077**	**4.6700e-003**	**0.0390**	**0.0341**	**0.0730**	**0.0131**	**0.0313**	**0.0444**	**0.0000**	**416.2326**	**416.2326**	**2.8400e-003**	**0.0000**	**416.2921**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.7961	0.0000	0.7961	0.3453	0.0000	0.3453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5947	6.7852	4.5635	6.0200e-003		0.3234	0.3234		0.2976	0.2976	0.0000	558.4207	558.4207	0.1711	0.0000	562.0138
Total	**0.5947**	**6.7852**	**4.5635**	**6.0200e-003**	**0.7961**	**0.3234**	**1.1195**	**0.3453**	**0.2976**	**0.6429**	**0.0000**	**558.4207**	**558.4207**	**0.1711**	**0.0000**	**562.0138**

3.3 Grading - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.6100e-003	0.0125	0.1126	1.8000e-004	0.0157	1.1000e-004	0.0158	4.1700e-003	1.0000e-004	4.2700e-003	0.0000	13.1827	13.1827	8.5000e-004	0.0000	13.2006
Total	**6.6100e-003**	**0.0125**	**0.1126**	**1.8000e-004**	**0.0157**	**1.1000e-004**	**0.0158**	**4.1700e-003**	**1.0000e-004**	**4.2700e-003**	**0.0000**	**13.1827**	**13.1827**	**8.5000e-004**	**0.0000**	**13.2006**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0537	0.0000	0.0537	0.0233	0.0000	0.0233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5947	6.7852	4.5635	6.0200e-003		0.3234	0.3234		0.2976	0.2976	0.0000	558.4201	558.4201	0.1711	0.0000	562.0131
Total	**0.5947**	**6.7852**	**4.5635**	**6.0200e-003**	**0.0537**	**0.3234**	**0.3772**	**0.0233**	**0.2976**	**0.3209**	**0.0000**	**558.4201**	**558.4201**	**0.1711**	**0.0000**	**562.0131**

3.3 Grading - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.6100e-003	0.0125	0.1126	1.8000e-004	3.4600e-003	1.1000e-004	3.5700e-003	1.1700e-003	1.0000e-004	1.2600e-003	0.0000	13.1827	13.1827	8.5000e-004	0.0000	13.2006
Total	**6.6100e-003**	**0.0125**	**0.1126**	**1.8000e-004**	**3.4600e-003**	**1.1000e-004**	**3.5700e-003**	**1.1700e-003**	**1.0000e-004**	**1.2600e-003**	**0.0000**	**13.1827**	**13.1827**	**8.5000e-004**	**0.0000**	**13.2006**

3.4 Construction Phase 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3295	2.8342	1.9718	2.8800e-003		0.1932	0.1932		0.1811	0.1811	0.0000	258.1240	258.1240	0.0650	0.0000	259.4893
Total	**0.3295**	**2.8342**	**1.9718**	**2.8800e-003**		**0.1932**	**0.1932**		**0.1811**	**0.1811**	**0.0000**	**258.1240**	**258.1240**	**0.0650**	**0.0000**	**259.4893**

3.4 Construction Phase 1 - 2017

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.2700e-003	0.0156	0.1407	2.3000e-004	0.0196	1.3000e-004	0.0198	5.2200e-003	1.2000e-004	5.3400e-003	0.0000	16.4784	16.4784	1.0600e-003	0.0000	16.5007
Total	**8.2700e-003**	**0.0156**	**0.1407**	**2.3000e-004**	**0.0196**	**1.3000e-004**	**0.0198**	**5.2200e-003**	**1.2000e-004**	**5.3400e-003**	**0.0000**	**16.4784**	**16.4784**	**1.0600e-003**	**0.0000**	**16.5007**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3295	2.8342	1.9718	2.8800e-003		0.1932	0.1932		0.1811	0.1811	0.0000	258.1237	258.1237	0.0650	0.0000	259.4890
Total	**0.3295**	**2.8342**	**1.9718**	**2.8800e-003**		**0.1932**	**0.1932**		**0.1811**	**0.1811**	**0.0000**	**258.1237**	**258.1237**	**0.0650**	**0.0000**	**259.4890**

3.4 Construction Phase 1 - 2017

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.2700e-003	0.0156	0.1407	2.3000e-004	4.3200e-003	1.3000e-004	4.4600e-003	1.4600e-003	1.2000e-004	1.5800e-003	0.0000	16.4784	16.4784	1.0600e-003	0.0000	16.5007
Total	**8.2700e-003**	**0.0156**	**0.1407**	**2.3000e-004**	**4.3200e-003**	**1.3000e-004**	**4.4600e-003**	**1.4600e-003**	**1.2000e-004**	**1.5800e-003**	**0.0000**	**16.4784**	**16.4784**	**1.0600e-003**	**0.0000**	**16.5007**

3.5 Construction Phase 2 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0467	0.4507	0.3694	5.0000e-004		0.0248	0.0248		0.0232	0.0232	0.0000	44.8598	44.8598	0.0118	0.0000	45.1085
Total	**0.0467**	**0.4507**	**0.3694**	**5.0000e-004**		**0.0248**	**0.0248**		**0.0232**	**0.0232**	**0.0000**	**44.8598**	**44.8598**	**0.0118**	**0.0000**	**45.1085**

3.5 Construction Phase 2 - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	1.7000e-004	1.5400e-003	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1952	0.1952	1.0000e-005	0.0000	0.1954
Total	**9.0000e-005**	**1.7000e-004**	**1.5400e-003**	**0.0000**	**2.4000e-004**	**0.0000**	**2.4000e-004**	**6.0000e-005**	**0.0000**	**7.0000e-005**	**0.0000**	**0.1952**	**0.1952**	**1.0000e-005**	**0.0000**	**0.1954**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0467	0.4507	0.3694	5.0000e-004		0.0248	0.0248		0.0232	0.0232	0.0000	44.8598	44.8598	0.0118	0.0000	45.1084
Total	**0.0467**	**0.4507**	**0.3694**	**5.0000e-004**		**0.0248**	**0.0248**		**0.0232**	**0.0232**	**0.0000**	**44.8598**	**44.8598**	**0.0118**	**0.0000**	**45.1084**

3.5 Construction Phase 2 - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	1.7000e-004	1.5400e-003	0.0000	5.0000e-005	0.0000	5.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.1952	0.1952	1.0000e-005	0.0000	0.1954
Total	**9.0000e-005**	**1.7000e-004**	**1.5400e-003**	**0.0000**	**5.0000e-005**	**0.0000**	**5.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.1952**	**0.1952**	**1.0000e-005**	**0.0000**	**0.1954**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	68.4603	204.5897	973.8654	1.5565	100.2115	3.5631	103.7746	26.7982	3.2803	30.0785	0.0000	114,983.0227	114,983.0227	4.3135	0.0000	115,073.6070
Unmitigated	68.4603	204.5897	973.8654	1.5565	100.2115	3.5631	103.7746	26.7982	3.2803	30.0785	0.0000	114,983.0227	114,983.0227	4.3135	0.0000	115,073.6070

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	119,626.11	22,655.16	11670.84	263,780,563	263,780,563
Total	119,626.11	22,655.16	11,670.84	263,780,563	263,780,563

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.432494	0.068575	0.183624	0.160239	0.046129	0.007778	0.006784	0.077842	0.000817	0.001136	0.010310	0.000579	0.003693

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	54,370.1095	54,370.1095	2.4992	0.5171	54,582.8879
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	54,370.1095	54,370.1095	2.4992	0.5171	54,582.8879
NaturalGas Mitigated	3.0808	28.0077	23.5264	0.1681		2.1286	2.1286		2.1286	2.1286	0.0000	30,489.7464	30,489.7464	0.5844	0.5590	30,675.3019
NaturalGas Unmitigated	3.0808	28.0077	23.5264	0.1681		2.1286	2.1286		2.1286	2.1286	0.0000	30,489.7464	30,489.7464	0.5844	0.5590	30,675.3019

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	5.71356e+008	3.0808	28.0077	23.5264	0.1681		2.1286	2.1286		2.1286	2.1286	0.0000	30,489.7464	30,489.7464	0.5844	0.5590	30,675.3019
Total		**3.0808**	**28.0077**	**23.5264**	**0.1681**		**2.1286**	**2.1286**		**2.1286**	**2.1286**	**0.0000**	**30,489.7464**	**30,489.7464**	**0.5844**	**0.5590**	**30,675.3019**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	5.71356e+008	3.0808	28.0077	23.5264	0.1681		2.1286	2.1286		2.1286	2.1286	0.0000	30,489.7464	30,489.7464	0.5844	0.5590	30,675.3019
Total		**3.0808**	**28.0077**	**23.5264**	**0.1681**		**2.1286**	**2.1286**		**2.1286**	**2.1286**	**0.0000**	**30,489.7464**	**30,489.7464**	**0.5844**	**0.5590**	**30,675.3019**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	1.89994e+008	54,370.1095	2.4992	0.5171	54,582.8879
Total		**54,370.1095**	**2.4992**	**0.5171**	**54,582.8879**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	1.89994e+008	54,370.1095	2.4992	0.5171	54,582.8879
Total		**54,370.1095**	**2.4992**	**0.5171**	**54,582.8879**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	86.9328	1.4800e-003	0.1593	1.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	0.3067	0.3067	8.3000e-004	0.0000	0.3241
Unmitigated	86.9328	1.4800e-003	0.1593	1.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	0.3067	0.3067	8.3000e-004	0.0000	0.3241

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	19.8876					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	67.0301					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0151	1.4800e-003	0.1593	1.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	0.3067	0.3067	8.3000e-004	0.0000	0.3241
Total	**86.9328**	**1.4800e-003**	**0.1593**	**1.0000e-005**		**5.7000e-004**	**5.7000e-004**		**5.7000e-004**	**5.7000e-004**	**0.0000**	**0.3067**	**0.3067**	**8.3000e-004**	**0.0000**	**0.3241**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	19.8876					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	67.0301					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0151	1.4800e-003	0.1593	1.0000e-005		5.7000e-004	5.7000e-004		5.7000e-004	5.7000e-004	0.0000	0.3067	0.3067	8.3000e-004	0.0000	0.3241
Total	**86.9328**	**1.4800e-003**	**0.1593**	**1.0000e-005**		**5.7000e-004**	**5.7000e-004**		**5.7000e-004**	**5.7000e-004**	**0.0000**	**0.3067**	**0.3067**	**8.3000e-004**	**0.0000**	**0.3241**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	16,048.1579	129.9843	3.1895	19,766.5681
Unmitigated	16,048.1579	130.0079	3.1944	19,768.5769

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	3968.94 / 0	16,048.1579	130.0079	3.1944	19,768.5769
Total		**16,048.1579**	**130.0079**	**3.1944**	**19,768.5769**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	3968.94 / 0	16,048.1579	129.9843	3.1895	19,766.5681
Total		**16,048.1579**	**129.9843**	**3.1895**	**19,766.5681**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	4,320.0780	255.3093	0.0000	9,681.5733
Unmitigated	4,320.0780	255.3093	0.0000	9,681.5733

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	21282.1	4,320.0780	255.3093	0.0000	9,681.5733
Total		**4,320.0780**	**255.3093**	**0.0000**	**9,681.5733**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	21282.1	4,320.0780	255.3093	0.0000	9,681.5733
Total		**4,320.0780**	**255.3093**	**0.0000**	**9,681.5733**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Summary of Construction Related Emissions

Emissions for 2017 (tons/yr)

Activities	CO	VOC	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO2e
Ft. Irwin - Tiefort City	12.8	1.56	15.9	0.018	1.04	0.862	1,624
Vehicles - Ft. Irwin - Tiefort City	4.07	0.48	0.678	0.0086	0.080	0.055	879
Total, Construction Emissions, ton/year	16.9	2.04	16.5	0.026	1.12	0.916	2,503

Summary of Operation Related Emissions

Activities	CO	VOC	NO_X	SO_2	PM_{10}	$PM_{2.5}$	CO2e
Ft. Irwin - Tiefort City	0.371	0.0468	0.45	0.00050	0.0248	0.0233	45.3
Vehicles - Ft. Irwin - Tiefort City	0.0604	0.00721	0.0175	0.0001298	0.001368	0.000973	13.38
Total, Construction Emissions, ton/year	0.431	0.0540	0.468	0.00063	0.0262	0.0243	58.7

1.0 Calculation of Emissions from Vehicles

1.1 Calculation of Criteria Pollutant Emission for POVs

1.1.1 Calculation of Mileage for POVs & Delivery Trucks

Vehicle Type[1]	Number/day	Miles/Vehicle/ Day	Total Miles/ Day
POVs	100	80.0	8,000
Delivery Trucks	2	80.0	160
Dump Trucks	3	20.0	60
TOTAL			8,220

(1) Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)
(2) Miles are total for the project.

1.1.2 Calculation of Criteria Pollutant Emission Rates

Vehicle Type	Vehicle Model Year	Number of Vehicles	Daily Mileage [1]	Vehicle Emission Factors (lb/mile) [2]								Actual Emissions (lb/day) [3]								
				CO	VOC	NO_x	SO_x	PM10	PM2.5	CO2	CH4	CO	VOC	NO_x	SO_x	PM10	PM2.5	CO2	CH4	CO2e
POVs	Default	10	8,000	0.0054	0.00060	0.00051	0.000011	0.000094	0.000062	1.106275	0.000053	4.30E+01	4.81E+00	4.10E+00	8.64E-02	7.56E-01	4.95E-01	8.85E+03	4.24E-01	8.86E+03
Delivery Trucks	Default	2	160	0.010	0.0015	0.011	0.000027	0.00043	0.00035	2.84005	0.00007	1.60E+00	2.40E-01	1.71E+00	4.36E-03	6.90E-02	5.54E-02	4.54E+02	1.07E-02	4.55E+02
Dump Trucks	Default	3	60	0.010	0.0015	0.011	0.000027	0.00043	0.00035	2.84005	0.00007	5.99E-01	2.40E-01	1.71E+00	4.36E-03	6.90E-02	5.54E-02	4.54E+02	1.07E-02	4.55E+02
TOTAL EMISSIONS												**45.2**	**5.29**	**7.53**	**0.10**	**0.89**	**0.61**	**9,759**	**0.45**	**9,770**

(1) Daily mileage is for all the vehicles in a vehicle category. Input the appropriate mileage estimated in Section 1.1.1
(2) California Air Resources Board's EMFAC2007 model (version 2.30) was used to calculate vehicle emission factors.
(3) Emission Factor (lb/mile) x Daily Mileage = Actual Emissions (lb/day)

Year	Days of Construction
2017	180

1.0 Calculation of Emissions from Vehicles

1.1 Calculation of Criteria Pollutant Emission for POVs

1.1.1 Calculation of Mileage for POVs & Delivery Trucks

Vehicle Type[1]	Number/day	Miles/Vehicle/ Day	Total Miles/ Day
POVs	15	80.0	1,200
Dump Trucks	2	80.0	160
TOTAL			1,360

(1) Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)
(2) Miles are total for the project.

1.1.2 Calculation of Criteria Pollutant Emission Rates

Vehicle Type	Vehicle Model Year	Number of Vehicles	Daily Mileage [1]	Vehicle Emission Factors (lb/mile) [2]								Actual Emissions (lb/day) [3]								
				CO	VOC	NO_x	SO_x	PM10	PM2.5	CO2	CH4	CO	VOC	NO_x	SO_x	PM10	PM2.5	CO2	CH4	CO2e
POVs	Default	15	1,200	0.0054	0.00060	0.00051	0.000011	0.000094	0.000062	1.106275	0.000053	6.45E+00	7.21E-01	6.16E-01	1.30E-02	1.13E-01	7.43E-02	1.33E+03	6.36E-02	1.33E+03
Dump Trucks	Default	2	160	0.010	0.0015	0.011	0.000027	0.00043	0.00035	2.84005	0.00007	1.60E+00	2.40E-01	1.71E+00	4.36E-03	6.90E-02	5.54E-02	4.54E+02	1.07E-02	4.55E+02
TOTAL EMISSIONS												**8.05**	**0.96**	**2.33**	**0.0173**	**0.182**	**0.130**	**1,782**	**0.074**	**1,784**

(1) Daily mileage is for all the vehicles in a vehicle category. Input the appropriate mileage estimated in Section 1.1.1
(2) California Air Resources Board's EMFAC2007 model (version 2.30) was used to calculate vehicle emission factors.
(3) Emission Factor (lb/mile) x Daily Mileage = Actual Emissions (lb/day)

Year	Days of Construction
2018	15