# Draft Environmental Assessment Closure of Former Defense Fuel Support Point at Moffett Field, Santa Clara County, California

**April 2016**

Prepared for:

**Defense Logistics Agency**
**Fort Belvoir, Virginia**

**and**

**National Aeronautics and Space Administration**
**Ames Research Center, Santa Clara County, California**

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# DRAFT ENVIRONMENTAL ASSESSMENT
# CLOSURE OF FORMER DEFENSE FUEL SUPPORT POINT AT MOFFETT FIELD, SANTA CLARA COUNTY, CALIFORNIA

## TITLE PAGE

**Lead Agency for the Environmental Assessment:** Defense Logistics Agency

**Cooperating Agency for the Environmental Assessment:** National Aeronautics and Space Administration

**Title of Proposed Action:** Closure of Former Defense Fuel Support Point at Moffett Field, Santa Clara County, California

**Affected Region:** Santa Clara County, California

**Designation:** Environmental Assessment

This Environmental Assessment (EA) presents analyses of the potential environmental impacts resulting from the closure of the former Defense Fuel Support Point, including removal of underground storage tanks and associated pipelines and equipment. This EA is a public document containing a full analysis of the potential environmental effects of the Proposed Action and alternatives on resource areas such as air quality, biological resources, cultural resources, geological resources, water resources, hazardous materials and wastes, noise, and transportation.

The Defense Logistics Agency prepared this EA in accordance with the National Environmental Policy Act of 1969 and other applicable laws. The National Aeronautics and Space Administration, as the property owner, is a cooperating agency in the preparation of this EA.

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# EXECUTIVE SUMMARY

In accordance with the National Environmental Policy Act and Council on Environmental Quality regulations, this Environmental Assessment was prepared to analyze the potential environmental impacts of removing five underground storage tanks (USTs), piping, and equipment from the inactive former Defense Fuel Support Point (DFSP) at Moffett Field, Santa Clara County, California, in connection with the facility's closure; hereafter this is referred to as the Proposed Action. DFSP Moffett Field lies within the National Aeronautics and Space Administration (NASA) facility, and the Defense Logistics Agency (DLA) has been a tenant there since 1994. DLA previously stored capitalized fuel product at DFSP Moffett Field, first as a supplier to the U.S. Navy starting in 1992 and then to NASA as a result of Base Realignment and Closure beginning in 1994. DLA ceased fuel operations at DFSP Moffett Field in 2003. The fuel facility was cleaned and secured in 2005, and the facility has remained in caretaker status since then. The baseline condition from which to assess the potential environmental impacts of the alternatives is an inactive caretaker status.

The purpose of the Proposed Action is to reduce environmental risks associated with the five closed USTs; address two Notices of Violation that DLA Energy, received in March 2015 from the State of California Water Resources Control Board and County of Santa Clara regarding improper UST maintenance; and eliminate aging infrastructure no longer required to meet the Department of Defense mission. DLA Energy received the Notices of Violation based upon the State of California Water Resources Control Board and County of Santa Clara's determination that DLA is not maintaining the five USTs in compliance with California and Santa Clara County codes after the USTs were emptied and cleaned in 2005. The Proposed Action is therefore also necessary to resolve State of California Water Resources Control Board and County of Santa Clara assertions that DLA is not in compliance with the California Code of Regulations (CCR), Title 23, Division 3, Chapter 16, Article 7, *Underground Storage Tank Requirements,* and Unified Facilities Criterion 3-460-0. DLA Energy is committed to closure of these tanks, as well as implementation of a phased closure agreement (Phase II) with the Santa Clara Environmental Health Department.

Under the Proposed Action, DLA proposes to permanently close DFSP Moffett Field. Under this proposal the fuel facility infrastructure would be physically disconnected, abandoned in place, dismantled, and/or demolished. NASA would continue to be the property owner of the parcel. The Proposed Action involves the closure of the five USTs and associated pipelines, truck fill stands, high-speed aircraft fueling hydrants, and related infrastructure (e.g., manhole vaults, pumps, pump houses, pump pads, hydrants, racks, cathodic protection system).

Under the No Action Alternative, DFSP Moffett Field's former fuel facilities would remain in their current nonclosure status and the State of California Water Resources Control Board and County of Santa Clara, would continue to consider the site in violation of state and county environmental regulations for the failure to be properly closed. Implementation of the No Action Alternative would leave the DFSP Moffett Field facilities in a caretaker status.

The overall environmental effect of implementing the Proposed Action is expected to be short-term and less than significant. A summary of potential impacts is provided in Table ES-1.

**Table ES-1. Summary of Environmental Consequences**

| Summary of Potential Impacts | | |
|---|---|---|
| **Resource Area** | **Proposed Action (Alternative 1)** | **No Action Alternative** |
| Air Quality | No Significant Impact<br>The Proposed Action would result in short-term, intermittent impacts on air quality, including emissions from demolition and excavation activities, such as earthwork, as well as fugitive dust from site disturbance and vehicle exhaust from demolition and excavation equipment and vehicles. Ground disturbance will be short-term. Limited to approximately 5- to 6-months, and the use of dust control mitigation measures (e.g., wet suppression) during demolition and excavation activities, the contribution would be significantly reduced and result in minor, short-term adverse effects to air quality. These activities would not exceed *de minimis* levels; a conformity determination would not be required. When considered in combination with other projects in the vicinity, the Proposed Action would not result in cumulative impacts on air quality. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |
| Biological Resources | No Significant Impact<br>The Proposed Action would temporarily remove vegetation and potential burrowing owl (*Athene cunicularia*) habitat within the project site and could result in impacts on wildlife species during demolition and excavation. The burrowing owl is a California species of special concern and a federal species of concern and is protected under the Migratory Bird Treaty Act. With the implementation of avoidance, minimization, and mitigation measures such as predemolition and preexcavation surveys, biological monitoring, and creation of artificial burrows for burrowing owls after UST removal, the Proposed Action is not likely to adversely affect any federal or state listed threatened, endangered, or candidate species or its habitat. Implementation of the Proposed Action would not result in significant impacts on biological resources. When considered in combination with other projects in the vicinity, the Proposed Action is not likely to result in cumulative impacts on biological resources. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |

| Summary of Potential Impacts | | |
|---|---|---|
| **Resource Area** | **Proposed Action (Alternative 1)** | **No Action Alternative** |
| Cultural Resources | No Significant Impact<br>The Proposed Action is located in the Sunnyvale Historic District. Several historical structures dating back to the Cold War era would be removed under the Proposed Action. In accordance with Section 106 of the NHPA. NASA has taken into account the potential effects of the Proposed Action on historic properties, and has determined that the Proposed Action would result in no adverse effect. Under Section 106, NASA makes determinations of eligibility and adverse effects and requests the SHPO's concurrence with those determinations, as deemed appropriate. On April 11, 2016, NASA, as the lead federal agency under NHPA, contacted the California SHPO to initiate Section 106 review and consultation on the identification of historic properties and the assessment of adverse effects within an Area of Potential Effects for the project. When considered in combination with other projects in the vicinity, the Proposed Action would not result in cumulative impacts on cultural resources. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |
| Geology, Topography, and Soils | No Significant Impact<br>The demolition and excavation associated with the permanent closure of the fuel facility would result in temporary surface disturbance by excavation and grading. DLA would use BMPs for erosion control to prevent erosion and potential landslides. The disturbed areas would be backfilled and regraded to their natural topography, then compacted and reseeded. BMPs would be identified in the geotechnical/engineering evaluation, Closure Plan, NPDES General Construction Permit, Stormwater Pollution Prevention Plan, Work Plan, Environmental Protection Plan, Quality Control Plan, and Quality Assurance Surveillance Plan. With the implementation of those BMPs, it is expected that the Proposed Action would not result in a significant impact to geological resources. When considered in combination with other projects in the vicinity, the Proposed Action would not result in cumulative impacts on geological resources. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |

| Summary of Potential Impacts | | |
|---|---|---|
| Resource Area | Proposed Action (Alternative 1) | No Action Alternative |
| Hazardous Materials and Wastes | No Significant Impact<br>The Proposed Action would involve removing USTs and associated infrastructure and would include post-removal characterization sampling in accordance with CCR requirements for tank removal. No potential remediation is expected. If contamination is found, remediation would be completed in accordance with appropriate regulations under a separate project. The Proposed Action is subject to compliance with impact avoidance and minimization measures. To reduce the risk of human exposure to contamination, BMPs would be implemented; these would be outlined in the Closure Plan, NPDES General Construction Permit, site-specific Stormwater Pollution Prevention Plan, Waste Management Plan, Sampling and Analysis Plan, Environmental Protection Plan, Quality Control Plan, Quality Assurance Surveillance Plan, Accident Prevention Plan, and Health and Safety Plan. During the closure of the USTs and the pipelines, excavated soil would be characterized in accordance with CCR, and if sample results should indicate contaminated soil exists, that soil would not be used as backfill and would instead be appropriately disposed of off-site. The Proposed Action would not result in a significant impact from hazardous materials and waste. When considered in combination with other projects in the vicinity, the Proposed Action would not result in cumulative impacts related to hazardous materials and waste. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |
| Hydrology and Water Resources | No Significant Impact<br>DLA would obtain all necessary stormwater permits and implement BMPs to ensure that stormwater runoff would not impact water quality during demolition and excavation. The Proposed Action would be subject to compliance with impact avoidance and minimization measures and the BMPs that would be outlined in the Closure Plan, NPDES General Construction Permit, site-specific Stormwater Pollution Prevention Plan, Waste Management Plan, Sampling and Analysis Plan, Environmental Protection Plan, Quality Control Plan and Quality Assurance Surveillance Plan. With implementation of BMPs from these documents, it is expected that the Proposed Action would not result in a significant impact to hydrology and water resources. When considered in combination with other projects in the vicinity, the Proposed Action would not result in cumulative impacts related to hydrology and water resources. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |

| Summary of Potential Impacts | | |
|---|---|---|
| Resource Area | Proposed Action (Alternative 1) | No Action Alternative |
| Noise | No Significant Impact<br>The Proposed Action is expected to result in short-term, intermittent elevation of ambient noise levels during demolition and excavation activities. No sensitive receptors such as residences, schools, or hospitals are within 7,500 feet of the project site. Demolition and excavation activities would use noise-generating equipment; however, it is not expected to produce significant amounts of additional noise beyond the noise currently generated by air traffic and would not significantly affect noise receptors when combined with other current and future noise emitters in the surrounding areas. Noise associated with demolition activities would range from approximately 74 to 90 decibels at 50 feet but would decrease with the distance from the source. The surrounding topography and buildings would shield sensitive noise receptors from demolition noise. Therefore, noise levels from the Proposed Action would not result in a significant impact. When considered in combination with other projects in the vicinity, the Proposed Action would not result in cumulative impacts related to noise. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |
| Transportation and Circulation | No Significant Impact<br>Short-term, minor impacts during demolition and excavation are expected due to an increase of less than 25.7 ADT count from traffic associated with the transport of personnel, materials, and equipment. The context and intensity of the potential impacts are expected to be minor. A Traffic Control Plan would be developed to avoid congestion within Moffett Field. The majority of demolition and excavation-related traffic would access Moffett Field from the Highway 101 and Ellis Street exit to the main gate. The short-term addition of 25.7 ADT would not result in a significant contribution to regional traffic. When considered in combination with other projects in the vicinity, the Proposed Action is not likely to result in cumulative impacts related to traffic and circulation. | No Significant Impact<br>DFSP Moffett Field's former fuel facilities would remain in their current nonclosure, caretaker status. For the purposes of this EA the No Action Alternative is not a feasible alternative but serves to document baseline conditions. |

**DFSP** – Defense Fuel Support Point; **EA** – Environmental Assessment; **UST** – underground storage tank; **NASA** – National Aeronautics and Space Administration; **NRHP** – National Register of Historic Places; **SHPO** – State Historic Preservation Officer; **DLA** – Defense Logistics Agency; **BMP** – best management practice; **NPDES** – National Pollutant Discharge Elimination System; **CCR** – California Code of Regulations; **ADT** – average daily traffic

Based on the analysis contained herein, it is the conclusion of this Environmental Assessment that the Proposed Action would not result in significant impacts on human health or the environment, and that a Finding of No Significant Impact should be issued for compliance with the National Environmental Policy Act.

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| | |
|---|---|
| AADT | Annual Average Daily Traffic |
| AB | Assembly Bill |
| ACHP | Advisory Council on Historic Preservation |
| ACM | Asbestos-Containing Material |
| ADT | Average Daily Traffic |
| APE | Area of Potential Effect |
| APP | Accident Prevention Plan |
| ARC | Ames Research Center |
| AST | Aboveground Storage Tank |
| BAAQMD | Bay Area Air Quality Management District |
| BMP | Best Management Practice |
| CAA | Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| Cal/OSHA | California Department of Occupational Safety and Health Administration |
| CANG | California Air National Guard |
| CAP | Clean Air Plan |
| CARB | California Air Resources Board |
| CCAA | California Clean Air Act |
| CCC | California Coastal Commission |
| CCR | California Code of Regulations |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| $CH_4$ | Methane |
| CO | Carbon Monoxide |

| | |
|---|---|
| $CO_2$ | Carbon Dioxide |
| CWA | Clean Water Act |
| CY | Cubic Yard |
| dB | Decibel |
| dBA | A-weighted decibel |
| DCE | Cis-1,2-dichloroethylene |
| DFSP | Defense Fuel Support Point |
| DLA | Defense Logistics Agency |
| DoD | Department of Defense |
| DOSH | Division of Health and Safety |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| EPA | United States Environmental Protection Agency |
| EPP | Environmental Protection Plan |
| ESA | Endangered Species Act |
| FAC | Facultative |
| FACW | Facultative Wetland Species |
| FEMA | Federal Emergency Management Agency |
| FONSI | Finding of No Significant Impact |
| GHG | Greenhouse Gas |
| GOCO | Government Owned/Contractor Operated |
| HAP | Hazardous Air Pollutant |
| HD | Historic District |
| HMCD | Health and Hazardous Materials Compliance Division of Santa Clara County |
| HSP | Health and Safety Plan |

| | |
|---|---|
| HWCL | California Hazardous Waste Control Law |
| ICRMP | Integrated Cultural Resources Management Plan |
| JP | Jet Propellant |
| LBP | Lead-Based Paint |
| LCP | Lead-Containing Paint |
| LOS | Level of Service |
| MBTA | Migratory Bird Treaty Act |
| MEW | Middlefield-Ellis-Whisman |
| $N_20$ | Nitrous Oxide |
| NA | Not Applicable |
| NAAQS | National Ambient Air Quality Standards |
| NAS | Naval Air Station |
| NASA | National Aeronautics and Space Administration |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| No. | Number |
| $NO_2$ | Nitrogen Dioxide |
| NOAA | National Oceanic and Atmospheric Administration |
| NOV | Notice of Violation |
| $NO_x$ | Nitrogen Oxides |
| NPDES | National Pollutant Discharge Elimination System |
| NPR | NASA Procedural Requirement |
| NRHP | National Register of Historic Places |
| $O_3$ | Ozone |
| OBL | Obligate Wetland Species |
| OSHA | Occupational Safety and Health Administration |

| | |
|---|---|
| OTIE | Oneida Total Integrated Enterprises |
| Pb | Lead |
| PCB | Polychlorinated Biphenyl |
| PM | Particulate Matter |
| $PM_{2.5}$ | Very Fine Particulate Matter |
| $PM_{10}$ | Fine Particulate Matter |
| PST | Pacific Standard Time |
| QASP | Quality Assurance Surveillance Plan |
| QCP | Quality Control Plan |
| RCRA | Resource Conservation and Recovery Act |
| ROG | Reactive Organic Gases |
| ROI | Region of Influence |
| SAP | Sampling and Analysis Plan |
| SCVTA | Santa Clara Valley Transportation Authority |
| $SF_6$ | Sulfur Hexafluoride |
| SFBAAB | San Francisco Bay Area Air Basin |
| SFBCDC | San Francisco Bay Commerce and Development Commission |
| SFBRWQCB | San Francisco Bay Regional Water Quality Control Board |
| SHPO | State Historic Preservation Officer |
| SIP | State Implementation Plan |
| $SO_2$ | Sulfur Dioxide |
| SOP | Standard Operating Procedure |
| SR | State Route |
| SWPPP | Stormwater Pollution Prevention Plan |
| SWRCB | State Water Resources Control Board |
| TAC | Toxic Air Contaminant |

| | |
|---|---|
| TCA | 1,1,1 Trichloroethane |
| TCE | 1,1,1 Trichloroethylene |
| TCP | Traffic Control Plan |
| TPH | Total Petroleum Hydrocarbons |
| UFC | Unified Facilities Criteria |
| U.S. | United States |
| USACE | United States Army Corps of Engineers |
| USFWS | United States Fish and Wildlife Service |
| U.S.C. | United States Code |
| UST | Underground Storage Tank |
| VOC | Volatile Organic Compound |
| WIP | Work Implementation Plan |
| WMP | Waste Management Plan |

# 1.0 PURPOSE AND NEED

## 1.1 Introduction

The Defense Logistics Agency (DLA), in conjunction with the National Aeronautics and Space Administration (NASA) Ames Research Center (ARC), prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 and other applicable laws.

This EA presents analyses of the potential environmental impacts resulting from the closure of the former Defense Fuel Support Point (DFSP) at Moffett Field, Santa Clara County, California. Closure would involve removing the fuel facility's five underground storage tanks (USTs) and associated piping and equipment (e.g., manhole vaults, pumps, pump houses, pump pads, hydrants, racks, cathodic protection system). Closure of DFSP Moffett Field, as described, will hereafter be referred to as the Proposed Action. Leaving the DFSP in its current state, without taking action, is called the No Action Alternative. The Proposed Action and No Action Alternative are described in detail in Section 2.2.

This EA contains a full analysis of the potential environmental effects of the Proposed Action and alternatives. The purpose of this EA is to comply with NEPA by providing sufficient data to determine whether to issue a Notice of Intent to prepare an Environmental Impact Statement (EIS) or prepare a Finding of No Significant Impact (FONSI). This EA does not evaluate changes to property tenant agreements or potential reuse of the site by NASA or by its tenants. The EA evaluates potential impacts on resource areas (discussed in Chapters 3 and 4) resulting from the USTs and associated infrastructure.

## 1.2 Defense Fuel Support Point Moffett Field

DFSP Moffett Field is located in Santa Clara County, California, and borders the cities of Mountain View and Sunnyvale (Figure 1-1). NASA currently owns the property where the fuel facility is located. The facility has been operated by DLA under a host-tenant real estate agreement and a Memorandum of Understanding. DLA has been a tenant since 1994. DLA ceased fuel operations at DFSP Moffett Field in 2003. The fuel facility was cleaned and the facility has remained in caretaker status with NASA since 2005.

### *1.2.1 Project Location*

The fuel facility is on the northeast portion of the NASA Property, formerly called Naval Air Station (NAS) Moffett Field. The fuel facility is bordered by the Moffett Field Golf Club, Hangars 2 and 3, the airfield, and industrial and commercial buildings (Figures 1-2 and 1-3; see Appendix A for a complete set of project drawings). The footprint of the former DFSP Moffett Field fuel facility encompasses approximately 4 acres. The fuel facility includes five bulk field-constructed USTs, 8,545 linear feet of pipeline corridor, four aircraft fuel hydrants, and a truck loading facility.

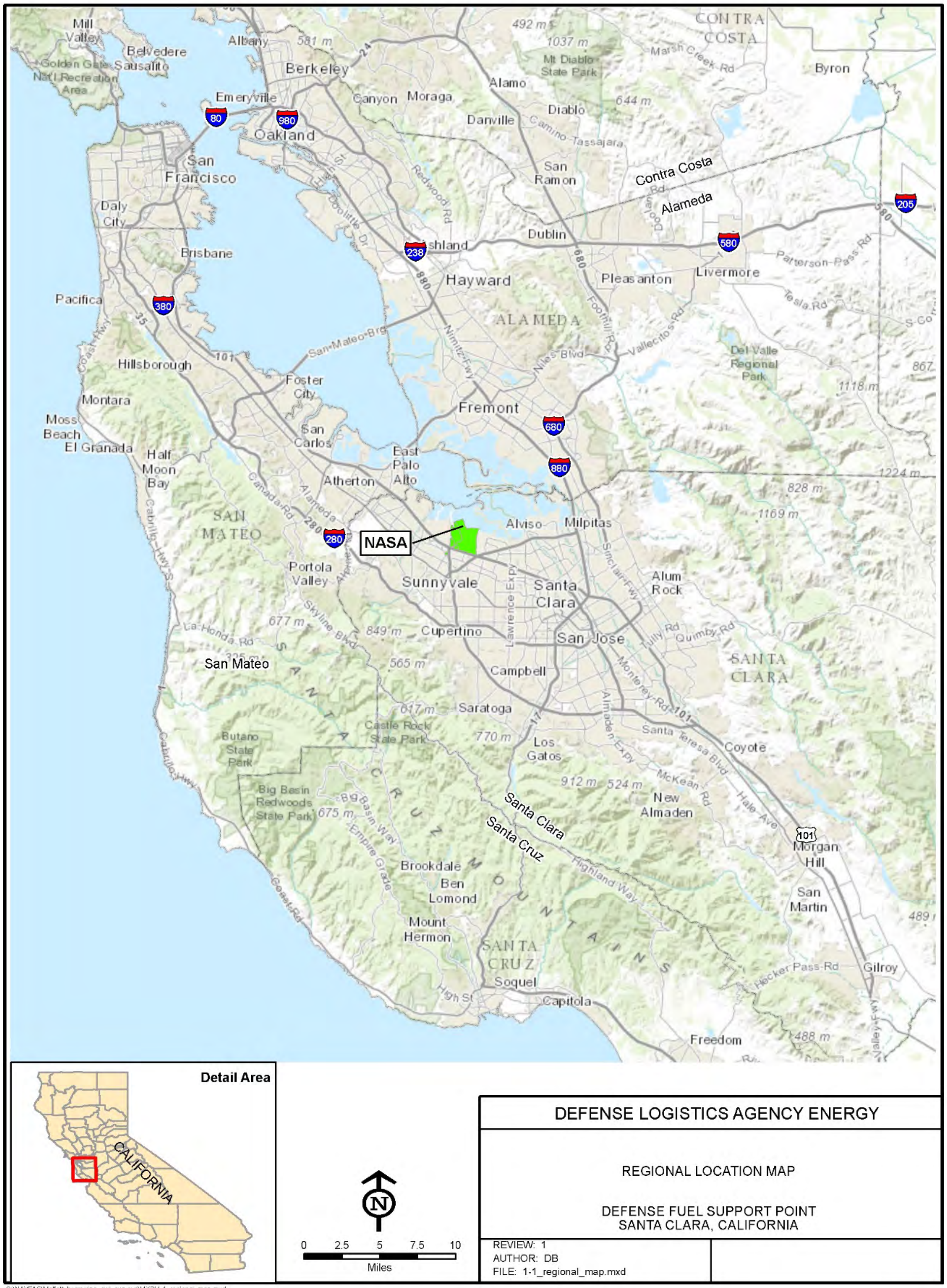
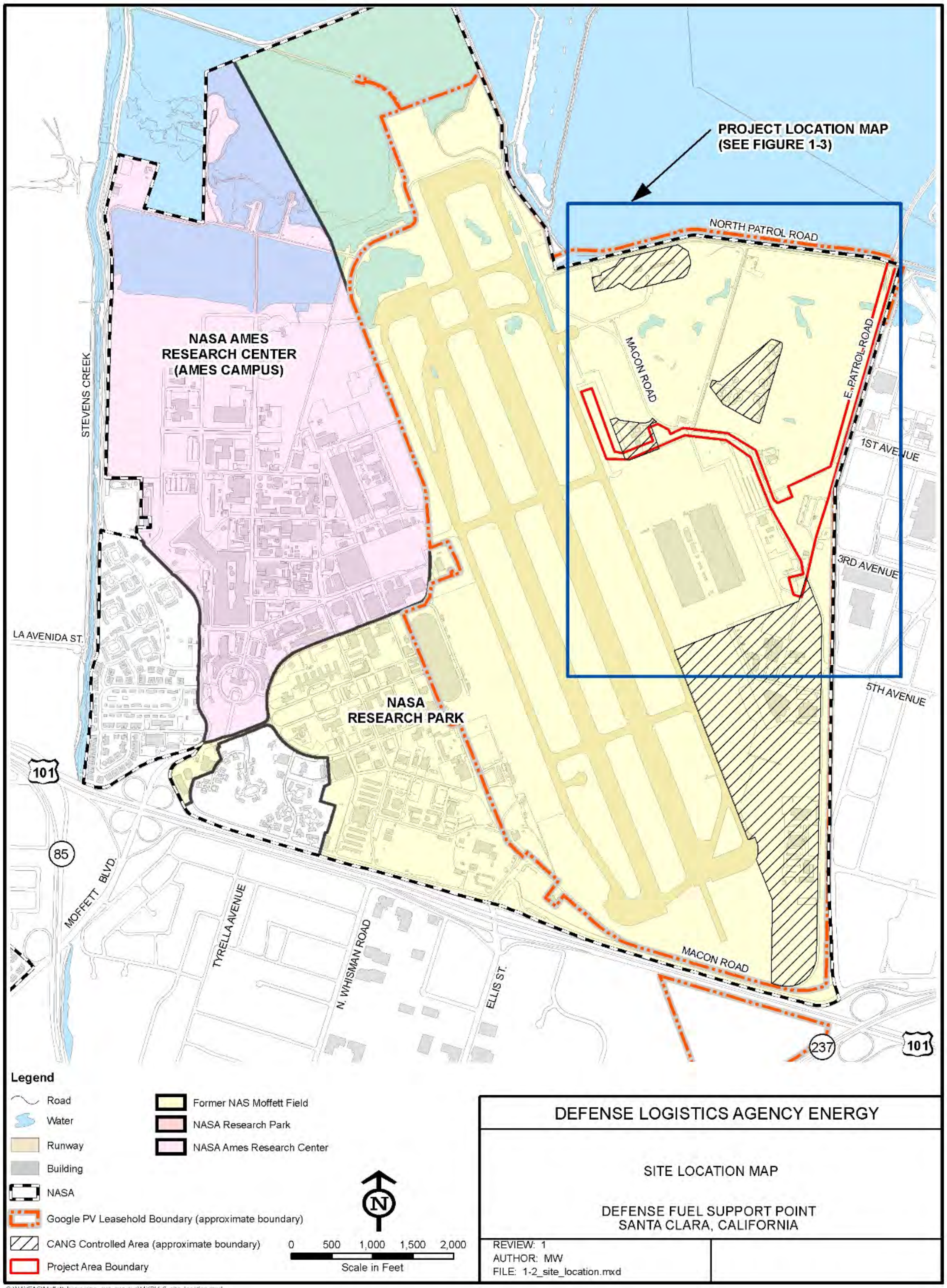



**Figure 1-1. Regional Location**

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2 **Figure 1-2. Site Location Map**

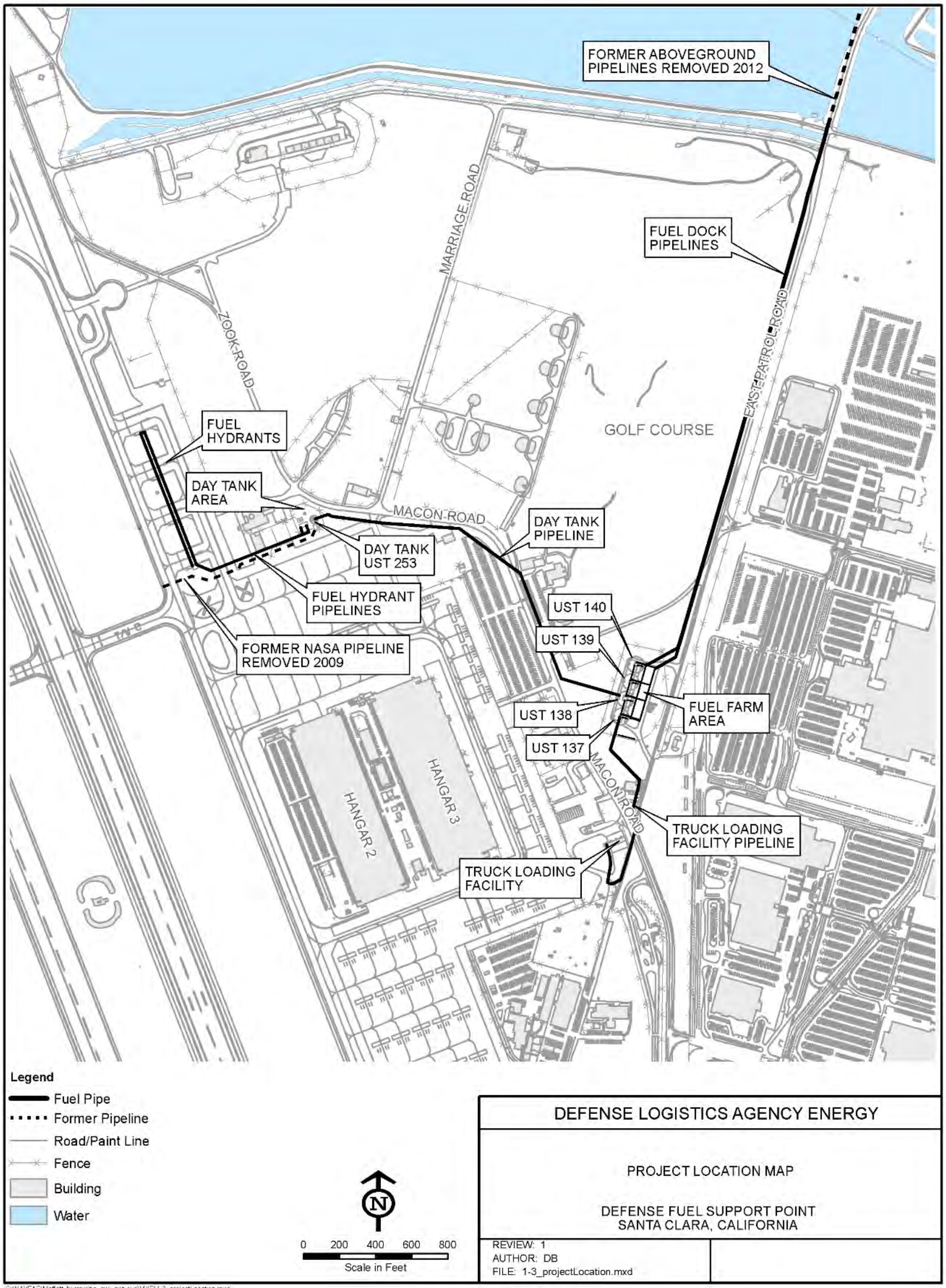



**Figure 1-3. Project Area**

### *1.2.2 Mission*

DLA provides worldwide logistics support for the missions of the military departments and the Unified Combatant Commands under conditions of peace and war. It also provides logistics support to other Department of Defense (DoD) Components and certain federal agencies, foreign governments, international organizations, and others, as authorized.

The mission of DFSP Moffett Field historically was to receive, store, and distribute fuel to DoD facilities, specifically the United States (U.S.) Navy. Before operations ceased in 2003, fuel was received via barges, transported by pipeline, and stored in USTs and aboveground storage tanks (ASTs). Fuel was then distributed by truck and pipeline to regional military facilities.

### *1.2.3 History*

The Navy began construction of the Moffett Field fuel facility in 1951 to provide the Navy with aviation fuels.-DFSP Moffett Field received, stored, and delivered aviation gasoline and two kerosene-based jet propellants (JPs), JP-5, and JP-8. These fuels were received from barges at the fuel pier at Guadalupe Slough, or via trucks. The fuels were then piped through underground and aboveground pipelines and eventually stored in USTs and ASTs.

In 1992 the Navy capitalized the fuel inventory at the facility and DLA became involved as a supplier of the aviation fuel. In 1994, as part of the Base Realignment and Closure program, the Installation was closed as an active military base. The Navy then transferred the property to NASA, and the Base was renamed the Moffett Federal Airfield (MFA).

DLA continued to operate the DFSP after the facility was turned over to NASA. DLA and NASA signed a host-tenant real-estate agreement in 1996 to operate and maintain the bulk fueling facility. DLA operated the government-owned/contractor-operated (GOCO) DFSP Moffett Field facility from 1992 until 2003. The fuel facility ceased operation in December 2003 when the inventory was drawn down; a new contractor-owned/contractor-operated facility was constructed on NASA to take over the fuel facility mission. In 2005, DLA cleaned and secured the GOCO facility.

NASA still maintains ownership of the DFSP Moffett Field and all tenant leased facilities within the NASA Property. For example, NASA entered into a lease agreement with Planetary Ventures LLC to handle ongoing maintenance, operations, and management of the airfield. The California Air National Guard (CANG) has also entered into an agreement with NASA for partial use of the airfield. CANG is currently reconfiguring the facilities to meet its mission and security requirements, consistent with the agency's 2009 EA/FONSI for long-term lease and Installation Development Plan. NASA's other land assets are on the west side of the airfield.

In 2009 NASA removed the 6-inch-diameter pipeline that ran from the day tank area to fuel hydrants on the west side of the airfield. (See detailed project maps in Appendix A). In 2012 NASA removed the 10-inch-diameter aboveground fuel line from the fuel pier to the intersection of Northern Channel and East Patrol Road.

The ASTs were removed in September 2015 under a separate action (Oneida Total Integrated Enterprises [OTIE] 2016). On 20 May 2015, UST closure permit applications were submitted to the Santa Clara County Department of Environmental Health, Hazardous Materials Compliance Division (HMCD).

Figure 1-2 and additional project maps in Appendix A illustrate the location of the former fuel facility at DFSP Moffett Field. Pipelines once connected to the fuel pier at Guadalupe Slough to the bulk storage area of the former DFSP main tank farm, day tank area, and truck loading rack. The pipeline north of the fuel pier bridge was removed in 2012. Fuel hydrant pipelines were also connected to the former high-speed-aircraft refueling hydrants on the runway at the NASA Property. (Refer to Section 2.2 for a detailed description of the Proposed Action and to Chapters 3 and 4 for an analysis of the potential impacts on sensitive resource areas.)

## 1.3 Purpose and Need for Action

The purpose of the Proposed Action is to reduce environmental risks associated with the USTs; address two Notices of Violation (NOVs) that DLA Energy, received from the State of California Water Resources Control Board and County of Santa Clara in March 2015; and eliminate aging infrastructure no longer required to meet the DoD mission.

The Proposed Action is also necessary to resolve State of California Water Resources Control Board and County of Santa Clara assertions that DLA is not in compliance with the California Code of Regulations (CCR), Title 23, Division 3, Chapter 16, Article 7, *Underground Storage Tank Requirements*, and the Unified Facilities Criterion (UFC) 3-460-0.

## 1.4 Scope of Environmental Review

Eight resource areas were analyzed during the preparation of this EA; seven additional resources were eliminated from detailed analysis per governmental regulations. Those resource areas are discussed below.

### *1.4.1 Resources Analyzed in Detail*

This EA provides a detailed analysis of the following eight resources areas (see Chapter 3 for a detailed analysis):

- Air quality
- Biological resources
- Cultural resources
- Geology, topography, and soils
- Hydrology and water resources
- Hazardous materials and waste
- Noise
- Transportation and circulation

### *1.4.2 Resource Areas Eliminated From Detailed Analysis*

In accordance with NEPA and Council on Environmental Quality (CEQ) regulations, the EA does not evaluate the following seven resource areas in detail because it is unlikely that impacts to these resources would occur, or because any impacts that may occur would be minor (i.e., less than significant) as supported by the provided rationale. The resources and the basis for their exclusion follow.

<u>Environmental Justice</u>

Implementation of the Proposed Action would comply with Executive Order (EO) 12898, *Federal Action to Address Environmental Justice in Minority and Low-income Populations,* and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks.* The Proposed Action would not involve site improvements outside the boundaries of the NASA Property. No impacts on schools, children, or minority populations would occur. Additionally, no permanent population centers are proposed and no low-income communities or minority communities exist within the immediate project vicinity. Access to the project site is restricted. Consequently, implementation of the Proposed Action would not result in a change of baseline conditions that would impact low-income or minority communities susceptible to adverse socioeconomics or environmental justice impacts. Accordingly, NASA has not prepared a detailed environmental justice analysis.

<u>Land Use</u>

DFSP Moffett Field is a former industrial facility that received, stored, transferred, and delivered fuel until operations ceased in December 2003. At this time, NASA has no plans to reuse DFSP Moffett Field. The current land use is classified as industrial and most of the project area functions as upland grassland habitat. Should a proposed change in land use occur after DFSP Moffett Field closure, the proposal would be analyzed under a separate action.

<u>Public Health and Safety</u>

Implementation of the Proposed Action would occur within the boundaries of DFSP Moffett Field, an area with restricted public access. Following closure, the facility would continue to be fenced and controlled. Under both the Proposed Action and the No Action Alternative, all rules and regulations governing safety, access, hazardous materials, and hazardous wastes would continue to be followed, including measures to minimize safety and environmental health risks. There would be no change to the availability of community emergency response services (e.g., police, fire, paramedics). Therefore, impacts on public health and safety from implementation of the Proposed Action are unlikely to occur. Accordingly, DLA has not prepared a detailed public health and safety analysis.

<u>Recreation</u>

No significant impacts on recreation are expected as a result of the implementation of the Proposed Action. The fuel dock pipelines that would be removed run along the east edge of the

Moffett Field Golf Club which is currently leased to Planetary Ventures. Excavation would be in areas adjacent to East Patrol Road. However, traffic control would provide at least a 100-foot-wide buffer between the project work area and golf course activity. Furthermore, the fuel lines would be abandoned in place near established trees and near wetland habitat on and near the golf course. A Traffic Control Plan (TCP) would include details regarding necessary traffic signage or need for temporary detours to access the golf course.

A portion of pipeline would be removed from a bridge located above the Northern Channel just north of the intersection at North Patrol Road and East Patrol Road (Figure A-17, Appendix A). The bridge is part of the Bay Trail, a 500-mile recreational corridor that extends around the shoreline of San Francisco Bay, used by pedestrians and bicyclists to enjoy the beauty of San Francisco Bay and nature. A crane would be used to secure the pipeline as it is cut and capped at the southern bank of the Northern Channel. The crane would be used to hoist and load the pipeline into a vehicle on East Patrol Road to be transported to the Schnitzer-Oakland Scrap Metal Yard in Oakland, California. A flagman and spotter would temporarily halt pipeline removal should a pedestrian or bicyclist approach the bridge. Pipeline removal on the bridge is expected to take no more than a few hours and would not result in a loss of public access to the Bay Trail. Details of how public access to the bridge on the Bay Trail would be maintained during the pipeline removal process would be included in a TCP.

The Proposed Action would not result in a loss of public access to recreational resources. Accordingly, DLA has not prepared a detailed recreation resource analysis.

<u>Socioeconomics</u>

Implementation of the Proposed Action would involve temporary demolition and excavation that would provide construction-related employment. The temporary increase in employment would not result in disproportionate impacts on minority or low-income populations, nor would local populations increase or decrease as a result of the temporary demolition and excavation activities associated with the proposed project. The Proposed Action would result only in minor, short-term, positive impacts on local business supporting project workers (e.g., food, housing, fuel, construction supplies) for the duration of the closure activities. Accordingly, DLA has not prepared a detailed socioeconomics analysis.

<u>Utilities</u>

The Proposed Action would not involve construction of new facilities that would require the additional use of utilities. Electrical utilities may be shut off temporarily during demolition and excavation; however, there would be no need for permanent changes or updates to utilities. No significant impacts on utilities are expected as a result of the implementation of the Proposed Action. Utility-related impacts are expected to be short-term, minor, and less than significant overall. Accordingly, DLA has not prepared a detailed utilities analysis.

Visual Resources

The Proposed Action would not result in any permanent alterations to the existing viewshed. Demolition and excavation would be within DFSP Moffett Field, which strictly limits public access. The facility is visible only from the Moffett Field Golf Club, industrial buildings in the Lockheed Martin facility to the east of East Patrol Road, and Moffett Towers, which overlooks the fuel farm area and truck loading facility from the southeast. A portion of the project would be visible from the Bay Trail discussed above in *Recreation*. The Proposed Action would result in temporary demolition and excavation activities involving demolition and excavation vehicles such as backhoes, jackhammers, skip loaders, trucks, and a crane. Visual impacts are expected to be short-term, minor, and less than significant overall. Accordingly, DLA has not prepared a detailed visual resource analysis.

## 1.5 Intergovernmental Coordination

Table 1-1 presents the anticipated permits and approvals potentially needed for the Proposed Action. Appendix B contains Agency coordination letters and responses.

**Table 1-1. Intergovernmental Coordination**

| Permit/Consultation/Coordination | Agency | Current Status |
|---|---|---|
| UST System Closure Permit | HMCD | Application submitted. Application also requires submittal of final Closure Plan, which would follow this EA. |
| Hazardous Materials Storage Tank System Cleaning/Cutting Permit | HMCD | Pending |
| Construction Permit | NASA ARC | Pending |
| Trench/Excavation Permit | State DOSH | Pending |
| Construction Stormwater (NPDES) | SWRCB | Pending |
| Demolition Notification | BAAQMD | Pending |
| Coastal Zone Consistency Determination | SFBCDC | Coastal Zone Consistency Determination application was submitted to the SFBCDC on April 20, 2016. |
| Bay Area Air Quality Management District – Rules and Regulations 1 through 13 | BAAQMD | Pending |
| California Code of Regulations, Titles 13 and 17, for California Air Resources Board | BAAQMD | Pending |
| Preliminary Jurisdictional Determination | USACE | Delineation Report submitted to USACE on March 28, 2016. USACE action pending. |
| NHPA Section 106 Consultation | SHPO | April 20, 2016 |
| Construction Dewatering (may require additional permit for water discharges) | SFBRWQCB | Pending |

| Permit/Consultation/Coordination | Agency | Current Status |
|---|---|---|
| Construction Permit | NASA ARC | Pending |
| Hot Work Permit | NASA ARC | Pending |
| Excavation/Drilling Permit | NASA ARC | Pending |
| Confined Space Permit | NASA ARC | Pending |
| Facility Closure/Obstruction Permit | NASA ARC | Pending |
| Electrical Work (High-Voltage) Permit | NASA ARC | Pending |
| Cranes Lift Permit | NASA ARC | Pending |
| Well Destruction /Construction Permits | Santa Clara Valley Water District | Pending |

**UST** – underground storage tank; **HMCD** – Hazardous Materials Compliance Division; **EA** – Environmental Assessment; **NASA** – National Aeronautics and Space Administration; **ARC** – Ames Research Center; **DOSH** – Division of Occupational Safety and Health; **NPDES** – National Pollutant Discharge Elimination System; **SWRCB** – State Water Resources Control Board; **BAAQMD** – Bay Area Air Quality Management District; **SFBCDC** – San Francisco Bay Conservation and Development Commission; **USACE** – United States Army Corps of Engineers; **NHPA** – National Historic Preservation Act; **SHPO** – State Historic Preservation Office; **SFBRWQCB** – San Francisco Bay Regional Water Quality Control Board

## 1.6 Public Participation Opportunities

This EA considers input received from the public, stakeholder groups, agencies, local governments, and commercial enterprises such as NASA, DLA, the CANG, and Planetary Ventures LLC, a Google subsidiary (Figure 1-4). Documentation verifying agency coordination and responses is provided in Appendix B.

To provide a transparent and open decision-making process, DLA will make this EA and referenced documents available to applicable federal, state, and local agencies, other stakeholders, and the general public for review and comment.

A final decision document will be issued following completion of the 30-day review period and will address comments received under this NEPA process.

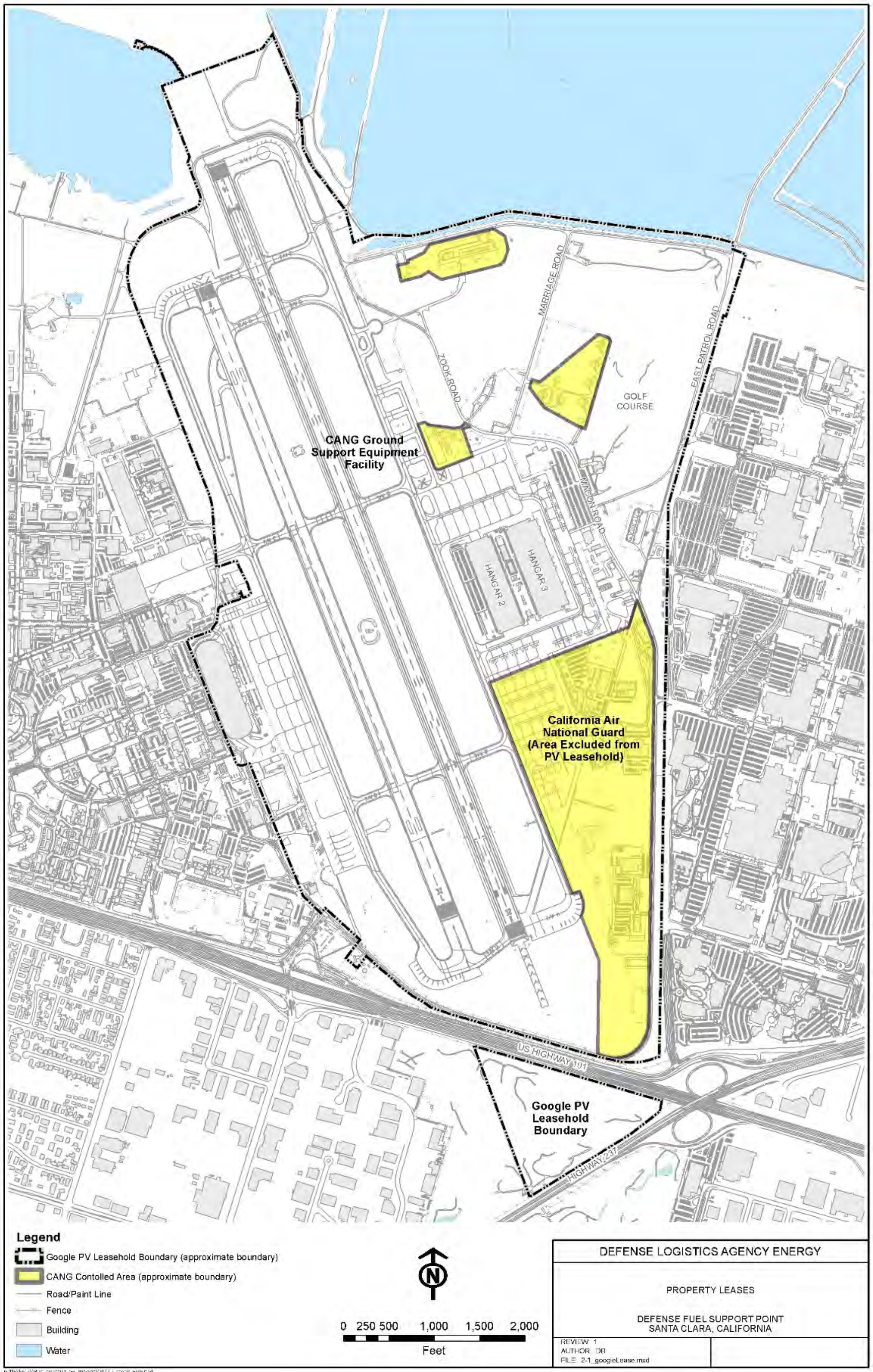



**Figure 1-4. Stakeholder Property Leases**

# 2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This EA carries forward for detailed analysis only those alternatives that could meet the purpose of and need for the DFSP Moffett Field closure as defined in Section 1.4.2 and those that may meet the reasonable alternative screening factors listed in Section 2.1. Reasonable alternatives include those that are practical or feasible from a technical and economic standpoint. (See Section 1.4 for a discussion of resources analyzed or excluded from analysis in this EA.)

At this time, NASA does not have plans to reuse DFSP Moffett Field. The current land use is classified as industrial, and most of the project area which is not developed or covered by impervious surfaces consists of nonnative grassland. Should a change in land use be proposed, it would be analyzed under a separate action. The mission that DFSP Moffett Field previously fulfilled has been met by contract-provided fuel and services since 2003. In addition, the existing infrastructure at DFSP Moffett and the pipeline that previously supplied DFSP Moffett with fuel are nonoperational and would require extensive and expensive repair and replacement to meet current operating permit requirements. This EA does not evaluate property disposal issues such as potential reuse of the site by NASA or others. This EA also does not analyze potential remediation and cleanup activities at DFSP Moffett Field; however, it acknowledges that cleanup activities could become necessary based on conditions discovered during implementation of the Proposed Action.

## 2.1 Reasonable Alternative Screening Factors

The screening factors used to develop the reasonable range of alternatives are as follows:

- The alternative would result in the complete closure of the DFSP Moffett Field former fuel facility.
- The alternative would not result in a change in land ownership or land use.
- The alternative would minimize impacts on the environment.
- The alternative would meet CCR requirements in accordance with UFC 3-460-01.

## 2.2 Description of Proposed Action and Alternatives

### *2.2.1 Proposed Action*

Under the Proposed Action, DLA, with cooperation from NASA, would permanently close the DFSP Moffett Field former fuel facility (refer to Figure 1-3). The term “fuel facility” as used in this EA refers to the following eight components of DFSP Moffett Field:

1. Bulk storage tank area (including USTs 137, 138, 139, and 140 (Figure A-10, Appendix A), also referred to as the “fuel farm area.”
2. Day tank area (including UST 253 (Figure A-9, Appendix A).
3. Truck loading facility, including truck loading racks and canopy (Figure A-11, Appendix A).
4. Fuel hydrants, which are four high-speed aircraft fueling hydrants (Figure A-6, Appendix A).

5. Fuel dock pipelines, which are two 10-inch-diameter underground pipelines in a 3,010-foot-long corridor (Figures A-12 to A-17, Appendix A).
6. A day tank pipeline, which is one 8-inch-diameter underground pipeline in a 2,100-foot-long corridor (Figures A-7 to A9, Appendix A).
7. Truck loading facility pipeline, which includes two 6-inch-diameter underground pipelines in a 1,165-foot-long corridor (Figures A-11 and A-12, Appendix A).
8. Fuel hydrant pipelines, which are composed of two underground pipelines in a 2,270-foot-long corridor (Figure A-6, Appendix A).

### *2.2.2 Alternatives Analyzed in the EA*

The alternatives analyzed in this EA are the Proposed Action (Alternative 1) and the No Action Alternative, as described below. Section 2.2.3 describes the two alternatives considered but eliminated from further analysis (Alternatives 2 and 3).

Alternative 1 (Preferred Action): Complete Closure with Partial Demolition

Appendix A contains site plans that illustrate the plan for Alternative 1, the Preferred Alternative. Under the Preferred Alternative (referred to herein as the Proposed Action), the five USTs and associated pipelines, fueling hydrants, truck fill stands, and associated infrastructure and appurtenances would be closed in accordance with UFC 3-460-01[1] and the *State of California Underground Storage Tank Requirements,* CCR Title 23, Division 3, Chapter 16, Article 7. UST closure permit applications were submitted to the appropriate agencies for approval in May 2015. Appendix A, Project Site Maps 5 through 17, illustrate the following actions, which would occur under this alternative.

Within the fence boundaries of the fuel farm area and day tank area, all tanks, pipelines, buildings, and associated infrastructure and appurtenances would be cleaned,[2] abated,[3] and/or removed by demolition and excavation. Contaminated soil encountered during the removal operation would be excavated and characterized for waste disposal in accordance with the Closure Plan (OTIE 2015) to be reviewed and approved by the HMCD. The reinforced concrete tank floors would be left in place. The Proposed Action would only handle the amount of contaminated soil necessary to accomplish the removal project. Excavations would be no larger than necessary, and bulk of contaminated soil, if any, would be left in place for potential cleanup during a later action.

- 8,480 lineal feet of pipeline would be closed by excavation/demolition and 6,510 lineal feet of pipeline would be closed in place. Within the pipeline corridors, approximately

[1] UFC 3-460-01, *Design: Petroleum Fuel Facilities,* provides guidance on the rehabilitation, deactivation, and closure of fueling facilities. Chapter 14 of the criterion lists the requirements for closing a fueling facility (DoD 2013).
[2] Tanks and pipelines would be cleaned to remove fuel residuals prior to removing or abandoning, in accordance with Certified Unified Program Agencies regulations.
[3] Hazardous building materials such as asbestos gaskets and loose (flaking) lead-containing paint would be abated prior to demolition, per federal and state regulations.

300 lineal feet of aboveground piping would be cleaned, abated, and demolished. Approximately 14,990 lineal feet of underground pipelines would be cleaned, abated, and demolished where practical. In areas where demolition and excavation of pipelines would impact sensitive site features, pipelines would be closed in place, specifically those sections where removal by excavation and demolition could damage structures such as nearby underground utilities, aircraft ramps and taxiways, mature vegetation that is part of the Moffett Field Golf Club, and wetlands or waters of the U.S. Underground pipeline segments that are closed in place would be cleaned, then sealed at each end. After pipeline removal is complete, the area would be filled using on-site soil, supplemented by imported soil as necessary, to restore the topography to match the surrounding grade. Backfilled excavations would be compacted to engineering standards, and vegetation would be restored to match surrounding vegetation.

- The truck loading facility would be left in place due to its historical significance (see Section 3-3). At the truck loading facility, the aboveground portion of the fuel system would be abated and cleaned. The belowgrade pipeline would be closed in place. The hardscape (e.g., pavement, pads, and curbing) would be left in place.

- At the fuel hydrants, the abovegrade equipment would be cleaned, abated, and removed by demolition. The belowgrade pipeline would be closed in place. The hardscape (e.g., tarmac, pavement, pads, and curbing) would be left in place.

- Utilities that serviced the fuel system would be disconnected and secured.

- Approximately 7 acres would be disturbed by the closure and demolition activities. Approximately 24,432 cubic yards (CY) of soil would be excavated and stockpiled while infrastructure is being demolished. That soil would be used to backfill after demolition is completed. Approximately 3,717 CY of additional soil would be imported to complete backfill.

- A draft Closure Plan[1] (OTIE 2015) has been be prepared to describe the work to be performed and the environmental closure commitments. The final Closure Plan would be submitted to the HMCD, the lead agency overseeing tank closure under the *State of California Underground Storage Tank Requirements,* CCR Title 23, Division 3, Chapter 16, Article 7.

[1] A Closure Plan is a plan that describes the procedures for terminating the storage of hazardous materials and/or hazardous wastes in a storage facility in a manner that (1) eliminates or minimizes the need for further maintenance; (2) eliminates or minimizes any threat to public health, safety, or the environment from residual hazardous materials or hazardous wastes in the facility; and (3) demonstrates that the hazardous materials and/or hazardous wastes that were stored in the facility would be removed, disposed of, neutralized, or reused in an appropriate manner.

- Once closure/demolition activities are complete, the disturbed areas would be graded to restore topography to match surrounding grade, compacted to engineering standards and hydroseeded to match the surrounding landscape.

- Within the pipeline corridors, aboveground pipelines would be cleaned, abated, and demolished.

- There were prior releases of fuel at the facility (see Section 3.6); therefore, this project includes a provision for sampling and disposal of approximately 3,210 tons of petroleum-contaminated soil, in the event it is encountered. Any follow-up investigation and remediation is not part of this project. The provision for the contaminated soil is based on 10 percent of the excavated soil from the day tank area and fuel farm being petroleum-contaminated (assuming 1.4 tons per bank CY). The estimated 3,210 tons of petroleum-contaminated soil would be removed and disposed of at the Altamont Landfill in Livermore, California, 51 miles from the work site.

Under this proposal, the existing fuel facility infrastructure would be physically disconnected, abandoned in place, dismantled, and/or demolished based on consultation with the HMCD and pursuant to the *State of California Underground Storage Tank Requirements*, CCR Title 23, Division 3, Chapter 16, Article 7. NASA would continue to be the property owner of the parcel. Details of the potential environmental consequences of Alternative 1 are discussed in Chapters 3 and 4.

<u>No Action Alternative</u>

DFSP Moffett Field is currently in caretaker status for regulatory purposes. The mission of the facility, to provide DLA's U.S. government customers with fuel and services, has been officially terminated since 2003. The pipeline that provided fuel to these USTs is no longer operational, and the infrastructure to operate these USTs is also nonoperational. The USTs were emptied of fuel and cleaned in 2005. The ASTs were removed in 2015. According to NOVs received on March 25, 2015 from the State of California Water Resources Control Board and County of Santa Clara, DLA Energy is currently not in compliance with California and Santa Clara County codes due to not properly closing the five USTs when they were emptied and cleaned. DLA Energy is committed to closing the former fuel facility in response to the NOVs and the 2011 phased closure agreement (Phase II) with the Santa Clara Environmental Health Department.

The No Action Alternative would leave the DFSP Moffett Field's fuel facilities in caretaker status and their current state of nonclosure and the State of California Water Resources Control Board and County of Santa Clara, would continue to consider the site in violation of state and county environmental regulations for the failure to be properly closed. Returning DFSP Moffett Field to operational status is highly unlikely because DLA no longer has a mission at the NASA Property that requires this fuel facility to be operational (Section 2.2.3, Alternative 2).

### *2.2.3 Alternatives Considered but Eliminated from Further Analysis*

In accordance with the NEPA process, an EA should identify any alternatives eliminated from detailed analysis during the planning process. The following two additional alternatives were considered but eliminated from further consideration.

<u>Alternative 2: Nonclosure – Obtain Operating Permit through Regulatory Compliance</u>

As stated in the No Action Alternative, DFSP Moffett Field ceased operations in 2003 and is currently in caretaker status for regulatory purposes. Under *State of California Underground Storage Tank Requirements,* CCR Title 23, Division 3, Chapter 16, Article 7, the facilities cannot permanently or indefinitely remain in temporary closure, but must either achieve permanent regulatory closure or return to operational status. Timely action would need to be taken to restore operational status, requiring operating permits. Under Alternative 2, the resumption of operations would require substantial government investment to modernize the fuel facilities, as they are in need of major renovation/replacement, repair, and extensive maintenance to meet regulatory requirements. The GOCO facility ceased operations in 2003, and mission requirements are currently being met by a contractor-owned/contractor-operated facility. There is no requirement to return the GOCO facility to operation. Since DLA Energy removed all fuel from the facility in 2005 and the facility's mission has been officially terminated, Alternative 2 has been eliminated from further analysis.

<u>Alternative 3: Complete Closure with Complete Demolition</u>

Under this alternative all USTs and pipelines would be demolished. Pipelines would not be abandoned in place. However, the *State of California Underground Storage Tank Requirements,* CCR Title 23, Division 3, Chapter 16, Article 7, does not require complete removal by excavation and specifically provide for closure by abandoning USTs and pipelines in place, under certain conditions. Furthermore, complete closure would risk damaging nearby underground utilities, aircraft ramps and taxiways, mature vegetation at the golf course, wetlands or waters of the U.S., and historic structures. For these reasons, DLA has eliminated Alternative 3 from further analysis.

FORMAT PAGE

# 3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes existing environmental conditions and potential environmental consequences from implementation of Alternative 1 (the Proposed Action) and the No Action Alternative. The eight resources considered are air quality, biological resources, cultural resources, geology, water resources, hazardous materials and waste, noise, and transportation.

Under the No Action Alternative, the facility would remain in inactive caretaker status and the State of California Water Resources Control Board and County of Santa Clara, would continue to consider the site in violation of state and county environmental regulations for the failure to be closed properly. The No Action Alternative therefore provides the baseline from which any environmental changes resulting from the implementation of an alternative can be identified and evaluated. Potential changes or impacts on the resources are described as environmental consequences.

In compliance with NEPA and CEQ regulations, the description of the affected environment focuses only on those aspects potentially subject to impacts. Cumulative impacts are addressed in Chapter 4.

## 3.1 Air Quality

### *3.1.1 Definition of Resource*

Air quality refers to the concentration of air contaminants in a specific location and is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions.

Regulatory Setting

Air quality in the San Francisco Bay Area air basin (SFBAAB) is regulated at the federal level by the U.S. Environmental Protection Agency (EPA), at the state level by the California Air Resources Board (CARB), and at the local level by the Bay Area Air Quality Management District (BAAQMD). CARB is a department of the California Environmental Protection Agency and oversees air quality planning and control throughout California. It is primarily responsible for ensuring implementation of the 1989 amendments to the California Clean Air Act (CCAA), responding to the federal CAA amendment requirements, and regulating emissions from motor vehicles and consumer products within the state. The BAAQMD is the primary agency responsible for ensureing that air quality standards, NAAQS and California Ambient Air Quality Standards (CAAQS), are attained and maintained in the SFBAAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. If state and federal air quality standards are not met, the BAAQMD is responsible to develop strategies for compliance with the standards. Each of these agencies develops rules, regulations, and policies for regulating air quality in accordance with applicable legislation. Although EPA regulations may not be superseded, both state and local regulations may be more stringent.

Federal Clean Air Act

The EPA is responsible for enforcing the Clean Air Act (CAA) of 1970 and its 1977 and 1990 amendments. The purpose of the CAA is to establish the National Ambient Air Quality Standards (NAAQS), which classify areas as to their attainment status relative to NAAQS; develop schedules and strategies to meet the NAAQS; and regulate emissions of criteria pollutants and air toxics to protect public health and welfare. The EPA has established primary and secondary NAAQS for the following six criteria pollutants: ozone ($O_3$), carbon monoxide (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), respirable fine particulate matter ($PM_{10}$), and lead (Pb).

Under the CAA, individual states are allowed to adopt ambient air quality standards and other regulations, provided they are at least as stringent as federal standards. Amendments to the CAA established new deadlines for achievement of NAAQS, depending on the severity of nonattainment

General Conformity

Section 176(c) of the CAA, as amended, requires federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with the CAA and with federally enforceable air quality management plans. The EPA's General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements for a conformity analysis are called *de minimis* levels. *De minimis* levels are measured in tons per year and vary from pollutant to pollutant; they are used to assess the severity of any violations of nonattainment status. The relevant study area for air quality includes the SFBAAB, which encompasses the project area.

The EPA's General Conformity Rule establishes a process to demonstrate that a proposed federal action would not (1) cause or contribute to new violations of federal air quality standards; (2) increase the frequency or severity of existing violations of federal air quality standards; or (3) delay the timely attainment of federal air quality standards. Compliance is presumed if the net increase in direct and indirect emissions from a federal action would be less than the relevant *de minimis* level. However, if the increase in emissions for a nonattainment pollutant exceeds *de minimis* levels, a formal conformity determination process must be implemented.

State and Federal Air Toxics Rules and Regulations

The BAAQMD Air Toxic's Control Program unites federal and state laws with local goals to identify and reduce toxic air contaminants in the San Francisco Bay Area. Under this program projects are reviewed for potential health impacts before demolition and excavation. Industrial and commercial sources of toxic air contaminants (TACs) are identified and emissions reductions are encouraged; and control measures are applied to reduce TAC emissions locally and nationally (BAAQMD 2015).

TACs are a defined set of airborne pollutants that may pose a present or potential hazard to human health. A wide range of sources, from industrial plants to motor vehicles, emit TACs. Like very fine particulate matter ($PM_{2.5}$), TAC can be emitted directly and can also be formed in the atmosphere through reactions among different pollutants.

The health effects associated with TACs are quite diverse and generally are assessed locally, rather than regionally. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis or genetic damage; they may also result in short-term acute affects such as eye watering, respiratory irritation (a cough), running nose, throat pain, and headaches. For evaluation purposes, TACs are separated into carcinogens and noncarcinogens based on the nature of the physiological effects associated with exposure to the pollutant. Carcinogens are assumed to have no safe threshold below which health impacts would not occur, and cancer risk is expressed as excess cancer cases per one million exposed individuals, typically over a lifetime of exposure. Noncarcinogenic substances differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis. Acute and chronic exposure to noncarcinogens is expressed as a hazard index, which is the ratio of expected exposure levels to an acceptable reference exposure levels (BAAQMD 2012)

TACs in California are primarily regulated through the Tanner Air Toxics Act (California Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987, referred to as the Hot Spots Act (AB 2588). To date, CARB has identified over 21 TACs, and adopted the EPA's list of hazardous air pollutants (HAPs) as TACs.

CARB has adopted airborne toxics control measures for sources that emit a particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate Best Available Control Technology to minimize emissions.

CARB adopted a Diesel Risk Reduction Plan, which recommends control measures to achieve a diesel particulate matter (PM) reduction of 85 percent by 2020 from year 2000 levels. Recent regulations and programs include a low-sulfur diesel fuel requirement and more stringent emission standards for heavy-duty diesel trucks and off-road, in-use diesel equipment. As emissions are reduced, it is expected that the risks associated with exposure to the emissions would also be reduced.

In 2007, CARB adopted a regulation to reduce diesel particulate matter and nitrogen oxides ($NO_x$) emissions from in-use, off-road, heavy-duty diesel vehicles in California. The regulation imposes limits on vehicle idling and requires fleets to reduce emissions by retiring, replacing, repowering, or installing exhaust retrofits to older engines. In December 2010, major amendments were made to the regulation, including a delay of the first performance standards compliance date to no earlier than January 1, 2014 (CARB 2015).

### 3.1.2 State Laws and Regulations

California Clean Air Act

The amendments to the CCAA establish ambient air quality standards for the state and a legal mandate to achieve those standards by the earliest practical date. Those standards apply to the same six criteria pollutants as the CAA and also include sulfate, visibility, hydrogen sulfide, and vinyl chloride. They are more stringent than the federal standards and, in the case of $PM_{10}$ and $NO_2$, far more stringent.

The EPA requires each state to prepare a State Implementation Plan (SIP), which describes how that state would achieve compliance with NAAQS. A SIP is a compilation of goals, strategies, schedules, and enforcement actions to lead the state into compliance with all federal air quality standards. Each change to a compliance schedule or plan must be incorporated into the SIP. In California, the SIP consists of separate elements for each air basin, depending on the attainment status of the particular air basin.

### 3.1.3 Local Laws and Regulations

Bay Area Air Quality Management District

BAAQMD prepares plans to attain ambient air quality standards in the SFBAAB. BAAQMD prepares Ozone Attainment Plans for the national ozone standard, Clean Air Plans (CAPs) for the California standard, and PM Plans to fulfill federal air quality planning requirements. BAAQMD also inspects stationary sources of air pollution, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by the CAA, CAA Amendments, and the CCAA.

BAAQMD adopted the Bay Area CAP in 2010 to improve the Bay Area's air quality and meet public health goals. More specifically, the control strategy described in the Bay Area CAP is designed to reduce emissions and decrease ambient concentrations of harmful pollutants, safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, and reduce greenhouse gas (GHG) emissions to protect the climate.

The Bay Area CAP addresses four categories of pollutants: (1) ground-level $O_3$ and its key precursors, reactive organic gas (ROG) and NOx; (2) PM, primarily $PM_{2.5}$, and precursors to secondary $PM_{2.5}$; (3) air toxics; and (4) GHGs. The control strategy in the Bay Area CAP describes stationary source measures, transportation control measures, mobile source measures, land use and local impact measures, energy and climate measures, and further study measures to reduce air pollutants (BAAQMD 2010).

### 3.1.4 Air Quality Standards

The EPA currently focuses on six criteria air pollutants as indicators of ambient air quality: $O_3$, CO, $NO_2$,$SO_2$, $PM_{10}$, and Pb. Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available, these pollutants are commonly referred to as "criteria air pollutants." The EPA has established primary and secondary NAAQS for the criteria pollutants; for PM, standards have been established for $PM_{10}$ and $PM_{2.5}$. The primary standards protect the public health and the secondary standards protect public welfare.

The EPA also permits states to adopt additional or more protective air quality standards if needed. The CARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing PM, in addition to the above-mentioned criteria air pollutants. In most cases, the CAAQS are more stringent than the NAAQS. The BAAQMD outlines the CAAQS and NAAQS (BAAQMD 2015) as listed in Table C-1 in Appendix C: 2013 National Ambient Air Quality Standards.

### *3.1.5 Affected Environment*

<u>Regional Setting</u>

The project area is in Santa Clara County, California, and borders the adjacent cities of Mountain View and Sunnyvale to the south. The SFBAAB is one of 15 air basins in California and consists of all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties; the southern portion of Sonoma County; and the southwestern portion of Solano County. Each basin denotes a specific area within the state that is defined by its common geographical features and weather patterns, which correspond to similar air pollution burdens. Ambient concentrations of air pollutants are determined by the qualities and quantities of emissions released by sources and the atmosphere's ability to transport, dilute, and transform the emissions. Natural factors that affect transport, dilution, and transformation include terrain, wind, atmospheric stability, and sunlight. The combination of low wind speeds and restricted vertical mixing is referred to as stable, or inversion conditions, and generally produces the highest concentrations of air pollutants. Therefore, existing air quality conditions in an area are determined by natural factors, such as topography, meteorology, and climate, as discussed below.

This section also describes the regulatory setting and existing conditions and evaluates the potential air quality effects of each EA alternative.

<u>Climate and Topography</u>

The SFBAAB is characterized by complex terrain consisting of coastal mountain ranges, inland valleys, and bays that distort normal wind flow patterns. The Coast Ranges split, resulting in a western coast gap at the Golden Gate and an eastern coast gap at the Carquinez Strait, which allow air to flow in and out of the SFBAAB and the Central Valley. The greatest distortions occur when low-level inversions are present and the air beneath the inversion flows independently of air above the inversion, a condition that is common in the summertime. During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco peninsula.

The climate is dominated by the strength and location of a semipermanent, subtropical high-pressure cell. During the summer, the Pacific high-pressure cell is centered over the northeastern Pacific Ocean, resulting in stable meteorological conditions and a steady northwesterly wind flow. That flow induces upwelling of cold water from below, which produces a band of cold water off the California coast. When air approaches the California coast, already cool and moisture-laden from its long journey over the Pacific, it is further cooled as it crosses this bank of cold water. This cooling often produces condensation, resulting in a high incidence of fog and stratus clouds along the Northern California coast in the summer. Generally in the winter, the Pacific high weakens and shifts southward, winds tend to flow offshore, upwelling ceases, and storms occur. During the winter rainy periods, inversions (layers of warmer air over colder air) are weak or nonexistent, winds are usually moderate, and air pollution potential is low. The Pacific high does periodically become dominant in the winter, bringing strong inversions, light winds, and a high pollution potential.

Climate Change

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from earth as it is reflected back into the atmosphere, much as a greenhouse does. A global increase in concentrations of GHGs has been implicated as the driving force in climate change. The GHGs that may contribute to global climate change include water vapor, carbon dioxide ($CO_2$), several trace gases, and aerosols. Currently anthropogenic (man-made) emissions are regulated in California for the following gases: $CO_2$, methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride ($SF_6$).

The State of California has adopted programs for reducing GHGs emissions. In 2006, the California legislature passed AB 32 (codified in the California Health and Safety Code, Division 25.5, Sections 38500 *et seq.*), which requires CARB to develop and implement emission limits, regulations, and other measures to reduce GHG emissions to 1990 levels by 2020.

Anthropogenic emissions of $CO_2$ in developed countries occur largely from combustion of fossil fuels. In California, the major categories of fossil fuel combustion that are $CO_2$ sources are broken into sectors for residential, commercial, industrial, transportation, and power generation. Other GHG emissions such as $CH_4$ and $N_2O$ are also tracked, but occur in much smaller quantities. When quantifying GHG emissions, the different global warming potentials of GHG pollutants are taken into account by normalizing their rates to a $CO_2$ equivalent emission rate.

Lead

Lead occurs in the atmosphere as PM. Historically, the combustion of leaded gasoline was the primary source of airborne lead in the Bay Area; however, the use of leaded gasoline is no longer permitted for on-road motor vehicles. Other sources of lead include the manufacturing and recycling of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters.

### *3.1.6 Local Air Basin Attainment Status*

The project site lies within Santa Clara County, which is within the SFBAAB. The SFBAAB is currently designated as a marginal nonattainment area with respect to the national 8-hour ozone standard and as a nonattainment area for the 24-hour $PM_{2.5}$ standard. Portions of the SFBAAB are also designated as maintenance areas for the national CO standard.

To fulfill federal air quality planning requirements, the BAAQMD adopted a $PM_{2.5}$ emissions inventory for year 2010 at a public hearing on November 7, 2012. The Bay Area 2010 CAP also included several measures for reducing PM emissions. On January 9, 2013, the EPA issued a final rule determining that the San Francisco Bay Area has attained the 24-hour $PM_{2.5}$ NAAQS, therefore suspending the federal SIP planning requirements for the Bay Area (BAAQMD 2015). The San Francisco Bay Area is currently designated as an attainment maintenance area.

BAAQMD adopted the Bay Area Ozone Attainment Plan in 2001 in response to the EPA's finding of failure of the Bay Area to attain the national ambient air quality standard for $O_3$. The plan includes a control strategy for $O_3$ and its precursors to ensure a reduction in emissions from stationary sources, mobile sources, and the transportation sector (BAAQMD 2001).

General conformity requirements would not apply to actions where the total project-generated direct or indirect emissions would not be equal to or exceed the applicable emissions levels, known as the *de minimis* thresholds, and would be less than 10 percent of the area's annual emissions budget, known as regionally significant thresholds. The *de minimis* thresholds applicable to the SFBAAB are 50 tons per year for ROGs and 100 tons per year for $PM_{2.5}$, $NO_x$, and CO.

CARB monitors the amount of pollutants discharged into the atmosphere for the SFBAAB while the BAAQMD regulates stationary sources of air pollution in the Bay Area. Table 3-1 lists the 2012 estimated annual averages for emission data for the SFBAAB (CARB 2013).

**Table 3-1. Annual Emissions Data for the San Francisco Bay Area Basin and Santa Clara County Criteria Pollutant Emissions (tons per day)**

| $SO_2$ | CO | $PM_{10}$ | $PM_{2.5}$ | $NO_2$ | ROG |
|---|---|---|---|---|---|
| 23.0 | 1,272.0 | 118.9 | 45.6 | 317.6 | 265.0 |

**$SO_2$** – sulfur dioxide; **CO** – carbon monoxide; **$PM_{10}$** – fine particulate matter; **$PM_{2.5}$** – very fine particulate matter; **$NO_2$** – nitrogen dioxide; **ROG** – reactive organic gases

### *3.1.7 San Francisco Bay Area Air Basin Monitoring Station Data*

Criteria air pollutants are monitored at several stations within the SFBAAB. The monitoring station nearest the project site for the Proposed Action is at 10 Arkansas Street in San Francisco. That station measures $O_3$, $NO_2$, CO, $PM_{10}$, $PM_{2.5}$, and toxics (including hexavalent chromium). In general, the ambient air quality measurements from this station are representative of the air quality in the vicinity of the project area.

### *3.1.8 Environmental Consequences*

Emission thresholds associated with CAA conformity requirements are the primary means of assessing the significance of potential air quality impacts associated with implementation of the Proposed Action. An emission inventory spreadsheet was used to estimate air pollutant emissions from the Proposed Action (Appendix C). It includes assumptions for the total length of roads, number of truck trips, vehicle types, and the duration of demolition and excavation activities. The total average daily and annual emissions of each criteria pollutant were compared to the thresholds of significance. Where operations-related emissions exceed project thresholds, the mitigation measures as outlined in Appendix D are implemented, thereby reducing air quality impacts to a less than significant level.

A formal conformity determination is required for federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed *de minimis* thresholds. Potential impacts are evaluated based on estimated direct and indirect emissions associated with implementation of the Proposed Action or alternatives.

For the purpose of this analysis ROG, HAP, and TAC compounds are included in volatile organic compound (VOC) emissions from vehicle exhaust as a conservative approach for determining the significance of those emissions.

Sensitive receptors are defined as children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, convalescent facilities, and residential areas are examples of facilities or areas that may house or attract sensitive receptors. The only known sensitive receptor at the NASA Property is the NASA ARC Child Care Center more than 7,500 feet from the nearest point of the project site to the west of the airfield. Other potentially sensitive receptors include residential units immediately southwest of the project area, north of U.S. Route 101, and south of Wescoat Road. The detailed emissions inventory spreadsheet is provided in Appendix C.

<u>Proposed Action</u>

Potential impacts on air quality can be divided into short-term and long-term. Short-term impacts are usually associated with grading and demolition and excavation activities, and long-term impacts are typically associated with the operation of new facilities. Under the Proposed Action, no long-term impacts would occur; only short term, *de minimis* impacts associated with demolition and excavation.

Demolition activities would consist of excavation and demolition required to remove and demolish the USTs, as well as the operation of related equipment. However, typical vehicles and equipment used during demolition and excavation include diesel-engine-driven demolition equipment (e.g., backhoe loaders, track excavators, motor graders, large-wheeled loader, articulated dump trucks, soil compactors, and water trucks). Cranes, skip loaders, tractors/backhoes, and flatbed trucks, are commonly used for demolition and excavation.

Demolition equipment, such as excavators and loaders, would produce criteria air pollutants (e.g., CO, $SO_2$, $PM_{10}$, $PM_{2.5}$), ROGs, and $NO_x$, as well as GHGs from exhaust. Soil-disturbing activities contributed from demolition and excavation activities, and driving on unpaved roads would generate PM emissions. Asphalt placement would result in fugitive emissions of VOCs, COs, $SO_2$, $NO_x$, and polycyclic aromatic hydrocarbons. A list of demolition-related equipment and vehicles and the expected vehicle average daily traffic (ADT) counts are included in Appendix E. Hours of demolition and excavation would be limited to 7:00 a.m. to 6:00 p.m. Monday through Friday for up to 5 months.

Additional emissions would be generated by activities such as the use of power saws, drills, jackhammers, and oxy-acetylene cutting torches. If torches are used to cut painted metals, lead-containing-paint coatings, if present, would be first removed from cut location by using chemical paint strippers or other appropriate paint removal and abatement method, thereby avoiding the potential of emitting lead in vapors and reducing exposure potential to demolition workers.

Total GHGs emissions from the project would result from on-site demolition equipment as well as adjacent off-site travel and would be temporary in nature (Appendices E and F). EPA Tier 2 standards would apply to diesel engines as outlined in the emission inventory included in Appendices E and F. Tier 2 emission standards are set by the EPA for reciprocating internal combustion engines in order to reduce CO emissions and $NO_x$ particulates. There are currently four levels of emission reduction standards ranging from Tier 1, the oldest standard, to Tier 4, which is the most stringent. The decision about the standard to use depends on the age, size, and fuel type of the engine.

Demolition and excavation-related activities could generate TACs, specifically diesel PM, in the exhaust emissions of on-road haul trucks and off-road equipment. The closest community where exposures to TACs are relatively high is approximately 8 miles north of the project area in Redwood City/Palo Alto, California. Due to the variable nature of demolition and excavation activity and the approximate 5- to 6-month project duration, the generation of TAC emissions would be temporary and would not result in the exposure of sensitive receptors to substantial concentrations. During earthwork activities and the subsurface removal process, contaminated soils may be encountered. If HAPs and TAC metals are found in native soils, the mitigation measures found in Appendix D would be applied to minimize fugitive emissions.

The summary of annual and daily emissions associated with the Proposed Action is presented below in Tables 3-2 and 3-3, respectively. The detailed emissions inventory spreadsheet is located in Appendix C. The *de minimis* thresholds applicable to the SFBAAB are 50 tons per year for ROGs (VOCs) and 100 tons per year for $PM_{2.5}$, $NO_x$, and CO. The Proposed Action's total emissions are not expected to degrade air quality significantly or prevent the attainment or maintenance of NAAQS and the more stringent CAAQs (Table 3-3).

**Table 3-2. Summary of Proposed Action Annual Emissions Data (Tons per Year)**

| Alternative | Pollutant | Project Total Air Emissions (tons per year) | | | | Total |
|---|---|---|---|---|---|---|
| | | Mobile Tailpipe Emissions | Unpaved Road Emissions | Paved Road Emissions | Local Demolition Site Emissions | |
| Proposed Action | $PM_{10}$ | 0.59 | 0.98 | 0.58 | 2.01 | 4.16 |
| | $PM_{2.5}$ | 0.54 | 0.04 | 0.14 | 0.20 | 0.92 |
| | $NO_x$ | 14.87 | NA | NA | NA | 14.87 |
| | VOC | 1.04 | NA | NA | NA | 1.04 |
| | CO | 9.13 | NA | NA | NA | 9.13 |
| | $SO_2$ | 0.01 | NA | NA | NA | 0.01 |
| | $CO_2$ | 1,386 | NA | NA | NA | 1,386 |
| No Action | $PM_{10}$ | 0 | 0 | 0 | 0 | 0 |
| | $PM_{2.5}$ | 0 | 0 | 0 | 0 | 0 |
| | $NO_x$ | 0 | 0 | 0 | 0 | 0 |
| | VOC | 0 | 0 | 0 | 0 | 0 |
| | CO | 0 | 0 | 0 | 0 | 0 |
| | $SO_2$ | 0 | 0 | 0 | 0 | 0 |
| | $CO_2$ | 0 | 0 | 0 | 0 | 0 |

**$PM_{10}$** – fine particulate matter; **$PM_{2.5}$** – very fine particulate matter; **$NO_x$** – nitrogen oxides; **NA** – not applicable; **VOC** – volatile organic compound; **CO** – carbon monoxide; **$SO_2$** – sulfur dioxide; **$CO_2$** – carbon dioxide

**Table 3-3. Summary of Proposed Action Daily Emissions Data (Pounds per Day)**

| Alternative | Pollutant | Project Total Air Emissions (pounds per day) | | | | Total |
|---|---|---|---|---|---|---|
| | | Mobile Tailpipe Emissions | Unpaved Road Emissions | Paved Road Emissions | Local Demolition Site Emissions | |
| Proposed Action | $PM_{10}$ | 44.24 | 142.79 | 71.67 | 88.21 | 346.90 |
| | $PM_{2.5}$ | 38.29 | 4.92 | 17.59 | 8.82 | 69.63 |
| | $NO_x$ | 941.54 | NA | NA | NA | 941.54 |
| | VOC | 67.98 | NA | NA | NA | 67.98 |
| | CO | 613.61 | NA | NA | NA | 613.61 |
| | $SO_2$ | 0.94 | NA | NA | NA | 0.94 |
| | $CO_2$ | 102,270 | NA | NA | NA | 102,270 |
| No Action | $PM_{10}$ | 0 | 0 | 0 | 0 | 0 |
| | $PM_{2.5}$ | 0 | 0 | 0 | 0 | 0 |
| | $NO_x$ | 0 | 0 | 0 | 0 | 0 |
| | VOC | 0 | 0 | 0 | 0 | 0 |
| | CO | 0 | 0 | 0 | 0 | 0 |
| | $SO_2$ | 0 | 0 | 0 | 0 | 0 |

**$PM_{10}$** – fine particulate matter; **$PM_{2.5}$** – very fine particulate matter; **$NO_x$** – nitrogen oxides; **NA** – not applicable; **VOC** – volatile organic compound; **CO** – carbon monoxide; **$SO_2$** – sulfur dioxide; **$CO_2$** – carbon dioxide

The Proposed Action would not substantially increase the current generation of airborne pollutants, including particulates and GHGs. The pollutant emissions for the demolition and excavation phase for the Proposed Action would be below *de minimis* levels; therefore, the emissions due to the Proposed Action would not be regionally significant and are exempted from the General Conformity Rule. Air emissions calculations and a Record of Non-Applicability are included in Appendix C.

### *3.1.9 Impact Avoidance, Minimization, and Mitigation Measures*

The Proposed Action is likely to generate fugitive dust from site disturbance and vehicle exhaust from demolition and excavation equipment. Measures recommended by the BAAQMD to control dust generation would be incorporated into demolition and excavation contract specifications, thereby reducing the impact associated with $PM_{10}$ to a level of less than significant.

### *3.1.10 Summary*

The Proposed Action would generate short-term equipment and vehicle emissions and dust that could migrate off the site during certain conditions. In addition, measures recommended by the BAAQMD to control dust generation would be incorporated into the demolition and excavation contract specifications, thereby reducing the impact associated with $PM_{10}$ to a level of less than significant. Because they would not exceed *de minimis* levels, a conformity determination would not be required. Therefore, implementation of the Proposed Action would have no long-term adverse effects and would not have a significant impact to air quality.

No Action Alternative

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status. No construction activities would occur under the current temporary closure status; therefore, there would be no physical changes relative to existing conditions that could result in adverse impacts on air quality from demolition and excavation.

## 3.2 Biological Resources

### *3.2.1 Definition of Resource*

Biological resources include native or naturalized plants and animals and their habitats (e.g., grasslands, forests, and wetlands). This analysis of the effects of the Proposed Action on those resources focuses on plant and wildlife species that are important to the function of ecosystems, are of special importance to society, or are protected under federal law. For the purposes of this EA, these resources are divided into vegetation, wildlife, and special status species (federal and state).

Vegetation

Vegetation includes plant communities and their dominant constituent species within the project area.

Wildlife

Wildlife includes the animal species that commonly occur within or near the project area that have the potential to be impacted by the Proposed Action.

Federally Listed Special Status Species

Special status species are plant and animal species that are listed, have been proposed for listing, or are candidates for listing as threatened or endangered under the Endangered Species Act (ESA), the California ESA, and other species of concern as recognized by state or federal agencies. Under federal law, special consideration is given to bird species protected under the Migratory Bird Treaty Act (MBTA); EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds;* and the Bald and Golden Eagle Protection Act.

The MBTA is an international agreement among the U.S., Canada, and Mexico that protects designated species of birds. Specifically, the MBTA controls the taking of these birds, their nests, eggs, parts, or products. Virtually all native birds are protected under the MBTA, with only a few exceptions.. A complete list of all species of migratory birds protected by the MBTA is in 50 Code of Federal Regulations (CFR) 10.13.

EO 13186 directs federal agencies to take action to further implement the MBTA. Whereas the MBTA protects individual migratory birds, EO 13186 is intended to promote the conservation of migratory bird populations and their habitats. Under this EO, a Memorandum of Understanding to this effect has been developed under between DoD and the U.S. Fish and Wildlife Service (USFWS).

Codified in 50 CFR 22, Subchapter B, the Bald and Golden Eagle Protection Act prohibits anyone from taking[1] bald eagles or golden, including their parts, nests, or eggs except for scientific, educational, and depredation control purposes or for the religious purposes of Native American tribes. The import, export, purchase, sale, trade, or barter of bald and golden eagles, their parts, nests, or eggs is likewise prohibited.

California Listed Special Status Species

Other species of concern are considered sensitive by the California Department of Fish and Wildlife and California Native Plant Society (CNPS) and are managed under the 2015 NASA Environmental Resources Document and the 2002 NASA ARC Burrowing Owl Habitat Management Plan. Sensitive habitats include those that support these special status species and, therefore, are important to the conservation of these species.

### *3.2.2 Affected Environment*

The project area within the fuel facility footprint for the former DFSP Moffett Field comprises approximately 4 acres and 8,545 linear feet of pipeline corridors. Much of the corridor is under impervious paved areas or heavily disturbed nonnative grassland marked by tire tracks. No critical habitat[2] is present on or near the project site. The resources discussed are vegetation, wildlife, and special status species (federal and state).

Vegetation

The project site comprises paved surfaces and disturbed areas dominated by nonnative grasslands consisting of bromes (*Bromus* spp.) and wild oats (*Avena* spp.), and forbs, including several nonnative, invasive annual herbs such as filaree (*Erodium* spp.), summer mustard *(Hirschfeldia incana*), and wild radish (*Raphanus sativus*). A portion of the project site that runs along East Patrol Road contains nonnative dallis grass (*Paspalum dilatum*) and a few stands of prairie bulrush (*Scirpus maritimus*) (NASA 2015). Much of the pipeline alignment along the western edge of East Patrol Road consists of irrigated turf maintained by the Moffett Field Golf Club. A preferred turf seed mix would be obtained from NASA or Planetary Ventures, who leases the Moffett Field Golf Club, for turf restoration following the pipeline removal. Table 3-4

[1] The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

[2] Critical habitat is defined as a specific geographic area that is essential for the conservation of a federally threatened or endangered species and that may require special management and protection. Critical habitat may include areas that are not occupied by a species but are necessary for its recovery.

lists native and nonnative plant species observed on or near the project area. For a more detailed discussion of the environmental baseline and status of biological resources, refer to Chapter 4 of the 2015 NASA ARC Environmental Resources Document (NASA 2015).

**Table 3-4. Native and Nonnative Plants Observed on or near DFSP Moffett Field**

| Species | | Native Species | Nonnative Species |
|---|---|---|---|
| Common Name | Scientific Name | | |
| Ash | *Fraxinus* sp. | X | |
| Barley | *Hordeum* sp. | | X |
| Bermudagrass | *Cynodon dactylon* | | X |
| Black Mustard | *Brassica nigra* | | X |
| Bottlebrush | *Callistemon* sp. | | X |
| Bristly Oxtongue | *Helminthotheca echiodes* | | X |
| Bulbous Canarygrass | *Phalaris aquatica* | | X |
| Bull Thistle | *Cirsium vulgare* | | X |
| California Brome | *Bromus carinatus* | X | |
| California Poppy | *Eschscholzia californica* | X | |
| California Sycamore | *Platanus racemosa* | X | |
| Chicory | *Cichorium intybus* | | X |
| Citrus Tree | *Citrus* sp. | | X |
| Common Mallow | *Malva neglecta* | | X |
| Common Sowthistle | *Sonchus oleraceus* | | X |
| Coyotebrush | *Baccharis pilularis* | X | |
| Congdon's Tarplant | *Hemizonia parryi* ssp. *congdonii* | X | |
| Curly Dock | *Rumex crispus* | | X |
| Deodar Cedar | *Cedrus deodara* | | X |
| English Ivy | *Hedera helix* | | X |
| English Plantain | *Plantago lanceolata* | | X |
| Eucalyptus | *Eucalpytus* sp. | | X |
| Field Bindweed | *Convolvulus arvensis* | | X |
| Fremont Cottonwood | *Populus fremontii* | X | |
| Himalayan Blackberry | *Rubus discolor* | | X |
| Incense Cedar | *Calocedrus decurrens* | X | |
| Oak | *Quercus* sp. | X | |
| Oleander | *Nerium oleander* | | X |
| Pine | *Pinus* sp. | X | |
| Plum | *Prunus* sp. | | X |
| Rabbitfoot Grass | *Polypogon monspeliensis* | | X |

| Species | | Native Species | Nonnative Species |
|---|---|---|---|
| Common Name | Scientific Name | | |
| Red Sorrel | *Rumex acetosella* | | X |
| Redwood | *Sequoia sempervirens* | X | |
| Ripgut Brome | *Bromus diandrus* | | X |
| Rose (cultivated) | *Rosa* sp. | | X |
| Russian Olive | *Elaeagnus angustifolia* | | X |
| Ryegrass | *Lolium* sp. | | X |
| Sedge | *Cyperus* sp. | | X |
| Smartweed | *Polygonum lapathifolium* | X | |
| Stork's Bill | *Erodium* sp. | | X |
| Sugar Sumac | *Rhus ovata* | | X |
| Sweet Fennel | *Foeniculum vulgare* | | X |
| Sweetgum | *Liquidambar styraciflua* | X | |
| Tree of Heaven | *Ailanthus altissima* | | X |
| Wild Oat | *Avena fatua* | | X |
| Wild Radish | *Raphanus sativus* | | X |
| Yellow Star Thistle | *Centaurea solstitialis* | | X |

Source: NASA 2015

Wildlife

Common mammalian wildlife species expected to be present on the project site include California ground squirrels (*Spermophilus beecheyi*), Botta's pocket gophers (*Thomomys bottae*), coyotes (*Canis latrans*), and back-tailed jackrabbits (*Lepus californicus*). Ground squirrels and black-tailed jackrabbits were observed at the project site during two focused burrowing owl surveys conducted on August 14 and September 8, 2015. The California ground squirrels and ground squirrel burrows were noted to be in abundance within the project site and on the golf course (Appendix G). Other mammalian species known to occur in the area include western harvest mice (*Reithrodontomys megalotis*), deer mice (*Peromyscus maniculatus*), California vole (*Microtus californicus*), and house mice (*Mus musculus*), although none were observed during the burrowing owl surveys conducted in 2015 (Appendix G). The abundant small mammal population provides forage for predators such as raptors and coyotes. Nonnative red foxes (*Vulpes vulpes*) and feral cats (*Felis catus*) may also be seen at the NASA Property (NASA 2015).

Common avian wildlife that may be observed on or near the project site include the song sparrow (*Melospiza melodia*), white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Z. atriacapilla*), lesser goldfinch (*Carduelis psaltria*), American goldfinch (*C. tristis*), Brewer's blackbird (*Euphagus cyanocephalus*), western meadowlark (*Sturnella neglecta*), Bewick's wren (*Thryomanes bewickii*), and house finch (*Carpodacus mexicanus*) (NASA 2015).

Federally Listed Special Status Species

The ESA protects federally listed animal and plant species and their critical habitats. The USFWS maintains a list of species that are considered to be threatened, endangered, proposed, or candidates under the ESA. An endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future. Candidate species are those for which the USFWS has enough information on file to propose listing as threatened or endangered, but whose listing has been precluded by other agency priorities. Although federal agencies are not required by the ESA to consider candidate species, federal agencies typically provide special attention to them during the environmental review process (NASA 2015). Chapter 15, Table 15-2, of the NASA Environmental Resources Document contains a complete list of special status species that potentially occur on NASA ARC (NASA 2015).

One special status plant known to occur near but not within the project site is Congdon's tarplant (*Hemizonia parryi* ssp. *congdonii*), which has been observed in two isolated locations north of the golf course and outside of the project site. It is an annual herb that is native to California and is endemic (limited) to California (Calflora 2015). It is included in the CNPS's Inventory of Rare and Endangered Plants on List 1B.1, covers plants that are rare, threatened, or endangered in California and elsewhere (CNPS 2016). Congdon's tarplant was not observed in or near the project site during the August 14 and September 8, 2015 focused burrowing owl surveys. Both populations are currently marked with caution tape and easily avoided. This population would not be impacted by the Proposed Action.

Two federally listed endangered bird species are known to occur in the salt marshes to north of the project site, the California least tern (*Sterna antillarum browni*) and Ridgeway's rail (*Rallus obsoletus*), previously named California clapper rail.

The California least tern  has been observed foraging in the salt marshes to the north of the northernmost portion of the project site (Figure 3-1) and in various locations in the Don Edwards San Francisco Bay National Wildlife Refuge to the north of the NASA Property. This species can be identified by its black-capped head with a white stripe on the forehead, a long, narrow black-tipped, pale gray wings and broad, forked tail, white body and yellowish feet. When full grown California least tern (Figure 3-2) typically has a wingspan of about 30 inches (USFWS 2016b).

The Ridgeway's rail (Figure 3-3) has also been observed foraging in the salt marshes to the north of the northernmost portion of the project site (Figure 3-1). This species is one of the largest rails (family Rallidae), measuring 13 to 19 inches from bill to tail. It is characterized by its henlike appearance, a long, slightly downward-curving bill, olive-brown upper parts, a cinnamon-buff-colored breast, dark flanks crossed by white bars, and white undertail coverts that are often exposed when the bird is agitated (USFWS 2016a).

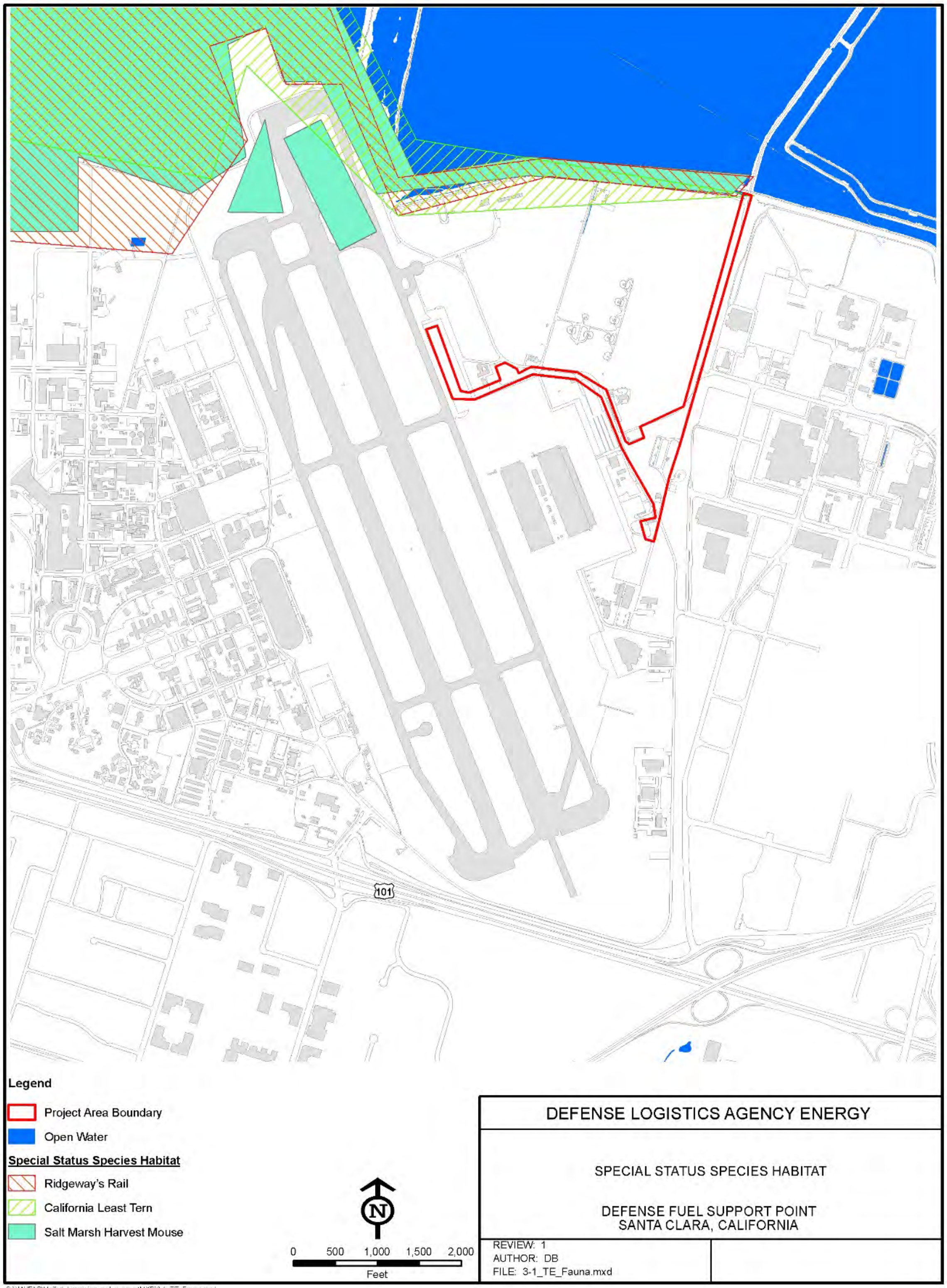



**Figure 3-1. Special Status Species Locations Near Project Site**


**Figure 3-2. California Least Tern**


**Figure 3-3. Ridgeway's Rail**

One federally listed endangered mammal species is known to occur near the project site. The salt marsh harvest mouse (*Reithrodontomys raviventris*) has been observed in the pickleweed (*Salicornia* sp.) in the salt marshes north of the northernmost portion of the project site (Figure 3-1). The salt marsh harvest mouse is distinguished by its dark brown pelage (above) and is pinkish cinnamon or tawny below (Figure 3-4). The tail is also bicolored. The upper incisors are grooved (USFWS 2016c).


**Figure 3-4. Salt Marsh Harvest Mouse**

<u>California Listed Special Status Species</u>

The western pond turtle (*Clemmys marmorata*), a California species of special concern, has been observed outside of the project site in the Northern Channel where it intersects with Marriage Road Ditch. This places their known habitat 2,000 feet from the project site, near the Macon/Zook Road. These geographic features are labeled on the detail drawings in Appendix A. NASA ARC has developed a Management Plan to protect the resident western turtle population (NASA 2015).

Western pond turtles inhabit freshwater streams and similar habitats and travel upland habitat to breed, and females may travel up to 328 feet to nest in spring and early summer (NASA 2015). Because the soils along Macon/Zook Road have been heavily disturbed, this area may not be suitable for nesting. Western pond turtles were not observed during the August 14 and September 8, 2015 focused burrowing owl surveys (Appendix G) or during subsequent burrowing owl monitoring site visits from February through April 2016.

The white-tailed kite (*Elanus leucurus*) is a fully protected species in California. According to the California Department of Fish and Wildlife (2015). Under the California ESA (CESA) fully protected species may not be taken or possessed and no license or permit would be issued for their take except for scientific research or relocation of a bird species for the protection of livestock. White-tailed kites' breeding and foraging habitat includes lowland grasslands, agricultural fields, oak woodlands, and riparian areas (California Partners in Flight 2002). White-tailed kites are not expected to nest within the project site, but there is a potential for them to forage near the site due to the abundance of ground squirrels. No white-tailed kites were observed during the August 14 and September 8, focused burrowing owl surveys (Appendix G) or during subsequent burrowing owl monitoring site visits (February through April 2016).

The American peregrine falcon (*Falco peregrinus anatum*) is state listed as an endangered species and is protected under the MBTA. Peregrine falcons are known to forage on suitable habitat on the NASA Property, which includes annual grasslands and weed-dominated areas (NASA 2015). No peregrine falcons were observed during the August 14 and September 8, 2015 focused burrowing owl surveys or during subsequent burrowing owl monitoring site visits (February through April 2016). However, they may forage near the site due to the abundance of ground squirrels (Appendix G).

The golden eagle (*Aquila chrysaetos*) is a California species of special concern and is also protected under the MBTA and the Bald and Golden Eagle Protection Act. According to NASA ARC records, a golden eagle has been observed feeding on California ground squirrels within the NASA Property. No golden eagles were observed during the August 14 and September 8, 2015 focused burrowing owl surveys or during subsequent burrowing owl monitoring site visits (February through April 2016). However, they may forage near the site due to the abundance of ground squirrels (Appendix G).

The burrowing owl (*Athene cunicularia*) is a California species of special concern, a federal species of concern, and protected under the MBTA (Figure 3-5). Although no burrowing owls or signs (e.g., scat, feathers) were observed on the project site during the surveys conducted on August 14 and September 8, 2015, one female burrowing owl was observed on February 23, 2016, exploring ground squirrel burrows within the fuel loading dock (Appendix A, Figure A-11). That owl vacated the site within one week, however, leaving no evidence of a nest. Burrowing owls have been observed historically near and within the project site (Figure 3-6; NASA ARC 2009, 2010, 2012, 2013, 2014). The combination of open, dry, sparsely vegetated terrain along with ground squirrel burrows within the disturbed areas makes the project site an attractive habitat for burrowing owls (Haug and Oliphant 1990).

The south San Francisco Bay region, which includes Santa Clara and Alameda counties, lost a substantial portion of its burrowing owl population during the explosive development of the 1980s, and burrowing owl numbers are still declining. The region currently supports a population of approximately 120 breeding pairs of burrowing owls. The NASA Property supports one of the largest subpopulations, with roughly 25 breeding pairs. The relatively large size of the NASA Property's burrowing owl population makes its survival critical to the long-term persistence of burrowing owls in the region (NASA 2015).


**Figure 3-5. Burrowing Owl**

Burrowing owls have thrived at the NASA Property for four main reasons. First, federal ownership of the NASA Property has largely protected the land from the rampant development that has destroyed much of the burrowing owl habitat in the rest of Santa Clara County. A second reason is that the large portions of the NASA Property are closed to the public, preventing much human disturbance of burrows supporting burrowing owls and foraging areas. Third, short-grass habitat has been maintained as part of standard procedures. Fourth, ground squirrels are not controlled throughout much of the NASA Property except on the Moffett Field Golf Club, which leaves burrowing owls their essential habitat requirements, including ground squirrels and their burrows (NASA 2015).


**Figure 3-6. Historic Locations of Western Burrowing Owl Burrows on Project Site**

### *3.2.3 Environmental Consequences*

Proposed Action

The Proposed Action would temporarily disturb up to 7 acres of previously disturbed surface area, including pavement, nonnative grassland, and invasive forb habitat. An estimated 24,432 CY of soil would be excavated to remove USTs and associated infrastructure. Demolition and excavation activities would result in intermittent noise impacts on wildlife. Following excavation, the site would be restored to match the surrounding topography and landscape. No artificial lighting would be used as demolition and excavation activities would occur during daylight hours. Portions of the areas proposed to be excavated would remove ground squirrel burrows which could potentially be used by burrowing owls. Large open areas adjacent to and near the project site contain suitable burrowing owl habitat (i.e. low growing grasses, and ground squirrel burrows) that would be available to the owls during demolition and excavation activities. No impacts from the implementation of the Proposed Action are anticipated to occur on any other sensitive or rare plant or wildlife species.

### *3.2.4 Impact Avoidance, Minimization, and Mitigation Measures*

Impacts on burrowing owls and other species within or near the project site would be avoided through proactive measures prior to grading. Impact avoidance, minimization, and mitigation measures are described below and in Appendix D. These measures have been developed in accordance with state and federal regulations as well as NASA ARC policies and procedures. These measures would ensure that potential impacts on wildlife and their habitat are avoided or mitigated. Examples of avoidance and mitigation measures include the following:

- During the nonbreeding season for burrowing owls (September 1 through the end of February) ground squirrel burrows that would otherwise be removed during pipeline excavation would be collapsed or occluded to preclude the recruitment of breeding burrowing owls to those burrows during demolition and excavation. (Table D-1: BIO-1, Appendix D).
- Burrowing owl surveys will be conducted by a qualified biologist approved by DLA and NASA ARC prior to closure/demolition activities. The biologist will also survey for other MBTA listed species listing in the project site (Table D-1: BIO-2, Appendix D).
- Environmental awareness training would be provided all demolition and excavation workers (Table D-1: BIO-3, Appendix D).
- Biological monitoring would continue throughout the demolition and excavation and closure process (Table D-1: BIO-3a, Appendix D).
- Following demolition and excavation activities, the site will be restored by hydroseeding with a with a local, native seed mix approved by DLA and NASA (Table D-1: BIO-6, Appendix D).

- Following demolition and excavation activities, artificial burrows would be installed to replace ground squirrel burrows that were damaged or removed during excavation/demolition, (Table D-1: BIO-6, Appendix D).

- The Proposed Action would adhere to the NASA ARC Burrowing Owl Habitat Management Plan.

#### *3.2.5 Summary*

The Proposed Action would result in temporary impacts on vegetation, which would be hydroseeded with a local native seed mix following closure of all tanks, pipelines, appurtenances, etc. There is a potential for some wildlife species to be temporarily impacted by noise and equipment movement during demolition and excavation. With the implementation of mitigation measures in Appendix D, the Proposed Action is not likely to have an adverse effect on these species and would thereby result in less than significant impacts on biological resources. With implementation of avoidance measures, the Proposed Action is not likely to adversely affect any federal or state listed threatened, endangered, or candidate species.

<u>No Action Alternative</u>

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status. No construction activities would occur under the current temporary closure status; therefore, there would be no physical changes relative to existing conditions that could result in adverse impacts on biological resources.

Due in part to the inactivity of the area, sensitive biological resources may begin to establish foraging territory or take up residency. Therefore, the No Action Alternative could result in a short-term benefit of territorial expansion for some wildlife species as evidenced by an abundance of ground squirrel burrows within the site. Consequentially, the future regulatory requirement to either close or obtain operational status would result in increased impacts on those species. Therefore, the No Action Alternative would likely eventually result in impacts on biological resources requiring mitigation, regardless of whether the facility ultimately is reopened or permanently closed.

## 3.3 Cultural Resources

#### *3.3.1 Definition of Resource*

Cultural resources are composed of districts, buildings, sites, structures, areas of traditional use, or objects with historical, architectural, archeological, cultural, or scientific importance. They include archeological resources (both prehistoric and historic), historic architectural resources (physical properties, structures, or built items), and traditional cultural resources (those important to living communities, including Native Americans, for religious, spiritual, ancestral, or traditional reasons).

### *3.3.2 Regulatory Setting*

This section identifies and describes potential impacts on historic properties, which may be defined as both prehistoric and historic resources. The project is a federal undertaking and is subject to Section 106 of the National Historic Preservation Act (NHPA) of 1966 (NHPA, as amended, Section 306108 of Title 54 United States Code [U.S.C.]) and its implementing regulations (36 CFR 800). Federal regulations define historic properties as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP), as defined in 36 CFR 800.16(l)(1). Under the NRHP criteria for evaluation, historic properties are those that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. Are associated with events that have made a significant contribution to the broad patterns of our history; or
B. Are associated with the lives of persons significant in our past; or
C. 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 components may lack individual distinction; or
D. Have yielded or may be likely to yield, information important in prehistory or history.

### *3.3.3 Affected Environment*

The area of potential effect (APE) identifies a boundary within which historic properties may be potentially affected by the project, as shown in the *Historic Property Survey Report for the Defense Fuel Support Point Closure Project, Moffett Field, California* (AECOM 2016: Figure 3). It encompasses all areas where the project could impact historic properties. Per 36 CFR 800.16(d), the APE is defined as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.” As such, the project’s APE takes into consideration potential physical, visual, noise/vibration, and/or functional changes to historic properties. For archaeological resources, the APE is defined as the limits of disturbance, including areas of temporary staging, equipment storage, spoils storage, grading, and excavation. Where the project proposes only excavation of subsurface pipeline, the APE is limited to the footprint of that activity. Excavation is proposed to the depth and width of the previously disturbed area of the pipeline, so the vertical APE extends to the approximate depth of the pipeline, which varies throughout the pipeline corridor. Excavation is expected to reach a maximum depth of 10 feet, but this will be determined during construction. The proposed APE boundary also includes built environment resources in the vicinity of the project footprint that may be indirectly affected through visual or contextual alterations. Due to the proposed removal of the day tank area and surficial elements of the high-speed fueling pits (MF 1016), which would create a visual change, a portion of the east side of the airfield within immediate view of these resources, including Hangars 2 and 3, was included in the APE.

A study of the project was conducted to determine whether cultural resources are present within the APE, and whether any of those resources are potentially eligible for inclusion in the NRHP. The results and conclusions of the Section 106 investigation can be found in the *Historic Property Survey Report for the Defense Fuel Support Point Closure Project, Moffett Field, California* (AECOM 2016 [Appendix J]). The State Historic Preservation Officer (SHPO) is currently reviewing the findings of the report.

Archival research revealed that a potentially sensitive archaeological area associated with the former nineteenth century Gallimore farm is located to the north and outside of the APE. Research also revealed that the APE overlaps with contributors to the NAS Sunnyvale Historic District, including Hangars 2 and 3 and Building 55, which are listed in the NRHP, and the MFA, which was determined an eligible contributor to the historic district. Currently, there are no federally recognized Native American tribes and no known sacred sites associated with the APE.

An archaeological pedestrian survey and an intensive built environment survey were conducted on March 21, 2016. The survey identified no archaeological resources, one historic district, and 15 buildings and structures (Table 3-5). The NASA Property, a contributing element of the NAS Sunnyvale Historic District, encompasses the APE. Of the 15 built environment resources identified, 3 resources are listed in the NRHP as contributors to the NAS Sunnyvale Historic District, 8 resources are features of the DFSP fueling facility, and the remaining 4 resources are miscellaneous features of the airfield.

**Table 3-5. Cultural Resources Survey and Evaluation Results**

| Building No. | Historic Name (Current Name) | Year Built | NRHP Status/ Evaluation | Effects Analysis |
|---|---|---|---|---|
| 46 | Hangar 2 | 1942 | Listed (NAS Sunnyvale HD) | No adverse effect |
| 47 | Hangar 3 | 1942 | Listed (NAS Sunnyvale HD) | No adverse effect |
| 55 | Boiler House (Hangars 2 and 3) | 1943 | Listed (NAS Sunnyvale HD) | No adverse effect |
| 69 | Inert Ammunition Storage | 1943 | Not eligible | No historic properties affected |
| 137 | Aircraft Fuel Storage Tank* | 1952 | Not eligible | No historic properties affected |
| 138 | Aircraft Fuel Storage Tank* | 1952 | Not eligible | No historic properties affected |
| 139 | Aircraft Fuel Storage Tank* | 1952 | Not eligible | No historic properties affected |

| Building No. | Historic Name (Current Name) | Year Built | NRHP Status/ Evaluation | Effects Analysis |
|---|---|---|---|---|
| 140 | Aircraft Fuel Storage Tank* | 1952 | Not eligible | No historic properties affected |
| 141 | Tank Truck Filling Rack* | 1952 | Not eligible | No historic properties affected |
| 169 | Vehicular Bridge* | 1953 | Not eligible | No historic properties affected |
| 439 | Aircraft Wash Rack | 1942 | Not eligible | No historic properties affected |
| 953 | Aircraft Ready Fuel Day Tank and Pumping Station* | 1956 | Not eligible | No historic properties affected |
| MF1002 | Aircraft Parking Apron | 1945 | Eligible as contributor | No adverse effect |
| MF1003 | High-Speed Aircraft Fueling Pits* | 1955 | Not eligible | No historic properties affected |
| MF1016 | Aircraft Taxiway (East Parallel) | 1945 | Eligible as contributor | No adverse effect |

**No.** – number; **NRHP** – National Register of Historic Places; **NAS** – Naval Air Station; **HD** – Historic District
* Feature of the jet fueling facility (Defense Fuel Support Point)

The NAS Sunnyvale Historic District was listed in the NRHP in 1994 as significant in the areas of military, engineering, and architecture, with two periods of significance from 1930 to 1935 and from 1942 to 1946. Under Criterion A, the district is significant for its association with coastal defense and naval technology; under Criterion C, the district is significant for the design of its 1933 station plan and buildings. The district listing included 43 contributing resources and 54 noncontributing resources in a discontiguous boundary. Three buildings in the APE are listed as retaining a significance and integrity that qualify them for NRHP listing as contributing resources of the district: Hangar 2, Hangar 3, and Building 55.

In 2013, the MFA was evaluated for listing in the NRHP and was determined to be eligible as a contributing resource to the NAS Sunnyvale Historic District within an amended, contiguous district boundary, and under an amended period of significance from 1930 to 1961 (AECOM 2013). Character-defining features associated with the airfield were preliminarily identified, but not fully evaluated for NRHP eligibility. Historic features of the airfield were identified as those “directly associated with the facility’s core aircraft, transport, research, maintenance, and training mission, which has evolved throughout its history” (AECOM 2013). Resources associated with the airfield that are within the APE were evaluated for individual significance, as potential contributors to the NAS Sunnyvale Historic District, and as potential character-defining features of the airfield.

Twelve additional resources were evaluated for NRHP eligibility. Two of the 12 resources are aviation circulation features, including an aircraft parking apron (MF1002) and an aircraft taxiway (MF1016), are not are not individually eligible for the NRHP but are character-defining features of the airfield. However, they are considered to be an eligible contributing resource to the NAS Sunnyvale Historic District. Two additional resources, Buildings 69 and 439, are secondary features of the airfield; however, they do not possess the level of significance or character-defining features of the airfield and are not individually eligible for the NRHP.

Eight of the 12 resources were part of the jet fueling facility (later the DFSP). The jet fueling facility does not appear to be individually eligible for the NRHP. The components of the jet fueling facility that were previously identified as potential character-defining features of the airfield either do not possess the level of significance to be character-defining or do not retain sufficient integrity to convey their historical associations. The pipelines, fuel farm, day tank area, truck filling rack, and other basic fuel storage and distribution elements of the jet fueling facility built between 1951 and 1953 served a secondary purpose in the aviation mission of the airfield, and do not represent distinctive or unique architecture or engineering related to its type from that period. The high-speed fueling pits, originally built between1955 and 1956, were replaced in 1976 and reconfigured further in 1983.This, in addition to the removal of the pipeline feed from the fuel dock to the onshore jet fueling facility, have diminished the integrity of these features. Due to its support function and the diminished integrity of some of its significant components directly related to the aviation mission of the airfield, the jet fueling facility does not appear to be a character-defining feature of the airfield.

### *3.3.4 Environmental Consequences*

<u>Proposed Action</u>

The APE contains contributors to the NAS Sunnyvale Historic District that are listed in or eligible for the NRHP, including Hangars 2 and 3, Building 55, and the airfield, including its contributing features MF1002 and MF1016.

Under the Proposed Action, approximately 7 acres will be disturbed. Several segments of pipeline (300 lineal feet above ground and 8,480 lineal feet below ground), the fuel farm (four USTs and associated equipment), and day tank area (one UST and associated equipment) would be excavated and removed. Another 6,510 linear feet of pipeline and the truck filling stand (Building 141) would be cleaned, closed permanently, and abandoned in place. Surficial elements of the high-speed fueling pits (MF1016) would be removed. Once completed, the Proposed Action would not be feasibly reversible, including removal or abandonment in place of the DFSP.

Historic properties identified in the APE will not be directly impacted by the Proposed Action. Although adjacent to the Proposed Action, the potential for indirect impacts through the visual or contextual change resulting from the removal of subsurface pipelines and tanks and aboveground features of the fuel farm and day tank area would be minimal. This is due to the scale and visibility of these structures within the visual context of the NAS Sunnyvale Historic

District or its contributors, Hangars 2 and 3, Building 55, and the airfield. The visual context and setting of the historic district are anchored in the formality and symmetry of the Spanish Colonial Revival-style Shenandoah Plaza campus, the utilitarian character and expansive hardscape of the airfield, which is punctuated by the massive, iconic, and futuristic Hangar 1. The east side of the airfield is also dominated by Hangars 2 and 3. The visual relationships between these major elements contribute to the setting and feeling of the airfield and the district. Changes to smaller-scale, noncontributing buildings, structures, or features in secondary areas of the airfield are unlikely to have an impact on the integrity of the overall district or its primary contributors.

The airfield's setting reflects its evolution to serve changing aviation missions since the 1930s, including modifications over time to accommodate new types of aircraft, including the airfield expansion in the early 1950s through current ongoing changes (AECOM 2013). These changes allowed the airfield to remain at the forefront of scientific and aviation research and permitted its continuing use. As such, a greater degree of flexibility is appropriate when considering changes to support ongoing uses and upgrading obsolete aviation features. The Proposed Action would not have direct impacts on historic properties and would not indirectly impede their ability to convey their historical significance. Overall, the Proposed Action would not diminish the integrity of the NAS Sunnyvale Historic District as a whole, or any of its characteristics that qualify the property for inclusion in the NRHP.

#### *3.3.5 Impact Avoidance, Minimization, and Mitigation Measures*

Although there is no record of archaeological resources within the APE, archaeological deposits could be uncovered during excavation. If there is an inadvertent discovery of archaeological resources during the project, NASA would follow its best management practices (BMPs) for unanticipated discoveries, as outlined in Standard Operating Procedure (SOP) 8 in the 2014 Draft Integrated Cultural Resources Management Plan (ICRMP) for NASA ARC (AECOM 2014). If previously unrecorded cultural and historical resources are encountered, work in the affected area would stop and the resources would be evaluated by a qualified archaeologist approved by DLA and NASA. To minimize potential impacts on cultural resources, the Proposed Action would follow SOPs from the NASA ARC ICRMP such as SOP 7, *Protecting Archaeological Resources*; SOP 8, *Inadvertent Discovery of Archaeological Resources*; and SOP 9, *Treatment of Human Remains and Funerary/Sacred Objects*. Additional information about cultural resource avoidance, minimization, and mitigation measures is given in Appendix D and discussed in depth in the NASA ARC ICRMP.

<u>Summary</u>

The APE contains contributing elements to the NAS Sunnyvale Historic District that are listed in or eligible for the NRHP, including Hangars 2 and 3, Building 55, and the airfield (MFA), including its character-defining features MF1002 and MF1016. Other resources present in the APE are not eligible for the NRHP. Under Section 106 of NHPA, NASA has taken into account the potential effects of the Proposed Action on historic properties and has determined that the Proposed Action would result in no adverse effect. With the mitigation measures described previously, the implementation of the Proposed Action would not have a significant impact on cultural resources.

No Action Alternative

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status. No construction activities would occur under the current temporary closure status; therefore there would be no physical changes relative to existing conditions that could result in adverse impacts on cultural resources.

## 3.4 Geology, Topography and Soils

### *3.4.1 Definition of Resource*

Geology, topography, soils, and mineral resources constitute the natural physical resources of a given area. The elevation, slope, aspect, and surface features found within a given area form its topography. Long-term geological, seismic, erosional, and depositional processes typically influence the topographic relief of an area. The geology of an area includes the geologic formations (i.e., bedrock) and geologic hazards of an area. Bedrock refers to consolidated earthen materials that may be made up of either (1) interlocking crystals (igneous and metamorphic rocks) or fragments of other rocks compressed and cemented together over time by pressure and (2) dissolved minerals that have hardened in place (sedimentary rocks). Geologic hazards include seismic hazards (e.g., earthquakes, ground rupture, ground shaking, liquefaction,[1] tsunamis), landslides, and erosion. Seismic hazards can trigger landslides and increase the effects of erosion.

Soil lies above bedrock and consists of unconsolidated, weathered bedrock fragments (sand and silt) and decomposed organic matter from plants, bacteria, fungi, and other living things. The value of soil as a geologic resource lies in its potential to support plant growth, especially agriculture. Mineral resources are metallic or nonmetallic earth materials that can be extracted for a useful purpose, such as iron ore that can be refined to make steel, gravel that can be used to build roads, or petroleum and natural gas.

The region of influence (ROI) for geological resources includes the DFSP facility and portions of the Moffett Field Golf Course adjacent to the pipeline route on East Patrol Road and Macon Road.

[1] Liquefaction is the sudden loss of strength and stiffness in water-saturated soils due to the ground shaking caused by an earthquake.

### *3.4.2 Affected Environment*

<u>Geology</u>

The project area is underlain by fine-grained Holocene alluvial fan and floodplain overbank deposits that are less than 10,000 years old (Knudsen et al. 2000). These deposits lie on the far downslope margin of alluvial fans that emanate from the Santa Cruz Mountains to the southwest and are dominated by clay and silt, with interbedded discontinuous lobes of coarse sand that become thinner in the direction of San Francisco Bay. The depth to groundwater is generally less than 10 feet below the ground surface within these deposits. Helley and Brabb (1971) further distinguish fluvial versus basin deposits, describing basin deposits as mainly organic-rich clay and silty clay, whereas fluvial (stream) deposits occur on the outer edges of young alluvial fans and that form levees between them and the basin deposits. The principal difference between them is that the fluvial deposits tend to have more variable grain size and lower organic content than basin deposits.

The upper 250 feet of alluvial fill material underlying the region of the site are divided into four Holocene/Pleistocene stratigraphic units that represent changes in deposition associated with sea-level changes during glacial periods. These units contain the area's three major aquifers (NASA 2015).

<u>Topography</u>

The project area is on the southern margin of the extreme south end of San Francisco Bay on filled land that was historically inland from the tidal marshland (Nichols and Wright 1971). The ground surface slopes downward gently to the north. The elevation of the ground surface at the project site ranges from 7 to 13 feet above mean sea level. The main surface drainage features in the area are the drainage ditches adjacent to Marriage Road and East Patrol Road. North of the NASA Property are diked salt evaporation ponds, and north of those ponds are mudflats (NASA 2015).

The southern San Francisco Bay occupies a sediment-filled structural trough in the Franciscan bedrock between the San Andreas and Hayward faults (Figuers 1998). The bedrock surface is more than 1,000 feet below mean sea level, beneath the east-central portion of southern San Francisco Bay, north of the Dumbarton Bridge. It is approximately 200 feet below mean sea level beneath U.S. Highway 101 (Figuers 1998).

<u>Soils</u>

Soil survey data for the project site identified two different soil types, the Urbanland-Hangerone complex and Embarcadero silty clay loam (Natural Resources Conservation Service 2015). The dominant soil at the proposed location is the Urbanland-Hangerone complex, which is a poorly drained soil with 0 to 2 percent slopes. The Urbanland soil consists of a parent material that is disturbed and human-transported, while Hangerone soils consist of drained alluvium derived from metamorphic and sedimentary rock and/or alluvium from metavolcanics. The typical profile for the Urbanland-Hangerone complex is clay from 0 to 35 inches, clay loam at 35 to 45 inches, gravelly loam at 45 to 72 inches, and clay at 72 to 89 inches. The second type of soil at the site is Embarcadero silty clay loam, which consists of moderately well-drained soils with 0 to 2 percent slopes. The typical profile for Embarcadero silty clay loam is clay loam from 0 to 7 inches, clay from 7 to 16 inches, silty clay at 16 to 47 inches, clay loam from 47 to 61 inches, and silty clay from 61 to 98 inches. The land has been classified as not prime farmland and is not applicable for the Storie Index in California, which governs soil's potential for cultivated agriculture (Natural Resources Conservation Service 2015).

### *3.4.3 Environmental Consequences*

Proposed Action

The evaluation of geological impacts with respect to the potential for significance considers the degree to which the following would potentially occur: (1) soil disturbance that would result from grading activities or (2) changes to existing topography that could increase the potential for erosion and landslides. Approximately 24,432 CY of soil would be excavated to remove USTs and associated infrastructure, and approximately 28,000 CY of soil (3,717 CY imported) would be replaced to restore the site to pregrading topography. NASA Ames Code JQ Environmental Division would review and approve all imported soils to determine acceptability of soils prior to import. No significant impacts on topography or soils are expected to occur as a result of implementing the Proposed Action. Earthwork at the site would temporarily disturb soils, but the impact would be short term and less than significant.

Geologic hazards such as earthquakes, liquefaction, mudslides, tsunamis, and seiches[1] would not result in impacts on the human environment because the project does not involve the development of new structures.

### *3.4.4 Impact Avoidance, Minimization and Mitigation Measures*

The Proposed Action would follow the Closure Plan (OTIE 2015) and development of a site-specific Stormwater Pollution Prevention Plan (SWPPP) and would operate under the NPDES General Construction Permit (State Water Resources Control Board [SWRCB] 2010), each with BMPs that would limit the potential for erosion due to stormwater runoff. These BMPs would include installing silt fences during demolition and excavation to keep sediment in place, preserving natural drainageways, hydroseeding with a local native seed mix to prevent post-grading erosion, and restricting the use of contaminants that might enter surface or groundwater supplies.

[1] Large ocean waves caused by significant seismic events.

### *3.4.5 Summary*

Under the Proposed Action, surface disturbance and grading would occur; however, the contractor would be required follow the Closure Plan (OTIE 2015) and operate under the NPDES General Construction Permit (SWRCB 2010), as well as prepare the following Environmental Quality Plans in accordance with local, state, and federal regulations: a state DOSH excavation permit, SWPPP, and a geotechnical/engineering evaluation. With the implementation of BMPs from each of these overlapping requirements it is expected that the Proposed Action would not result in a significant impact on geology, topography, or soils.

<u>No Action Alternative</u>

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status. No construction activities would occur under the current temporary closure status; therefore, there would be no physical changes relative to existing conditions that could result in adverse impacts on geological resources.

## 3.5 Hydrology and Water Resources

### *3.5.1 Definition of Resource*

Water resources include surface water, groundwater, water quality, and floodplains. Surface water includes lakes, ponds, rivers, streams, impoundments, nearshore waters, and wetlands. Groundwater is water that is below the ground surface. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. Floodplains are relatively flat areas adjacent to rivers, streams, watercourses, bays, or other bodies of water that are subject to inundations during flood events. A 100-year floodplain is an area that is subject to a 1 percent chance of flooding in any particular year.

Water resource regulations focus on the right to use water and protection of water quality. The principal federal laws enforced by the EPA to protect water quality are the Clean Water Act (CWA), as amended (33 U.S.C. § 1251, *et seq.*), and the Safe Drinking Water Act (42 U.S.C. § 300f, *et seq*.). The CWA provides for the protection of surface water quality and preservation of wetlands. The Porter-Cologne Water Quality Control Act (California Water Code § 13000-13999.10) assigns the SWRCB's and the San Francisco Regional Water Quality Control Board's (SFRWQCB's) responsibilities for protection of the waters within their regions. The SFRWQCBs are also responsible for implementing provisions of the CWA delegated to states, such as NPDES, which regulates point and nonpoint discharges of pollutants to water resources.

In the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan), the SFBRWQCB designated beneficial uses for the surface water and groundwater in the project area. Beneficial uses are defined as the uses of water necessary for the survival or well-being of man, plants, and wildlife and are protected against degradation of their quality in accordance with the State Porter-Cologne Act. Examples of beneficial uses include drinking, swimming, industrial and agricultural water supplies, and the support of fresh and saline aquatic habitats.

The Basin Plan sets objectives for water quality that must be maintained to protect the designated beneficial uses of water resources in the Central Coast Region and must conform to the state's antidegradation policy.

Waters of the U.S. other than wetlands are defined as areas under the U.S. Army Corps of Engineers' (USACE's) jurisdiction pursuant to Section 404 of the CWA and are generally defined by the ordinary high water mark. The USACE's jurisdiction can extend beyond the ordinary high water mark to the limit of adjacent wetlands, when present. Wetlands are defined under CWA regulations (33 CFR 328) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamp, marshes, bogs, and similar areas."

EO 11990, *Protection of Wetlands*, requires that governmental agencies, in carrying out their responsibilities, provide leadership and "take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands." Each agency is to consider factors relevant to a proposed project's effect on the survival and quality of the wetlands by maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, and wildlife. If no practical alternative can be demonstrated, agencies are required to provide for early public review of any plans or proposals for new construction in wetlands.

EO 11988, *Floodplain Management*, directs all federal agencies to refrain from conducting, supporting, or allowing any activity that would significantly encroach into a floodplain or impact floodplain resources, unless it is the only practicable alternative. If the lead agency finds that the only practicable alternative requires siting in a floodplain, the agency shall either design or modify its action to minimize harm to or within the floodplain and publically explain why the action is proposed to be located in a floodplain.

EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, revises EO 11988 and establishes a flexible framework to increase resilience against flooding and help preserve the natural values of floodplains. This ensures that federal agencies expand management from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain to address current and future flood risk and ensure that projects funded with taxpayer dollars last as long as intended.

### *3.5.2 Affected Environment*

Floodplains

The designated frequency for floodplain identification used by the Federal Emergency Management Agency (FEMA) is the 100-year flood. Flood hazard areas are identified as a Special Flood Hazard Area, which is an area that would be inundated by a flood event having a

1 percent chance of being equaled or exceeded in any given year. The 1 percent annual chance of flood is also referred to as the base flood or 100-year flood. According to FEMA data, the entire project site is within Zone D, where flood hazards are undetermined but possible (FEMA 2015). A large portion of the NASA Property is situated on previously submerged land or marshlands that have been filled to their existing elevations (Tetra Tech EC, Inc. 2013). The project site lies between 8 and 12 feet above mean sea level (reference datum NAVD88).

Salt ponds previously owned by Cargill Salt Company and used for salt production are located to the north of the project area. The USFWS administers salt ponds as part of the Don Edwards San Francisco Bay National Wildlife Refuge. These ponds and salt marshes border the San Francisco Bay (NASA 2015). Wetlands and other waters of the U.S. are addressed below under Surface Water.

Groundwater

The project site lies within the Santa Clara Valley groundwater basin, which consists of 240 square miles of principal aquifers. According to NASA (2015), groundwater beneath the project site is encountered in four discrete aquifers (A, B, C, and Deep). Groundwater in both the “A” and “B” aquifers flows generally toward the north-northeast and discharges into San Francisco Bay. Ground water in “C” aquifer also flows northeast toward the San Francisco Bay but the horizontal hydraulic gradient is substantially less steep than in the “A” and “B” aquifers (NASA 2015).

The first-encountered (shallowest) groundwater in the project area is the “A” aquifer. Within the project area, the “A” aquifer water table varies from elevation -2 to +2 feet mean sea level (SES-TECH 2014). The depth to groundwater varies from 0 to 1 feet at the north end of the fuel dock pipeline to approximately 15 feet in the southern and western parts of the project area. The water table of the “A” aquifer seasonally varies on the order of 1 to 2 feet.

A plume of petroleum hydrocarbon fuel exists in the groundwater beneath the tank farm area (PRC Environmental Management 1996; SulTech 2009). Refer to Section 3.6.2 for more detail about the petroleum hydrocarbon plume.

Several plumes of dissolved VOCs consisting primarily of the chlorinated hydrocarbon solvent 1,1,1 trichloroethylene (TCE), exists in the groundwater beneath NASA ARC (EPA 2015b). The day tank pipeline crosses over a chlorinated solvent groundwater plume from Stations 11+00 to 21+00. (SES-TECH 2015.). Refer to Section 3.6.2 for more detail on the chlorinated solvent plume.

Groundwater is not used as a source of domestic (potable) or industrial water at the project site. Groundwater in the area is recognized as a potential future source of drinking water, and groundwater cleanup standards have therefore been established (EPA 2015b). Potable water is supplied by the San Francisco Public Utilities Commission, which obtains water from the Hetch Hetchy Reservoir in the Sierra Nevada.

### Surface Water

The eastern drainage system of the NASA Property encompasses approximately 1,000 acres, which includes the entire project site. The drainage system is not connected to the stormwater retention pond near the northwest corner of the airfield. Localized flooding occurs near the project site during peak rainfall events due to a lack of adequate drainage capacity (NASA 2015).

The USACE previously issued a jurisdictional determination for a portion of the wetland delineation study area in October 2009 (USACE File Number 2001-25926S). The 2009 jurisdictional determination has since expired. On February 29, 2016, a routine wetland delineation in the project area was conducted by WRA Inc. (2016) to determine the presence and extent of potential wetlands and nonwetland waters subject to federal jurisdiction under Section 404 of the CWA. The wetland report (Appendix H) concludes that 0.29 acre of wetlands and 0.18 acre of nonwetland potentially jurisdictional waters are in the project area (WRA Inc. 2016). These areas may be considered as jurisdictional under Section 404 of the CWA. Wetlands were dominated by hydrophytic vegetation with facultative (FAC), facultative wetland (FACW), and obligate wetland (OBL) classified plants and contained wetland soil and hydrology indicators. These areas are adjacent to “navigable waters of the U.S.” and therefore meet the definition of jurisdictional wetlands and non-wetland waters in Section 404 of the CWA. Waters of the U.S. observed within the study area are not subject to Section 10 jurisdiction under the Rivers and Harbors Act as the study area is not subject to tidal influence. Pipeline segments within the waters of the U.S. would be abandoned in place pursuant to State of California UST requirements, CCR Title 23, Division 3, Chapter 16, Article 7. The report in Appendix H presents the methods and results of the delineation and was submitted to USACE on March 28, 2016.

### Coastal Zone

The federal Coastal Zone Management Act of 1972 (16 U.S.C. §1451, *et seq.*) provides for management of the nation’s coastal resources and balances economic development with environmental conservation by preserving, protecting, developing, and where possible restoring or enhancing the nation’s coastal zone. The primary authorities for the California Coastal Management Program are the California Coastal Act, McAteer-Petris Act, and Suisun Marsh Preservation Act (National Oceanic and Atmospheric Administration [NOAA] 2015).

The California Coastal Commission (CCC) manages development along the California coast except in the San Francisco Bay region (CCC 2015). The San Francisco Bay Conservation and Development Commission (SFBCDC) oversees development within the coastal zone along San Francisco Bay. The SFBCDC is a 27-member commission that represents various interests in the Bay Area, including federal, state, regional and local governments and the public of the San Francisco Bay region (NOAA 2015). The coastal zone for the SFBCDC includes the open water, marshes, and mudflats of greater San Francisco Bay, and areas 100 feet inland from the line of highest tidal action. The boundary also includes the Suisun Marsh and buffer zone, managed wetlands diked from the bay, and open waters diked from the bay that are used for salt production (NOAA 2012). The SFBCDC's jurisdiction is delineated in the San Francisco Bay Plan (SFBCDC 2008), which labels the NASA Property as an "airport priority use area" requiring projects on this federally owned and operated facility to obtain a coastal consistency determination by the SFBCDC. Since it is a federal facility, no permit is required from the SFBCDC; however a coastal consistency determination is required. At the request of the SFBCDC, DLA submitted a coastal permit application and requested SFBCDC's concurrence with a coastal consistency determination on April 19, 2016 (Appendix B).

### *3.5.3 Environmental Consequences*

<u>Proposed Action</u>

Stormwater at the NASA Property is currently regulated under NPDES General Permit No. CAS000001 for Storm Water Discharges Associated with Industrial Activities (SFRWQCB, 2012). In accordance with this general permit, NASA prepared a site-specific SWPPP, *Storm Water Pollution Prevention Plan, NASA Ames Research Center* (NASA ARC 2015). NASA implements this industrial SWPPP, updates the SWPPP on a regular basis, and provides an annual report to the SFBRWQCB.

Construction projects that disturb 1 acre or more of soil or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (SWRCB 2010). The Construction General Permit requires project owners or the responsible party to submit a Notice of Intent to obtain a separate NPDES permit for demolition and excavation activities and to develop and implement a SWPPP. The Proposed Action would disturb more than 1 acre. Therefore, this project would enroll in and adhere to the Construction General Permit for both general demolition and excavation and linear demolition and excavation. The project would also require preparation of a project-specific SWPPP. Demolition and excavation would comply with the 2015 SWPPP and the project-specific SWPPP, both of which require BMPs to avoid potential flooding and erosion and to provide safe and efficient collection and control of stormwater at a site undergoing development.

<u>Surface Water</u>

DFSP Moffett Field is in a heavily developed area and in places surrounded by impervious surfaces. Closure activities would not occur in surface waters, and no materials would be stored or stockpiled in surface waters. Demolition would result in no direct impacts on surface water. Indirect impacts on surface waters would be avoided through implementation of a project-specific construction SWPPP, and applicable BMPs (refer to *Water Quality,* below).

<u>Groundwater</u>

Groundwater is likely to be encountered during the removal of underground pipelines and USTs. Under a dewatering permit, wells or sumps may be used to lower the water table a few feet below the impacted excavation area at the day tank area and the fuel farm area. This lowering of the water table would be temporary, and water levels affected by dewatering would return to normal levels when removal is completed. All groundwater encountered would be captured, sampled, and pretreated before discharge in accordance with the project-specific SWPPP (see *Water Quality,* below) or potential operation under the Dewatering General Permit for Fuels and VOCs.

<u>Water Quality</u>

Within the pipeline corridors, underground pipelines would be cleaned, abated, and removed by demolition and excavation where practical. After pipeline removal by demolition and excavation, the area would be filled using on-site soil supplemented by imported soil, as necessary, to restore the topography of areas to match the surrounding grade. In areas where demolition and excavation of pipelines would impact sensitive site features, underground pipelines would be closed in place, cleaned, and sealed at each end. The Proposed Action could generate pollutants, including sediment and other constituents associated with demolition (e.g., nutrients, trace metals, oil and grease, miscellaneous waste, other toxic chemicals). Without controls, the pollutants could potentially enter receiving waters; however, controls would be identified in the impact avoidance and minimization measures in a project-specific SWPPP.

Demolition and excavation activities associated with the project would disturb more than 1 acre of land and would thereby be subject to the requirements of the Construction General Permit. In compliance with the Construction General Permit (SWRCB 2010), a project-specific construction SWPPP would be prepared and applicable BMPs would be implemented to minimize the potential for pollutants to enter receiving waters during demolition. If soil or groundwater contamination is discovered during project closure, a site investigation and restoration project would be initiated post-closure under a separate action.

<u>Floodplains</u>

A portion of the project site is located in FEMA’s 100-year floodplain; however, no structures would be constructed and the project site would be restored to pregrading conditions once work is completed. The portions of the pipeline that are within sensitive resource areas would be abandoned in place, resulting in no impacts on floodplains.

#### *3.5.4 Impact Avoidance, Minimization and Mitigation Measures*

All applicable regulatory requirements would be followed, as discussed in the detailed Closure Plan (OTIE 2015). This includes the development of a construction SWPPP and implementation of BMPs to minimize the potential for stormwater discharges to have direct or indirect impacts on nearby water resources from increased erosion, sedimentation, urban runoff, or stormwater pollutants resulting from grading and earthwork. These BMPs would include implementing on-site filtration, installing silt fences during demolition and excavation to keep sediment in place, street sweeping, preserving natural drainageways, hydroseeding with a local native seed mix, and restricting the use of contaminants that might enter surface or groundwater supplies. In addition, the demolition contractor would operate under the NPDES General Construction

Stormwater Permit (SWRCB 2010) and would obtain a SWPPP that would meet the minimum requirements for waste discharge. Demolition and excavation would not occur within wetlands or waters of the U.S.

### *3.5.5 Summary*

Short-term demolition and excavation activities to remove USTs and pipelines would not be likely to result in a significant effect on hydrology and water resources. Although a portion of the site is in a floodplain, no structures would be constructed. Demolition would occur outside of wetlands and waters of the U.S. Impacts on groundwater and surface water would be avoided through implementation of the following Environmental Quality Plans under local, state, and federal regulations:

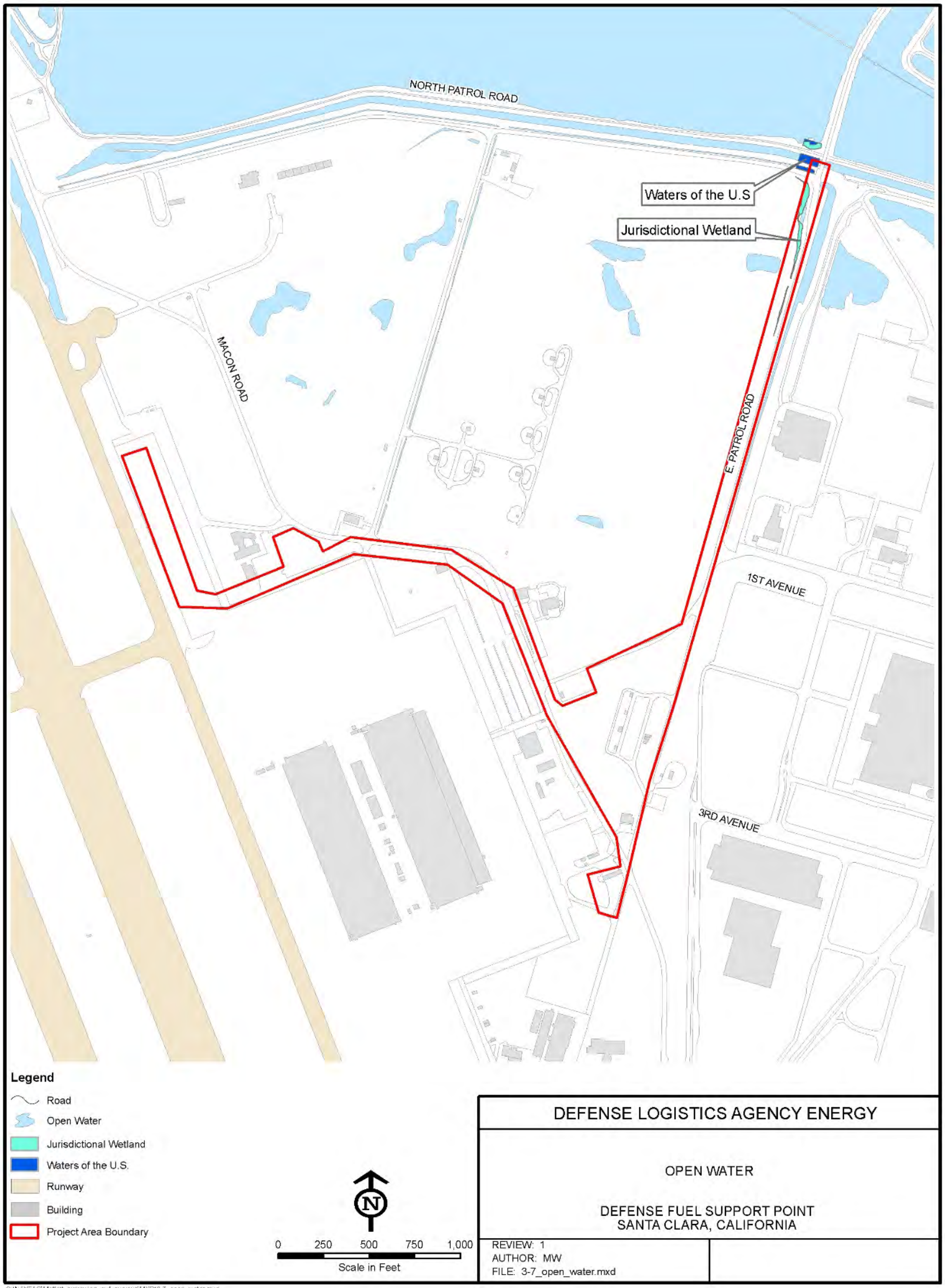
- 2015 SWPPP and project-specific construction SWPPP
- NPDES General Construction Permit (SWRCB 2010)
- Work Implementation Plan (WIP)
- Waste Management Plan (WMP)
- Sampling and Analysis Plan (SAP)
- Environmental Protection Plan (EPP)
- Quality Control Plan (QCP)
- Quality Assurance Surveillance Plan (QASP)

Each would have general and project-specific BMPs as discussed in the Closure Plan (OTIE 2015):

With implementation of BMPs from each of these plans, the Proposed Action would not result in a significant impact on hydrology or water resources.

<u>No Action Alternative</u>

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status.  No construction activities would occur under the current temporary closure status; therefore there would be no physical changes relative to existing conditions that could result in adverse impacts on hydrological resources.

1 


2 **Figure 3-7. Areas of Open Water**

## 3.6 Hazardous Materials and Wastes

### *3.6.1 Definition of Resource*

Hazardous materials are defined by 49 CFR 171.8 as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions" stated in 49 CFR 173. Transportation of hazardous materials is regulated by the U.S. Department of Transportation per 49 CFR 105-180.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include asbestos-containing material (ACM), polychlorinated biphenyls (PCBs), and lead-containing paint (LCP). The EPA is given authority to regulate these special hazard substances by the Toxic Substances Control Act (15 U.S.C. § 53). The EPA has established regulations regarding asbestos abatement and worker safety under 40 CFR 763 with additional regulations concerning emissions (40 CFR 61). Depending on the quantity or concentration of lead, whether from lead abatement or other activities, the disposal of lead-based-paint waste is potentially regulated by the Resource Conservation and Recovery Act (RCRA) at 40 CFR 260. The disposal of PCBs is addressed in 40 CFR 750 and 761.

### *3.6.2 Affected Environment*

The affected environment for hazardous materials and wastes is related to past and present hazardous materials and petroleum product storage and use; soil and groundwater contamination issues; and hazardous waste and petroleum waste disposal practices within the project area. Hazardous materials are defined as chemical substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, extremely hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. Hazardous materials may be found in the form of a solid, liquid, semisolid, or contained gaseous material that alone or in combination may (1) cause, or significantly contribute to, an increase in mortality or an increase in serous irreversible or incapacitating reversible illness or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

On a federal level, hazardous waste is regulated under RCRA, which provides the EPA with authority to control hazardous waste from "cradle to grave," including its generation, transportation, treatment, storage, and disposal. RCRA identifies hazardous sites with lists of specific wastes and categorizes wastes in accordance with RCRA-specific characteristics and definitions (e.g., ignitable, corrosive, reactive, toxic). The EPA uses the term "hazardous substance" for chemicals that, if released into the environment above a certain amount, must be reported and, depending on the threat to the environment. In this occurs, federal involvement in handling the incident can be authorized under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Petroleum products are those substances included within the petroleum exclusion to CERCLA, as interpreted by the courts and the EPA, including crude oil or any fraction thereof that is not otherwise listed or designated as a hazardous substance, such as gasoline, kerosene, diesel oil, jet fuels, and fuel oil. Natural gas, natural gas liquids, and synthetic gas usable for fuel are also considered petroleum products.

Cleanup of releases exclusively composed of petroleum products is conducted under RCRA or RCRA-based state laws and regulations. On a state level, the California Hazardous Waste Control Law (HWCL), codified in Title 22, Chapter 6.5 of the CCR, is the basic hazardous waste regulation in the state. The HWCL implements the RCRA waste management system in California and specifies that generators have the primary duty to determine whether their wastes are hazardous and to ensure its proper management and disposal. The Department of Toxic Substances Control is the state agency primarily responsible for enforcing the HWCL. In 1992, California was granted authorization by the EPA to also enforce the RCRA hazardous waste laws and regulations.

<u>Hazardous Building Materials: Asbestos in Structures and Buildings, and Lead-Containing Paint</u>

Asbestos is regulated both as a hazardous air pollutant under CAA regulations and as a potential worker safety hazard under the authority of the California Department of Occupational Safety and Health Administration (Cal/OSHA). These regulations prohibit emissions of asbestos from asbestos-related manufacturing, demolition, or construction activities; require medical examinations and monitoring of employees engaged in activities that could disturb buildings with ACM; specify precautions and safe work practices that must be followed to minimize the potential for release of asbestos fibers; and require notice to federal and local government agencies before beginning renovation or demolition that could disturb ACMs. The agencies with primary responsibility for asbestos safety are the BAAQMD, Cal/OSHA, Occupational Safety and Health Administration (OSHA), and the EPA.

Federal, state, and local laws and regulations govern handling of building materials that have LCP. OSHA Lead Construction Standards establish a maximum safe exposure level for the following types of construction work where lead exposure may occur: demolition or salvage of structures where lead or materials containing lead are present; removal or encapsulation of materials containing lead; and new construction, alteration, repair, or renovation of structures or materials containing lead. Intact paint on metal may be sent to a salvage or recycling operation. Scrap metal may be sent to a recycler as long as the loose, flaking paint is first removed or stabilized.

The age of the fuel facility’s construction suggests that there is a potential to encounter hazardous building materials such as LCP coatings and ACM in gaskets, pipe wraps, wiring insulation, roofing material, calking/joint compound, or other materials. Thus, it is reasonable to assume workers may encounter materials of potential concern in the course of disassembly and demolition.

A California Certified Asbestos Consultant and California Department of Public Health-certified lead inspector/assessor, project monitor, and project designer conducted an inspection for asbestos and lead paint in the accessible above ground and vault elements of DFSP areas and corridors. The inspection (SES 2015) included the visual inspection and sampling of manufactured building materials to identify ACMs and lead-containing materials or lead-containing paints prior to removal of the identified fuel storage and transfer elements of the former DFSP.

The inspection identified a number of building materials with concentrations of asbestos of 1 percent or greater, including: caulks, gaskets, and cement pipe sleeves at the fuel farm and day tank areas; gaskets in the pipeline and fuel hydrant areas; window glazes, gaskets, tar/felt pipe wrappings, and floor tile/mastics at the truck loading facility area; and cement pipe sleeves at the truck loading facility area. The inspection also identified a number of coatings with LCP (SES 2015). The final report with findings (SES 2015) is included as an appendix in the Closure Plan (OTIE 2015).

Superfund Sites

The project site partially lies within an 8-square-mile study area known as the Middlefield-Ellis-Whisman (MEW) site. The MEW site consists of three Superfund sites that were former semiconductor and other electronic manufacturing and metal finishing facilities. In the early 1980s, soil and groundwater analyses confirmed the presence of more than 70 chemicals, including TCE and 1,1,1-trichloroethane (TCA) (U.S. Army Reserve 2006). In compliance with a consent decree and Unilateral Administrative Order, each MEW company operates and maintains groundwater control measures to contain and clean up any contamination it has caused at the MEW site.

As stated in Section 3.5.2, plumes of dissolved VOCs, consisting primarily of chlorinated hydrocarbon solvents TCE and cis-1,2-dichloroethylene (DCE), exists in the groundwater beneath NASA ARC (EPA 2015b). One of these plumes is known as Site 26 and is being remediated by the U.S. Navy pursuant to the Operable Unit 5 Record of Decision (1996, amended 2014) (SES-TECH 2014). The day tank pipeline crosses over a chlorinated solvent groundwater plume at the following locations (SES-TECH 2014):

- Stations 9+00 to 15+00, with the primary groundwater contaminant being TCE having maximum groundwater concentration less than 20 micrograms per liter

- Stations 18+00 to 19+00, with the primary groundwater contaminant being DCE having maximum groundwater concentration less than 20 micrograms per liter

Planned excavations from Stations 9+00 to 19+00 of the day tank pipeline are not expected to be deep enough to encounter groundwater; however, there is a potential to encounter TCE and DCE in soil in that area.

Through a federal facilities compliance agreement, the Navy and NASA operate separate groundwater treatment systems to address their portions of the contamination plume. The Navy and MEW companies began groundwater treatment in 1998, while NASA's groundwater treatment operations began in 2001 (USACE 2005). An EPA review determined that soil and groundwater remediation were functioning as intended, requirements for soil cleanup were met, and groundwater remediation had reduced contaminant concentration throughout the plume. Groundwater cleanup would continue in order to meet existing groundwater cleanup standards (U.S. Army Reserve 2006). This remediation effort is not associated with the Proposed Action nor is it analyzed under this EA.

Groundwater is not used as a source of domestic (potable) or industrial water at the project site.

Petroleum Hydrocarbons

The storage and handling of petroleum fuel products at DFSP had the potential to release petroleum products to soil and groundwater, if there were leaks in fuel storage and handling systems. Releases from the bulk fuel storage tanks due to tank leaks were unlikely; the tanks were subject to tracer testing and were found sound. Quarterly monitoring of USTs and pipelines was performed by Tracer Research starting in 1998 (OTIE 2015). Tracer Research sampling points were located approximately every 23 feet along the underground pipelines. Sample points were also located around the five USTs at depths of 4 and 10 feet. Sample points were monitored quarterly, and monitoring reports were submitted to HMCD. However, a number of petroleum releases from DFSP Moffett Field fuel system elements have been documented during operation by the Navy.

**Fuel farm area (Figure A-12, Appendix A).** There is little recent soil and groundwater data from the fuel farm area, but substantial groundwater investigation data are available from the 1990s. The older data indicate that petroleum releases occurred at the fuel farm area; therefore petroleum hydrocarbon contamination could be encountered in soil and groundwater at the fuel farm area.

In 1988 JP-5 was released when UST 139 was overfilled (Erler and Kalinowski Inc. 2015). According to base personnel, approximately 5,000 gallons of JP-5 fuel were released and flowed onto the field north and west of the tank. Approximately 2,400 gallons of fuel were recovered.

Separate-phase petroleum (free product) was documented floating on the water table at the fuel farm, based on observation of wells installed in 1991. Separate-phase petroleum was observed in wells FP5-7, 5-8 and 5-9 at the time of their construction in 1991, but separate-phase petroleum was not observed in subsequent sampling events ((PRC Environmental Management 1996; SulTech 2009). The total petroleum hydrocarbons (TPH) for Well FP5-1 consisted of kerosene concentration of 2,000,000 micrograms per liter in 1993. Sampling of these wells appears to have ceased in 1995.

In 2009 the Navy completed an investigation of petroleum contamination in groundwater in a subsurface gravel channel deposit downgradient north of the fuel farm area (SulTech 2009). Historical releases from the storage tanks were the likely source of the contamination in the channel deposit.

Grab groundwater samples were collected from 17 locations using direct-push sampling technology. The samples were analyzed for TPH, and the data were used to select locations for monitoring wells. Two monitoring wells were installed, and groundwater samples were collected for four consecutive quarters.

Analysis of groundwater samples from the monitoring wells indicates that groundwater within the subsurface channel was contaminated with trace levels of TPH. Four quarters of groundwater sampling from the downgradient well indicated the residual petroleum plume was stable. Detected concentrations of TPH in the channel were less than the default environmental screening levels developed by the SFBRWQCB; therefore, the Navy found that petroleum in the groundwater within this channel deposit should not present a risk to current or future potential receptors at the site, and the Navy proposed no action to address the remaining TPH in groundwater within this channel deposit.

In summary, excavation and dewatering activities at the fuel farm have the potential to encounter petroleum hydrocarbon contamination in soil and groundwater.

**Day tank area (Figure A-9, Appendix A).** There is no documentation of releases of petroleum hydrocarbons from UST 253 or related fuel filters and pumps. The only known subsurface sampling of soil and groundwater at the day tank area took place from 1995 to 1997 and related to the removal of UST 17 from the southwestern portion of the day tank area. The maximum concentrations of petroleum constituents observed at UST 17 were 1,700 milligrams per kilogram TPH-extractable in soil and 56 milligrams per liter of TPH-gasoline in groundwater. The SFBRWQCB granted the UST site “no further action required” status.

#### *3.6.3 Environmental Consequences*

<u>Proposed Action</u>

Implementation of the Proposed Action would result in the removal of USTs and associated infrastructure. Given the predemolition survey results (SES 2015) and age of the facility it is certain that ACM will be encountered in building materials. An Abatement Plan would be developed and would be included in the Work Implementation Plans. ACM would be abated and disposed of per that plan.

Given the predemolition survey results (SES 2015) and age of the facility it is certain that lead is in the paint coatings. An Abatement Plan would be developed and would be included in the Work Implementation Plans, and lead would be abated and disposed of per the plan. Scrap metal that has lead in paint coatings may be sent to a recycler as long as the loose, flaking paint is first stabilized or removed. Intact lead paint on metal may be sent out for salvage or recycling.

Due to the age of the facility, PCBs may be encountered in oil-filled electrical equipment, such as the transformers at the fuel farm and the day tank area. A predemolition and excavation survey would be completed to identify PCBs. If PCBs are identified, an Abatement Plan would be prepared and PCB-contaminated oil and electrical equipment carcasses would be removed and disposed of per plan.

Soil and groundwater within the work site could potentially be contaminated due to historical fuel releases. Petroleum-contaminated soil and groundwater may be encountered when removing the USTs and pipelines. The Closure Plan (OTIE 2015) and subsequent work implementation plans would provide specific guidance for handling petroleum-contaminated soil and groundwater, ensuring that they are monitored during demolition and excavation. Under this guidance, contaminated media would be properly handled during demolition and excavation, ensuring worker exposure is minimized.

It is estimated that up to 3,210 tons of petroleum-contaminated soil might be encountered. The contaminated soil would be excavated and transported to the Altamont Landfill in Livermore, California. An estimated 2,023 tons of scrap steel would be transported to the Schnitzer-Oakland Scrap Metal Yard in Oakland, California. Concrete and asphaltic concrete debris would be transported to the Vulcan Materials Company in Pleasanton, California. All hazardous materials and wastes would be handled, stored, transported, and disposed of in accordance with applicable Installation policies, NASA and DLA regulations, and local, state, and federal laws described in detail in the Closure Plan (OTIE 2015). DLA would monitor these activities in accordance with the NASA and DLA regulations for handling and disposing of hazardous materials.

Appendix D describes Work Implementation Plans that would be prepared to guide the removal and management of hazardous materials, minimize worker exposure, ensure no release to environment, and ensure proper transportation and disposal of hazardous materials. Hazardous materials and waste impacts are primarily related to the health and safety of workers. Hazardous materials and waste impacts would be considered significant in the event that workers would be exposed to contaminated soil, petroleum products, petroleum waste, ACMs, LBP, PCBs, or other hazardous waste. Impacts from hazardous materials and waste would be considered significant if the project would damage or destroy active and necessary monitoring wells, remediation wells, or aboveground remediation infrastructure.

No significant impacts are expected to result from the use, storage, or disposal of hazardous materials associated with the Proposed Action.

#### *3.6.4 Impact Avoidance, Minimization and Mitigation Measures*

Contamination may be present in soils removed to expose foundations and underground pipelines. In the absence of proper controls, the exposure of on-site workers to contaminated soil could result in adverse health and safety impacts. However, the potential for adverse impacts would be addressed by the identified impact avoidance and minimization measures in the Closure Plan (OTIE 2015), the WIP, WMP, SAP, EPP, QCP, QASP, Health and Safety Plan (HSP), and Accident Prevention Plan (APP). Should additional soil or groundwater contamination be found during closure, a site investigation and restoration project would be initiated and would be assessed and remediated under a separate action.

Potentially contaminated soil would be segregated from clean soil and would be stockpiled and sampled to characterize the soil for proper disposal. Petroleum-contaminated soil would be disposed of at an appropriately licensed facility, with selection of the disposal facility based on characterization results.

Personnel involved in demolition and excavation activities that handle soil and groundwater would be required to have OSHA Hazardous Waste Operations and Emergency Response training in handling hazardous materials and wastes. All personnel would be informed of potential and likely hazards, and a HSP would be developed by the demolition and excavation contractor.

Impact avoidance and minimization measures associated with hazardous materials and wastes are listed in Appendix D and the Closure Plan (OTIE 2015).

<u>Summary</u>

Under the Proposed Action, all infrastructure would be closed, removed, and/or abandoned in place in accordance with applicable regulations. Proposed activities could encounter contamination; however, implementation of the identified impact avoidance and minimization measures in the Closure Plan (OTIE 2015), in conjunction with compliance with all applicable legal requirements, should prevent risk of human exposure to contamination. Following closure, there would be no potential for inadvertent releases of petroleum or hazardous materials as no fuel would be stored or transferred to or from DFSP Moffett Field. (Site assessments and remediation activities would follow UST removal, if necessary and if required by regulatory authorities, under a separate action from this project.) Proposed activities would proceed in accordance with the Closure Plan (OTIE 2015) and the following Environmental Quality Plans: WIP, WMP, SAP, EPP, QCP and QASP, as well as a HSP and APP. With implementation of BMPs from each of these overlapping requirements it is expected that the Proposed Action would not result in a significant impact related to hazardous materials and wastes.

<u>No Action Alternative</u>

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status.  No construction activities would occur under the current temporary closure status; therefore there would be no physical changes relative to existing conditions that could result in adverse impacts from hazardous materials and waste.

## 3.7 Noise

### *3.7.1 Definition of Resource*

The EPA defines noise as an “unwanted or disturbing sound.” Sound becomes unwanted when it either interferes with normal activities, such as sleeping or conversation, or it disrupts or diminishes one’s quality of life (EPA 2015a). The degree to which noise becomes disruptive depends on the way it is perceived by the receptors (people) living or working in the affected area.

### *3.7.2 Affected Environment*

The physical characteristics of noise include its level, frequency, and duration. Noise is measured in decibels (dB) with zero dB being the least perceptible sound to more than 130 dB, the level at which noise becomes a health hazard. Because the human ear is more sensitive to certain ranges of the sound spectrum, a weighted scale has been developed to more accurately reflect what the human ear perceives. These measurements are adjusted into units known as A-weighted decibels.

The NASA Procedural Requirement (NPR) Health Standard on Hearing Conservation (NPR 1800.1C) establishes minimum requirements for NASA’s agencywide Hearing Conservation Program. The NASA Hearing Conservation Policy aims to prevent occupational hearing loss by controlling noises generated by NASA. The exposure limits set by the policy can be found in Table 3-6.

**Table 3-6. Exposure Limits for Noise According to NASA's Hearing Conservation Program**

| Duration (Hours) | dBA |
|---|---|
| 16 | 82 |
| 8 | 85 |
| 4 | 88 |
| 2 | 91 |

Source: NASA 2015
**dBA** – A-weighted decibels

Sensitive Noise Receptors

Locations or land uses with receptors who may be sensitive to elevated noise levels typically include residential and recreational areas and public services. These sensitive noise receptors may experience sensitivity to noise generated by human activities such as demolition and excavation. The only sensitive noise receptors adjacent to or near the project area are in the western portion of DFSP Moffett Field at the NASA ARC Child Care Center, more than 7,500 feet from the nearest point of the project site (Figure 3-8).

Ambient noise is presently generated at the project site by activities not related to DFSP operations, as the facility is inactive. The area surrounding the project site includes aircraft operations, which temporarily generate hazardous noise levels. The surrounding community contributes a variety of off-site noise sources. Major sources include traffic along U.S. Highway 101 and State Route 85 (NASA 2015) and additional traffic noise on Macon Road and East Patrol Road. Additional off-site noises are mainly associated with NASA ARC (NASA 2015). Nearby NASA operations that cause noise include the following:

- National Full-Scale Aerodynamics Complex wind tunnels (40-by-80-foot wind tunnel and 80-by-120-foot wind tunnel)
- Unitary Plan wind tunnels (11-by-11-foot wind tunnel, 9-by-7-foot wind tunnel, and 8-by-7-foot wind tunnel)
- Arc jets at the Ames Arc Jet Complex
- Outdoor Aerodynamic Research Facility
- MFA airstrip

A discussion regarding noise levels potentially generated from other projects at the NASA Property that may occur during implementation of the DFSP Moffett Field closure is provided in Section 4.3.7, *Noise.*


**Figure 3-8. Nearest Sensitive Noise Receptors**

### *3.7.3 Environmental Consequences*

Proposed Action

The Proposed Action would be expected to generate demolition-related noise. A significant noise impact would occur if the proposed demolition and/or equipment operations were to result in a substantial increase in noise that would be (1) noticeably distinct from ambient conditions for sensitive receptors surrounding the project area and (2) either extreme (if short-term or intermittent) or continuous. To evaluate the level of potential impact, a qualitative analysis was performed that considered the noise generated by demolition equipment; the attenuation of noise over distances; and the reduction in noise caused by obstructions (e.g., topography, buildings) that lie between the noise source.

Proposed demolition equipment would include a crane, backhoes, bulldozers, excavators, loaders, dump trucks, pickup trucks, generators, air compressors, saws, welding equipment, and miscellaneous small equipment listed in Appendix F. Table 3-7 presents the noise levels associated with the operation of representative demolition equipment at a distance of 50 feet.

**Table 3-7. Estimated Demolition Equipment Noise Levels**

| Equipment Type | Estimated Noise Level at 50 Feet (dB) |
|---|---|
| Air Compressor | 81 |
| Backhoe | 80 |
| Compactor | 85 |
| Concrete Saw | 90 |
| Crane (mobile) | 83 |
| Bulldozer | 85 |
| Generator | 81 |
| Grader | 85 |
| Jackhammer | 88 to 90 |
| Loader | 85 |
| Pump | 76 |
| Scraper | 89 |
| Truck (heavy) | 88 |
| Welding Torch | 74 |
| Sheers | 90 |

Source: Federal Highway Administration 2006
**dB** – decibel

The highest known noise levels on the site, at or near 90 dB at 15 feet, are expected to be produced by hydraulic hammers,[1] which are jackhammers attached to backhoes that are used to demolish concrete. The second loudest noise generator (at or near 90 dB at 15 feet) would likely be equipment with a shear attachment.[2] The shears would cut through metal elements (e.g., plate steel, steel columns, steel ribs) of USTs. Shearing would be done to dismantle the tanks and size the steel for transport.

Demolition activities would occur more than 7,500 feet from the NASA ARC Child Care Center (Figure 3-8). Temporary noise associated with demolition would range from approximately 74 to 90 dB at 50 feet from the source. Equipment noise from demolition and excavation is usually considered to be a point source, with attenuation at a rate of 6 dB per doubling of distance. The noise levels would therefore dissipate to nearly imperceptible levels (above ambient levels) at the Child Care Center due to the intervening distance and attenuation from noise barriers such as Hangars 2 and 3 to the west of the fuel farm. During demolition, the overall noise from the site would typically be dominated by the three or four loudest noise generators among the equipment in use at the time.

All demolition would be done in an incremental and methodical manner; no explosions or instantaneous complete structure demolition (implosions) would occur. Demolition and excavation equipment and vehicles would be used during the demolition and excavation phase; however, that operation of equipment would limited to 7:00 a.m. to 6:00 p.m. Monday through Friday. In addition, BMPs such as placing mufflers on equipment would be used to reduce public exposure to noise at nearby facilities, the Moffett Field Golf Club and Lockheed-Martin office complex. The Moffett Field Golf Club is adjacent to the north and west of portions of the project site. The Lockheed-Martin office complex is approximately 800 feet to the east of the USTs and directly adjacent to a portion of the underground pipeline that runs along East Patrol Road.

Noise from closure activities would be limited to the working hours of the demolition crews and machinery; outside of working hours, noise levels would return to the normal ambient levels for existing conditions, reflective of the industrial area. Once demolition and excavation are complete, the Proposed Action would result in no significant noise impacts.

#### *3.7.4 Impact Avoidance, Minimization and Mitigation Measures*

The impact avoidance and minimization measures associated with potential noise impacts are listed in Appendix D. The Proposed Action would comply with the noise requirements discussed in the NASA ARC Environmental Resources Document (NASA 2015).

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[1] For more information regarding hydraulic hammer specifications, refer to the product website at http://www.cat.com/en_US/products/new/attachments/hammers.html.

[2] For more information regarding shear attachment specifications, refer to the product website at http://www.cat.com/en_US/products/new/attachments/shears.html.

### *3.7.5 Summary*

Noise associated with demolition activities would range from approximately 74 to 90 dB at 50 feet but would decrease with the distance from the source. The surrounding topography and buildings would shield sensitive noise receptors from demolition noise. The airfield and Hangars 2 and 3 lie between most noise-generating equipment at the work site and the Child Care Center, attenuating the noise to nearly imperceptible levels above the ambient noise associated with daily airfield use. No post-closure vehicle or equipment noise would be generated. Noise generated from the excavation/demolition would be intermittent and short term. Therefore, the implementation of the Proposed Action is not likely to have a significant impact to sensitive noise receptors.

<u>No Action Alternative</u>

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status. No construction activities would occur under the current temporary closure status; therefore there would be no physical changes relative to existing conditions that could result in an adverse noise impact.

## 3.8 Transportation and Circulation

### *3.8.1 Definition of Resource*

For the purposes of this analysis, transportation refers to the movement of traffic (i.e., passenger vehicles and trucks) on public and private roadways. Roadway operating conditions are described in terms of Level of Service (LOS) ratings, which have been developed by the Transportation Research Board. LOS is a qualitative measure that describes the operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. LOS is rated on a scale of A to F, with LOS A reflecting free-flowing traffic conditions and LOS F representing heavily congested conditions (Transportation Research Board of the National Academies 2010). Generally, LOS C or better is considered an acceptable operating condition during peak traffic periods in more rural contexts, while LOS D is considered to be adequate in urbanized areas such as DFSP Moffett Field.

### *3.8.2 Affected Environment*

The project site is accessible from U.S. Highway 101 via either the Moffett Boulevard exit and the main gate at Ellis Street or the Ellis Street exit to the main gate. The access road to the site, Macon Road, leads to the south end of the project site and extends northward until the road splits into Zook Road and East Patrol Road. U.S. Highway 101 runs east-west to the south of the project site and on the east edge of the peninsula, extending from northern California through San Francisco, southward past San Jose, and on to southern California. State Route 85 is a north-south highway that begins at U.S. Highway 101 just west of the NASA Property and continues to the southeast where it rejoins U.S. Highway 101 in south San Jose. State Route

237 is an east-west highway that intersects with U.S. Highway 101 near the southeast corner of NASA ARC (NASA 2015) and extends eastward to Milpitas where it connects with Interstate 880 (Figure 3-9; Figure A-20, Appendix A).

The Santa Clara Valley Transportation Authority (SCVTA) implements the County's Congestion Management Program, which includes monitoring selected expressways and regional arterials to determine whether Deficiency Plans are needed to reduce overall congestion. Table 3-8 lists the LOS conditions in 2012 for selected intersections within 1 mile of the main entrance to the site, the Ellis Gate (Fehr and Peers 2013; SCVTA 2012, 2015). Those intersections are in Mountain View, where the NASA Property is located, and represent current traffic conditions.

**Table 3-8. Level of Service Conditions for Selected Intersections in Mountain View**

| Intersection | Peak Hours | Delay (in minutes) | Level of Service |
|---|---|---|---|
| Ellis Street and U.S. Highway 101 North | AM | 16.0 | B |
| | PM | 17.7 | B |
| Ellis Street and U.S. Highway 101 South | AM | 14.9 | B |
| | PM | 11.2 | B+ |
| Ellis Street and Fairchild Drive | AM | 11.8 | B+ |
| | PM | 19.6 | B |
| Maude Avenue and Clyde Avenue | AM | 9.0 | A |
| | PM | 8.8 | A |
| Maude Avenue and SR 237 | AM | 19.7 | B- |
| | PM | 21.5 | C+ |
| East Middlefield Road and North Whisman Road | AM | 14.7 | B |
| | PM | 16.3 | B |
| East Middlefield Road and Ellis Street | AM | 13.0 | B |
| | PM | 14.4 | B |
| East Middlefield Road and Logue Avenue | AM | 11.6 | B+ |
| | PM | 13.9 | B |
| East Middlefield Road and SR 237 Westbound Ramps | AM | 17.5 | B |
| | PM | 14.8 | B |
| East Middlefield Road and SR 237 Eastbound Ramps | AM | 15.1 | B |
| | PM | 12.9 | B |
| East Middlefield Road and Bernardo Avenue | AM | 10.7 | B+ |
| | PM | 13.6 | B |
| Evelyn Avenue and Mary Avenue | AM | 79.4 | E- |
| | PM | 50.5 | D |
| Whisman Road and Whisman Station Drive | AM | 17.6 | C |
| | PM | 13.7 | B |

| Intersection | Peak Hours | Delay (in minutes) | Level of Service |
|---|---|---|---|
| Whisman Road and Central Expressway | AM | 17.5 | B |
| | PM | 19.4 | B |
| Mary Avenue and Central Expressway | AM | 44.3 | D |
| | PM | 46.0 | D |
| National Avenue and Fairchild Drive (unsignalized intersection) | AM | 5.8 | A |
| | PM | 6.3 | A |

Sources: Fehr and Peers 2013, SCVTA 2012, 2015
**U.S.** – United States; **SR** – State Route

Demolition and excavation vehicles would be expected to use the Ellis Street entrance, most likely entering and leaving from the Ellis Street gate. The California Department of Transportation Traffic and Vehicle and Data Systems Unit collects traffic counts for the state highway system. The annual average daily traffic [AADT] counts are summarized annually in a publication entitled Traffic Volumes on California Highways. In 2013, 174,000 average daily traffic were made southbound and 175,000 vehicle trips were made northbound along U.S. Highway 101, near the NASA Property at Ellis Street. The hourly peak volume was 12,800 southbound (back AADT) and 12,900 northbound (ahead AADT) (California Department of Transportation 2013).

### *3.8.3 Environmental Consequences*

Proposed Action

Closure-related activities are estimated to generate less than 25.7 average daily trips, or 2,464 total trips for the duration of UST removal. Traffic would include transportation of demolition- and excavation-related workers to and from the site. In addition, there would be miscellaneous traffic from the trucks used to drop off or pick up equipment and those used to export excavated USTs, piping, and potentially contaminated soil; and import fill soil. The petroleum-contaminated soil would be transported to the Altamont Landfill in Livermore, California. The scrap steel would be transported to the Schnitzer-Oakland Scrap Metal Yard in Oakland, California, and concrete and asphaltic concrete debris would be transported to the Vulcan Materials Company in Pleasanton, California. An estimated 3,717 CY of soil would be imported from the Vulcan Materials Company.

The most direct route to the project site for demolition- and excavation-related traffic to use is the on-ramp/exit ramp to and from Highway 101 at Ellis Street (Figures A-3-9 and A-20, Appendix A). The ramps currently operate at LOS B to C (Fehr and Peers 2013; SCVTA 2012, 2015). Project vehicles would use Ellis Street entering and leaving from the Ellis Street gate. Considering the relatively small increase in traffic generated by demolition and excavation (25.7 average daily trips), impacts on transportation and circulation on the NASA Property and its vicinity are expected to be less than significant; however, employees assigned around the project site and customers of the golf course may experience minor delays during the demolition and excavation phase of DFSP Moffett Field closure on weekdays. Demolition and excavation traffic would include workers arriving and departing for the day, as well as demolition and excavation vehicles bringing supplies and equipment and removing debris. This additional traffic would cease once closure-related activities are complete. Traffic impacts are expected to be short-term and less than significant.

#### *3.8.4 Impact Avoidance, Minimization and Mitigation Measures*

Before demolition and excavation activities commence, a TCP would be developed to minimize impacts on internal circulation near the project site. The TCP would illustrate the transportation and hauling routes to and from the work site, contain maps of all areas likely to disrupt traffic flow, and illustrate detour routes, signage, sign placement, and/or use of worker signs. See Appendix D.

#### *3.8.5 Summary*

The Proposed Action activities would generate approximately 25.7 average daily trips between August 2016 and February 2017. This temporary increase in daily trips would not result in unacceptable operating conditions during peak traffic periods. This is because the bulk of additional truck trips would not occur at that time and because a TCP would be implemented. Following the closure of DFSP Moffett Field, no additional traffic would result; therefore, implementation of the Proposed Action would have a temporary and direct but less than significant impact on transportation and circulation.

<u>No Action Alternative</u>

The No Action Alternative would leave the DFSP Moffett Field facilities in their current temporary closure/caretaker status.  No demolition and excavation activities would occur under the current temporary closure status; therefore there would be no physical changes relative to existing conditions that could result in adverse impacts on traffic and circulation.

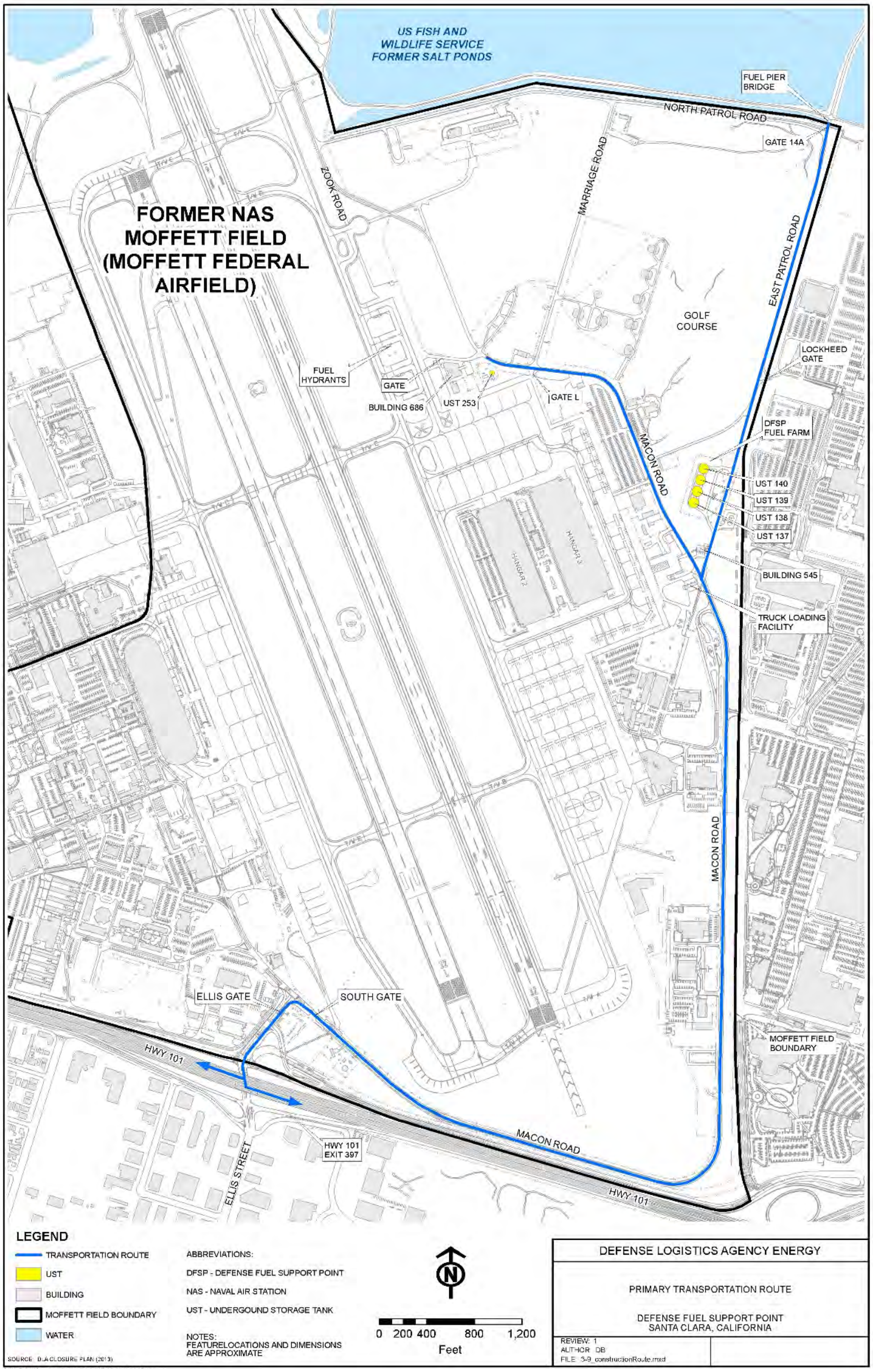


**Figure** 3-9**. Route to DFSP Moffett Field from U.S. Highway 101**


1

2 **Figure 3-100. Level of Service**

# 4.0 CUMULATIVE IMPACT ANALYSIS

The CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR 1500-1508). A cumulative effect is defined as the following (40 CFR 1508.7):

> …the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, State, or community goals to determine whether the total effect is significant" (CEQ 1997). The first step in assessing cumulative effects involves identifying and defining the scope of other actions and their interrelationship with a Proposed Action or alternatives. The scope must consider other projects that coincide with the location and timeline of a Proposed Action and other actions. Section 4.2.1 identifies the projects considered for the cumulative analysis. Section 4.3 provides an analysis of cumulative impacts for each of the environmental resources discussed in this EA.

## 4.1 Methodology

### *4.1.1 Geographic Scope of the Cumulative Effects*

The ROI of cumulative effects for each resource area was established for this EA based on the natural boundaries of the resources affected, rather than jurisdictional boundaries. Although the cumulative analysis focuses primarily on projects within the NASA Property, the ROI differs for each resource area issue. In cases where the Proposed Action was determined not to have a direct or indirect effect on a resource, no cumulative effects analysis was conducted. ROIs are defined in Section 4.3 for each resource area.

### *4.1.2 Time Frame of the Cumulative Effects Analysis*

The temporal period for each cumulative analysis varies by resource. Each project in a region has its own implementation schedule, which may or may not coincide or overlap with the schedule for implementing the Proposed Action. Past actions include projects that have been approved and/or permitted or have started construction. Past actions also include projects that have been completed. Present actions are projects that are under construction or implementation at the time of the analysis in this EA. Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, recent approvals, or permitting but have not yet started construction/implementation. More importantly, these actions are all limited to those within the designated geographic scope and time frame. This analysis does not evaluate speculative future actions that are merely possible, but rather those that are highly probable based on the information available at the time of this analysis. Projects are considered speculative if there is insufficient or no information is known about them or substantial uncertainty exists regarding the project.

## 4.2 Past, Present, Reasonably Foreseeable Future Actions Considered for Potential Cumulative Effects

The descriptions of past, present, and reasonably foreseeable future actions within the NASA Property and the potentially affected vicinity are briefly described in this section. For the purposes of this analysis, the period considered is the one associated with Proposed Action: Demolition and excavation are expected to begin in June 2016 and to be completed in September 2016. The spatial area of consideration for potential cumulative effects varies by resource area. The cumulative effects analysis of most of the resource areas focuses on projects within the boundaries of the NASA Property but considers numerous projects. The analysis also includes cumulative effects on the cities of Mountain View and Sunnyvale that could affect common resource areas such as air quality and traffic and circulation. The geographic distribution, intensity, duration, and historical effects of similar activities are considered when determining whether a particular activity might contribute cumulatively to the impacts of the Proposed Action on the resources identified in this EA.

### *4.2.1 Projects Considered for Potential Cumulative Effects*

Construction projects (not related to the Proposed Action) within the NASA Property and projects within 5 miles of DFSP Moffett Field in the communities of Mountain View and Sunnyvale were considered for potential cumulative effects (Tables J-1 and J-2, Appendix I). Those projects were initially considered for potential effects in combination with potential impacts resulting from the Proposed Action. However, it was determined that several proposed projects were in the design or preapproval stage and would not likely be under construction between June and September 2016, greatly reducing, or eliminating the potential for a cumulative impact on most, if not all resource areas. Conversely, the projects listed below are scheduled to be under construction at the same time as the excavation and demolition activities associated with the closure of DFSP Moffett Field. Each project is also within 5 miles of DFSP Moffett Field. These projects were therefore determined to have an increased potential for contributing cumulatively to impacts on the resources in the affected environment for DFSP Moffett Field, and potentially within the ROI of each resource area.

<u>Within the NASA Property</u>

In 2001, NASA ARC developed a Programmatic EIS to assess the impacts of numerous projects, including renovation of Hangars 1, 2, and 3 and construction of a security forces building. On November 20, 2002, NASA ARC prepared the NASA Ames Development Plan and the associated Final Programmatic EIS and adopted a Record of Decision authorizing the redevelopment of the former NAS Moffett Field. The following four projects within the NASA Property have been selected for cumulative analysis.

**NASA Project FC78.** Hangar 1 reskin and remediation (Project FC78, Figure J-1). The estimated construction period for Hangar 1 will be from May 1, 2016, to November 1, 2020.

**NASA Project FC79.** Hangars 2 and 3 remediation and structural renovation (Project FC79, Figure J-1). Construction began on December 1, 2015; the project is estimated to be completed by April 1, 2018.

**US-MFT-XXX, Moffett Field, Project FF65**. Security forces building (Project FF65, Figure J-1). This project includes construction of a 3,285-square-foot security forces building (Building 653) on East Patrol Road. Work began on April 1, 2016, and is estimated to be completed on April 1, 2019.

**CANG Project 3**. QMSN 019029 (Project 3, Figure J-1). This project includes construction of a new 54,780-square-foot facility to consolidate the location of airborne pararescue mission services. Construction began on January 11, 2016, and is expected to be complete on March 6, 2018.

The environmental impacts of this project were analyzed in the 2009 EA (CAGN 2009). In 2009, the U.S. National Guard Bureau developed an EA to assess the impacts of numerous CANG projects within a Proposed Long-Term Lease and Installation Development Plan for the 129th Rescue Wing, CAGN.  In 2009, the U.S. National Guard Bureau signed a FONSI concluding CAGN Project 3. along with all other CAGN proposed actions analyzed in the 2009 CAGN EA. would not be likely to have a significant impact on the quality of the human or natural environment or generate significant controversy either by itself or considering cumulative impacts.

<u>Outside the NASA Property</u>

Numerous projects were identified outside of the NASA Property in the cities of Mountain View and Sunnyvale. These projects mostly consist of residential and commercial developments. The following projects were determined to have the potential to contribute cumulative impacts on select resources when compared to impacts resulting from implementation of the Proposed Action, primarily because construction may occur with same time frame as the DFSP Moffett Field closure activities. Each projects is within 5 miles of DFSP Moffett Field.

All projects were subject to review under the California Environmental Quality Act (CEQA). In most cases the projects were also subject to a discretionary permit review, requiring approval by a hearing body such as the planning commission of the City of Sunnyvale or City of Mountain View.

**City of Mountain View.** The three projects analyzed are within a radius of 5 miles from the DFSP Moffett Field.

- Projects in the City of Mountain View within 2 miles of the DFSP Moffett Field.
    - National Avenue Partners at the 600 National Avenue (Project 3, Figure J-2). Construction of a new 4-story, 140,654-square-foot office building and a one-story parking structure and the removal of 11 heritage trees to replace four industrial buildings.

- Projects in Mountain View between 2 and 5 miles of the project site
    - Prometheus at 100 Moffett Boulevard (Project 8, Figure J-2). The project consists of an 84-unit residential apartment and includes three new buildings on a 2.68 acre site. The project includes the conversion of a vehicle on-ramp to a bicycle/pedestrian-only paseo connecting Stierlin Road to the corner of Central Expressway and Moffett Boulevard. Construction is under way and is expected to be completed late in 2016.
    - Austin's – Prometheus at 1616 El Camino Real West (Project 32, Figure J-2). This project consists of a 66-unit, 4-story apartment building that will replace two retail buildings (totaling approximately 6,100 square feet) and removal of two heritage trees on a 0.99 acre project site.

**City of Sunnyvale.** These 12 projects are within a 5-mile radius of the project site.

- Projects in Sunnyvale within 2 miles of the project site
    - 807 Eleventh Avenue (Project 12, Figure J-2).This project consists of the development of a new 200,000-square-foot building at the Ariba Campus. The project is currently under construction.
    - 433 North Mathilda Avenue (Project 14, Figure J-2). This project consists of two new office buildings totaling 213,216 square feet. The project is currently under construction.
    - 1221 Crossman Avenue (Project 17, Figure J-2). This project involves the development of an existing industrial site with two new 7-story office buildings and one parking structure. The project is currently under construction

- Projects in Sunnyvale between 2 and 5 miles of the project site
    - 767 North Mary Avenue, Sunnyvale (Project 19, Figure J-2). New 60-foot-tall wireless telecommunications tower in the parking lot of an industrial site. The project is currently under construction.
    - 1071 Noriega Avenue (Project 21, Figure J-2). This project involves a zoning reclassification and construction of a 3-story, 10-unit townhome development. Project includes demolition of an 11-unit apartment complex, division of 2 lots into 10 lots plus 1 common lot, and implementation of site improvements. The project is currently under construction.
    - 1095 West El Camino Real (Project 22, Figure J-2). This project is a mixed-use development involving 156 multifamily apartment units in a 4-story building and a 40,544-square-foot, 3-story office building. The project is currently under construction.
    - 479 North Pastoria Avenue (Project 23, Figure J-2). This project involves the development of a vacant 2.17-acre site with the construction of a 523,940-square-foot, 4-story office and research and development building and a detached 2-level parking structure.

- 815 West Maude Avenue (Project 24, Figure J-2). This project involves the redevelopment of a 0.53-acre site with the construction of a 23,340-square-foot, 3-story office and research and development building.
- 520 East Weddell Drive (Project 26, Figure J-2). This site will be redeveloped from industrial to residential use with the construction of 465 apartment units and associated parking. The project involves a General Plan amendment, rezoning, and a CEQA Environmental Impact Report.
- 610 East Weddell Drive (Project 27, Figure J-2). This project involves the redevelopment of the site from industrial to residential use by building 205 apartment units. The project involves a General Plan amendment, rezoning, and a CEQA Environmental Impact Report.
- 1101 North Fair Oaks Avenue (Project 28, Figure J-2). This project involves constructing 97 units of multifamily residential development.
- 470 Persian Drive (Project 29, Figure J-2). This project entails the redevelopment of an industrial site into a residential site with 47 condominium units.

## 4.3 Cumulative Impacts Analysis by Environmental Resource Area

This section addresses the potential cumulative impacts of the Proposed Action in conjunction with past, present, and reasonably foreseeable projects.

### *4.3.1 Air Quality*

<u>Proposed Action</u>

The ROI for cumulative air quality impacts is based on a review of all projects within a 5-mile radius of DFSP Moffett Field (Section 4.2.1). Several projects in the cities of Sunnyvale and Mountain View are likely to be under construction at the same time as the Proposed Action, which could lead to temporary air quality impacts from construction-related activities. Other project may complete construction by the time the Proposed Action is implemented; those built-out projects would become sources that would likely contribute to air quality impacts incrementally from vehicle exhaust and occupant use. The air quality impacts from both construction and built-out sources are assessed in accordance with methodologies recommended by the BAAQMD and in comparison to the recommended BAAQMD significance thresholds.

As noted in Section 3.1, no substantial impacts related to air quality are expected from the Proposed Action, including increases in air pollutant emissions or the deterioration of ambient air quality. Cumulative air quality effects occur when a variety of projects or sources contribute to emissions in the area of analysis. The time frame for air quality impacts associated with the Proposed Action would be the 5- to 6-month demolition and excavation period.

The main impacts on air quality from the Proposed Action that could contribute to cumulative impacts would be the closure activities associated with the excavation and demolition of the USTs and the operation of equipment. Due to the transitory nature of air pollution, the short-term increase in demolition and excavation-related emissions would have no cumulative or long-term impacts on the air quality of Santa Clara County. Furthermore, implementation of recommended fugitive dust control measures (Appendix D) would ensure that air emissions from proposed demolition and excavation activities would produce less than significant cumulative impacts.

<u>No Action Alternative</u>

The No Action Alternative would not create new impacts on air quality, only a continuation of existing conditions. When added to the effects from other projects in the cumulative effects region, the No Action Alternative would not result in significant cumulative air quality effects.

### *4.3.2 Biological Resources*

<u>Proposed Action</u>

The ROI for cumulative impacts on biological resources includes the four projects identified within the NASA Property (Section 4.2.1). The cumulative analysis of biological impacts is based on the presence of plant communities that provide suitable habitat for the species most likely to be impacted by the Proposed Action. Projects with potential direct and indirect impacts on biological resources include those that would result in the loss of native plant communities, permanent loss of sensitive plant populations, species losses that affect population viability, and the reduction in adjacent habitat quality from temporary actions such as the addition of noise and dust during operations. For native plant and wildlife communities, other cumulative impacts could include habitat fragmentation or the permanent loss of contiguous (interconnecting) native habitats such as migration or movement corridors.

The cumulative analysis of biological resources for this EA included an assessment of existing, and proposed development in native and nonnative grassland, such as possible impacts by the Proposed Action on the vegetative community that could in turn affect burrowing owl habitat. Natural vegetative communities surrounding DFSP Moffett Field have been highly modified by historic land uses. Despite this, the Installation continues to support a large diversity of wildlife, including many federally protected species. NASA ARC prepared an Environmental Resources Document (NASA 2005) that guides the management of the Installation’s natural resources while maintaining military mission readiness. Programmatic consultation with the USFWS provides the foundation for ESA compliance at the NASA Property, with selected habitats. Presently, the potential cumulative impacts on federally listed species are effectively reduced through avoidance, minimization, or compensation measures, as appropriate.

As stated in Section 3.2, implementation of the Proposed Action would result in the short-term (temporary) loss of nonnative disturbed habitat used by wildlife such as the burrowing owl; however, this habitat would be restored following demolition and excavation by hydroseeding with a local native seed mix. Lost burrows would be replaced by artificial burrows, increasing burrowing owl habitat (in Appendix D).

Because the Proposed Action and the new 54,780 square-foot facility for the airborne pararescue mission (CANG Project 3, Figure J-1) would be built over mostly impervious, paved, or highly disturbed areas, no increased impacts on grassland habitat are expected due to their construction. The remediation and renovations to Hangers 1, 2 and 3 are not expected to result in significant cumulative impacts because they are on previously disturbed, mostly impervious surfaces. Each project would be required to comply with applicable NASA ARC and federal regulations to avoid or minimize impacts on plant and wildlife species, with particular emphasis on avoiding impacts on special status species such as burrowing owls (Section 3.3.2).

When added to the potential effects from other construction projects at the NASA Property and surrounding communities, the Proposed Action would not be likely to result in significant cumulative effects on biological resources.

<u>No Action Alternative</u>

The No Action Alternative would not create new impacts on biological resources, only a continuation of existing conditions. When added to the effects from other projects in the cumulative effects region, the No Action Alternative would not result in significant cumulative effects.

### *4.3.3 Cultural Resources*

<u>Proposed Action</u>

As discussed in Section 3.3, the Proposed Action would remove or abandon in the place all components of DFSP Moffett Field; however, certain aboveground features of DFSP Moffett Field would remain in place, including the tank truck filling rack (Building 141) and the high-speed fueling pits (MF1003), so that visual alterations to the historic district’s setting would be negligible. NASA ARC also has several projects that are ongoing or planned for the foreseeable future. Projects that may affect historic properties are listed in Table J-1, Appendix I.

For the purposes of analyzing cumulative impacts on cultural resources in this EA, the ROI was limited to the NASA ARC, including the entire NRHP-listed NAS Sunnyvale Historic District and its listed and eligible contributing resources. DFSP Moffett Field lies within the historic district. The NAS Sunnyvale Historic District itself falls within the NASA Property, an active scientific research and technical facility that must continuously evolution and adapt to serve changing aviation missions and scientific uses. Because the NASA Property is ever changing, a greater degree of flexibility is required in analyzing the historic resources of the facility and the surrounding NAS Sunnyvale Historic District; guidance is provided in the Advisory Council for Historic Preservation’s (ACHP’s) *Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities* (ACHP 1991).These considerations are important to the analysis of potential cumulative impacts resulting from past, present, and foreseeable actions in the ROI.

NASA has determined that the Proposed Action will result in no adverse effects on historic properties. Like the Proposed Action, any planned projects would undergo Section 106 consultation with the SHPO to determine if they could result in adverse impacts on historic resources. Other federal actions at the NASA Property that could affect historic properties and are primary contributors to the NAS Sunnyvale Historic District (e.g., rehabilitation of Hangars 1, 2, and 3) would be required to undergo Section 106 review in adherence to the following:

- NASA's cultural resources management policies. as outlined in the 2014 Draft ICRMP (AECOM 2014)
- Any future programmatic agreements between NASA, the SHPO, and ACHP
- The 2002 NASA Ames Development Plan Final Programmatic EIS (NASA 2002)

Under these policies, NASA would ensure full consideration, avoidance, and resolution of potential future adverse effects on historic properties through the sensitive treatment of historic properties and their character-defining features. Therefore, when added to the impacts from other potential cumulative actions, the Proposed Action is not likely to result in significant cumulative impacts on cultural resources.

#### *4.3.4 No Action Alternative*

The No Action Alternative would not create new impacts on cultural resources, only a continuation of existing conditions. When added to the effects from other projects in the cumulative effects region, the No Action Alternative would not result in significant cumulative effects.

#### *4.3.5 Geology, Topography and Soils*

<u>Proposed Action</u>

The ROI for geological resources includes the landforms at DFSP Moffett Field, which include the projects within the NASA Property listed in Section 4.2.1. As stated in Chapter 3, the Proposed Action would result in temporary surface disturbance; however, the site would be restored to pregraded condition with backfilled excavations compacted to engineering standards and vegetation restored to match the surrounding vegetation. The other construction projects at the NASA Property would be subject to many of the same grading permits and other requirements as the Proposed Action. Those requirements include obtaining a NPDES Construction Permit (SWRCB 2010) and state DOSH excavation permit; preparing a SWPPP, WIP, WMP, SAP, EPP, QCP, and QASP; and performing a geotechnical/engineering evaluation. With implementation of BMPs from each of these overlapping requirements the Proposed Action is not expected to result in a significant impact to geology, topography or soil. Therefore, when added to the impacts from other potentially cumulative actions, the Proposed Action would not result in significant cumulative impacts on geological resources.

No Action Alternative

The No Action Alternative would not create new impacts on geological resources, only a continuation of existing conditions. When added to the effects from other projects in the cumulative effects region, the No Action Alternative would not result in significant cumulative effects.

### *4.3.6 Hydrology and Water Resources*

Proposed Action

The ROI for water resources includes DFSP Moffett Field and receiving waters, which include projects listed in Section 4.2.1. As discussed in Section 3.5, implementation of the Proposed Action would not result in significant impacts on water resources. Surrounding development projects within the NASA Property and in the cities of Mountain View and Sunnyvale would comply with the same regulatory requirements and use similar erosion control measures and BMPs as described for the Proposed Action. Under applicable environment regulations (i.e., NEPA and/or CEQA), other future projects would be required to consider their potential cumulative effects and to implement measures to avoid or minimize impacts on water resources. No addition to cumulative impacts are expected from stormwater runoff, as no new development would occur as part of the Proposed Action. The Proposed Action would comply with the Closure Plan (OTIE 2015), NPDES Construction Permit (SWRCB 2015), state DOSH excavation permit, and SWPPP. A WIP, WMP, SAP, EPP, QCP, QASP would be prepared and a geotechnical/ engineering evaluation performed. With implementation of BMPs from each of these overlapping requirements, the Proposed Action is not expected to result in a significant impact on hydrology and water. Therefore, when added to the impacts from other potentially cumulative actions, the Proposed Action would not result in significant cumulative impacts on water resources.

No Action Alternative

The No Action Alternative would not create new impacts on hydrology and water resources, only a continuation of existing conditions. When added to the effects from other projects in the cumulative effects ROI, the No Action Alternative would not result in significant cumulative effects.

### *4.3.7 Hazardous Materials and Wastes*

Proposed Action

The ROI for hazardous materials and wastes includes DFSP Moffett Field and the projects within the NASA Property listed in Section 4.2.1. As stated in Section 3.6, the Proposed Action would not result in significant impacts on workers associated with the UST removal effort due to strict adherence to OSHA standards and to a site-specific HSP and Closure Plan. Detailed precautionary measures would be implemented to substantially reduce potential exposure of on-site personnel to petroleum waste and/or hazardous waste. Other construction projects within the NASA Property would also be required to comply with stringent hazardous waste and health and safety related regulations. DLA would be required to implement the Closure Plan (OTIE 2015) and comply with the NPDES Construction Permit (SWRCB 2010). A state DOSH excavation permit would be obtained, and SWPPP, WIP, WMP, SAP, EPP, QCP, QASP, HSP, and APP prepared. With implementation of BMPs from each of these overlapping requirements, the Proposed Action is not expected to result in a significant impact relating to safety and hazardous materials. Therefore, when added to the impacts from other potentially cumulative actions, the Proposed Action would not result in significant cumulative impacts related to the increased exposure of people to health and safety risks from hazardous materials and wastes.

No Action Alternative

The No Action Alternative would not cause new exposure of people to hazardous materials and waste, only a continuation of existing conditions. When added to the effects from other projects in the cumulative effects region, the No Action Alternative would not result in significant cumulative effects.

### *4.3.8 Noise*

Proposed Action

The ROI for noise consists of the NASA Property and the adjacent communities of Sunnyvale and Mountain View. These projects are listed in Section 4.2.1. In combination with projects within the surrounding area, the Proposed Action would generate intermittent, short-term noise impacts within the ROI. The duration of these localized impacts would be limited to the demolition phase as discussed in Section 3.7. It is possible that the period of time construction from other projects within the ROI would overlap with the implementation of the Proposed Action. Should project overlap occur, demolition- and excavation-related noise could potentially magnify noise levels; however, due to the distance between the projects and the prevalence of shielding topography and structures, no cumulative noise impacts related to sensitive noise receptors are expected

When combined with impacts from the construction of a new 54,780-square-foot facility for the airborne pararescue mission (Project 3, Figure J-1), impacts from the Proposed Action would potentially increase impacts from noise related to construction activities. Construction on Hangars 2 and 3 would also contribute to noise levels; however, with attenuation at a rate of 6 dB per doubling of distance, overlap of the two projects would not likely result in significant cumulative noise impacts on sensitive receptors (Figure 3-8).

Outside of noise caused by ongoing projects, other activities near the site that generate noise include general motor vehicle traffic on U.S. Highway 101 and State Routes 85 and 237; traffic noise from employees reporting to work within the vicinity of the project site; operating aircraft on the airfield; and noise associated with activities at the NASA Property. Noise generated by the implementation of the Proposed Action would be intermittent, short-term, and minor in context and intensity and is not expected to have significant noise impacts when added to the other noise in the region (refer to mitigation measures in Appendix D). Therefore, when added to the impacts from other potentially cumulative actions, the Proposed Action would not result in significant cumulative impacts related to noise.

No Action Alternative

The No Action Alternative would not generate new noise impacts. When added to the effects from other projects in the cumulative effects region, the No Action Alternative would not result in significant cumulative effects.

### *4.3.9 Transportation and Circulation*

Proposed Action

The ROI for transportation includes traffic generated from activities at the NASA Property and traffic within a 5-mile radius of the project site, including the projects listed in Section 4.2.1. This analysis specifically focuses on the public roadway network that provides local and regional access to and from DFSP Moffett Field. Projects with the NASA Property and the cities of Sunnyvale and Mountain View (Section 4.2.1) would lead to an increase in construction-related traffic. Traffic from operational use to of these and other facilities will contribute to overall traffic conditions on the surface roads leading to the Ellis Street gate.

Traffic from closure activities would primarily use the Ellis Street/U.S. Highway 101 exit. Existing traffic combined with traffic from the Proposed Action and traffic from developments are expected to have a minor cumulative contribution to traffic and circulation on roads within the NASA Property and to the off-ramp and intersection of U.S. Highway 101 and Ellis Street. No substantial change in LOS is expected to occur because the Proposed Action would generate no more than 25.7 average daily trips over a period of 5 months (See LOS Map, Figure 3-10). Impacts would be short term, ending after completion of the project. In addition, the Proposed Action would not contribute to traffic impacts on weekends because demolition and excavation would be limited to weekdays.

Excavation of roads would also be minimized by abandoning pipelines in place where possible, thereby reducing the amount of time to complete the work and the number of trips to haul scrap metal and fill dirt. Regardless, a TCP would be developed and submitted to DLA and NASA ARC for approval prior to demolition and excavation. The TCP would include measures for avoiding demolition and excavation traffic during peak hours in areas prone to congestion, such as temporary use areas along Macon Road at 7:00 a.m. and 6:00 p.m. Monday through Friday.

Although the Proposed Action would contribute to the traffic volume during demolition and excavation, the increase in traffic would be intermittent, short-term, and minor in context and intensity and is not expected to have significant impact on traffic when added to the other traffic in the region. Therefore, when added to the impacts from other projects at the NASA Property and in Mountain View and Sunnyvale, the Proposed Action is not expected to contribute or to result in significant cumulative impacts on transportation and circulation.

No Action Alternative

The No Action Alternative would not create new impacts on traffic and circulation. When added to the effects from other projects in the cumulative effects region, the No Action Alternative would not result in significant cumulative effects.

# 5.0 OTHER CONSIDERATIONS REQUIRED BY NEPA

## 5.1 Compatibility of Proposed Action and Alternatives with the Objectives of the Federal, Regional, State, and Local Land Use Plans, Policies, and Controls

No potential conflicts are expected between the Proposed Action and the NASA Property's Master Plan, policies, or controls that address and guide land uses within the Installation.

Based on the analysis contained herein, this EA concludes that neither the implementation of the Proposed Action (Alternative 1) nor the No Action Alternative would constitute a major federal action with a significant impact on human health or the environment. It is recommended that a FONSI be issued to complete the NEPA documentation process.

FORMAT PAGE

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# Appendix A. Detailed Project Maps for Alternative 1

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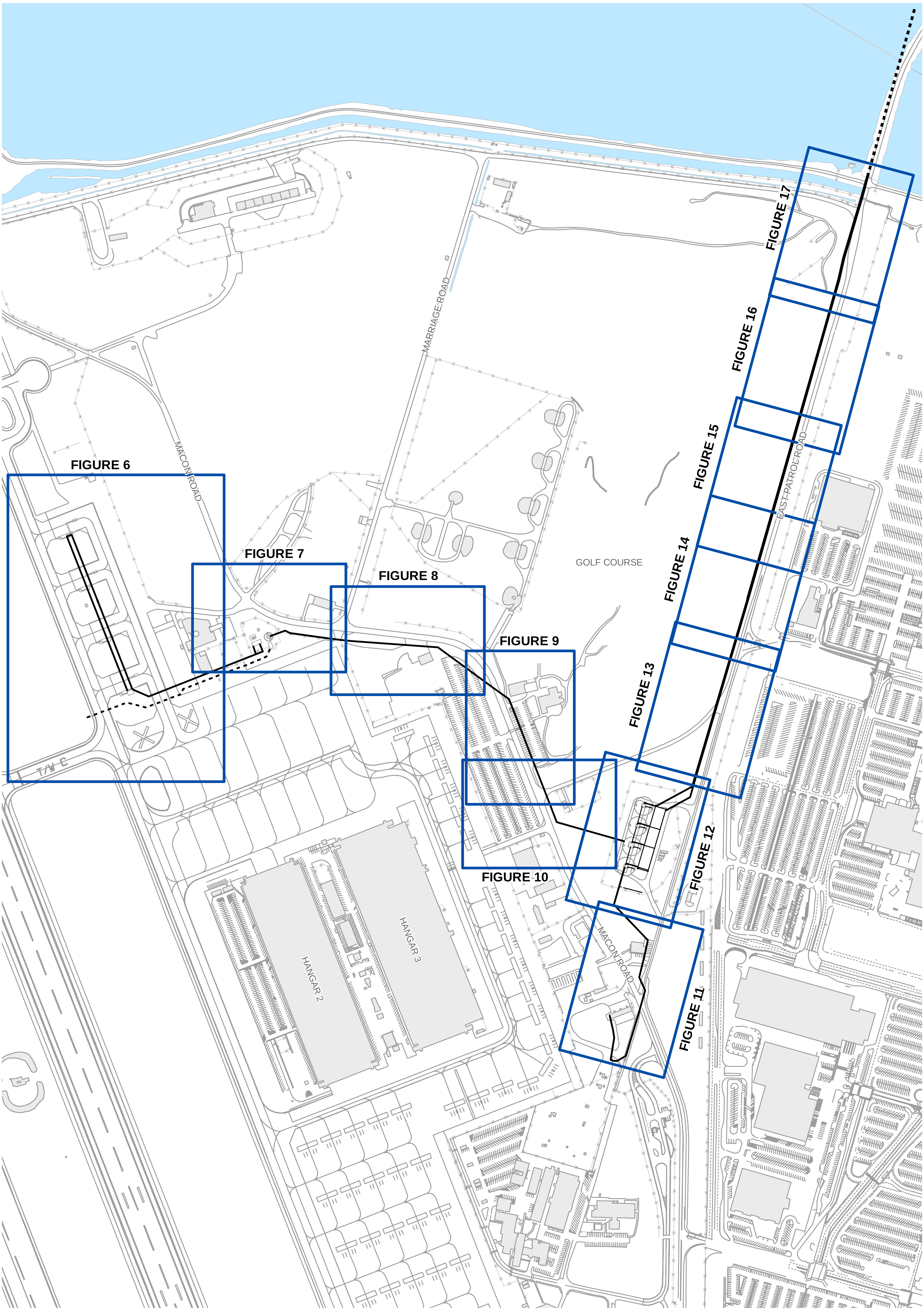


**Legend**

- Fuel Pipeline
- Former Fuel Pipeline
- Road/Paint Line
- Fence
- Building
- Water

N

0 200 400 600 800

Feet

DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 5
FIGURE KEY

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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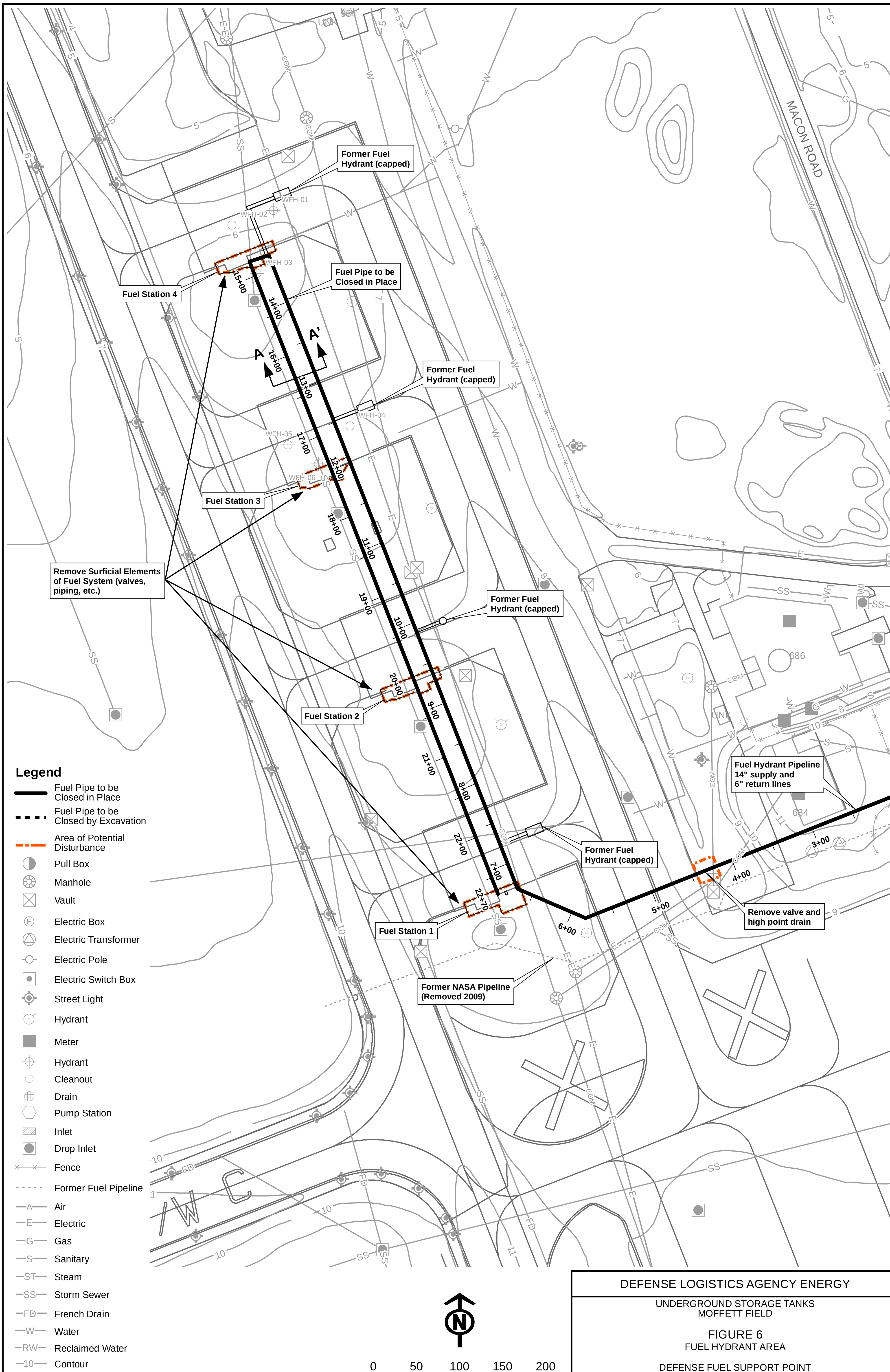


DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 6
FUEL HYDRANT AREA

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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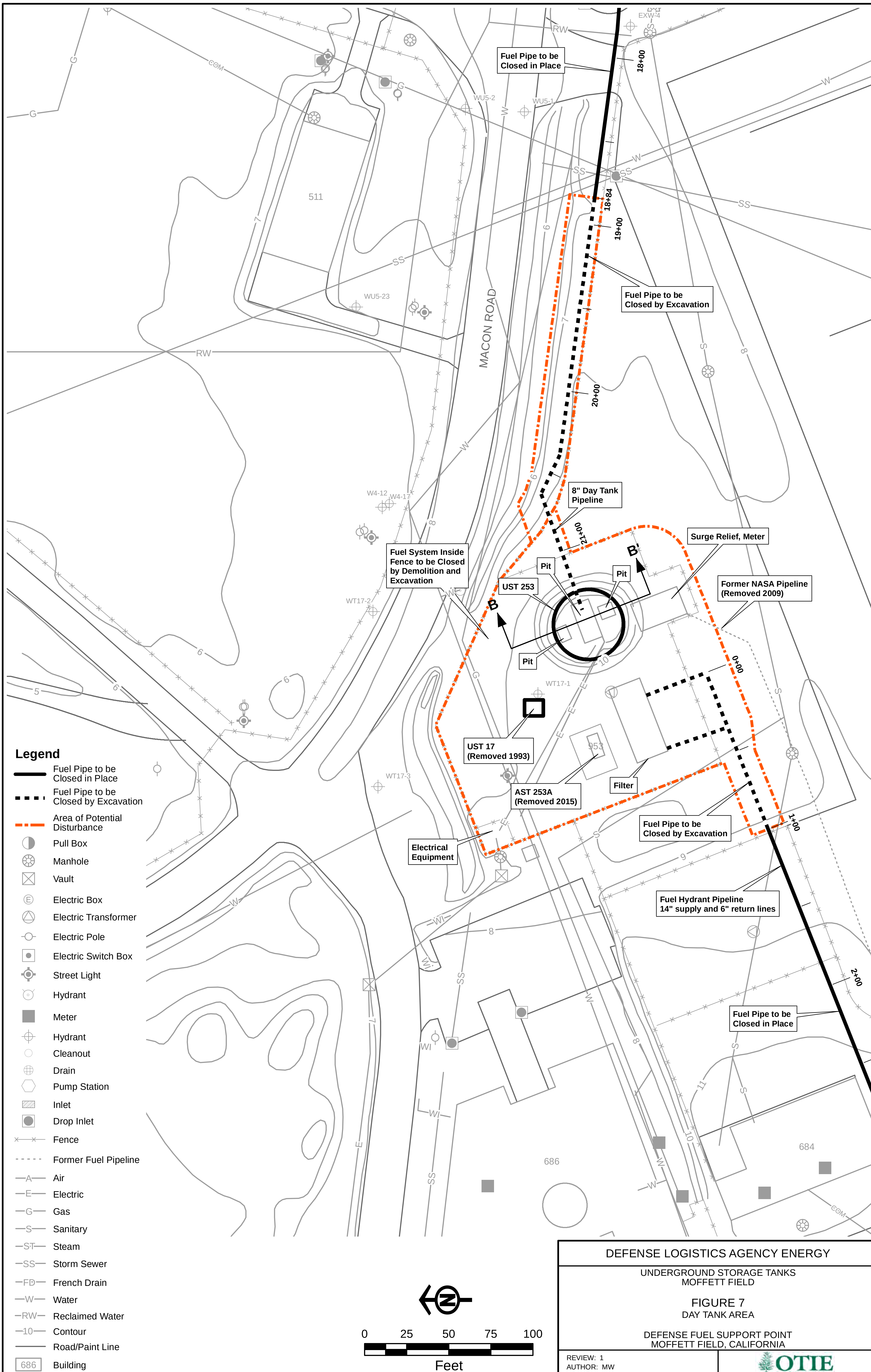


DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 7
DAY TANK AREA

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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AUTHOR: MW
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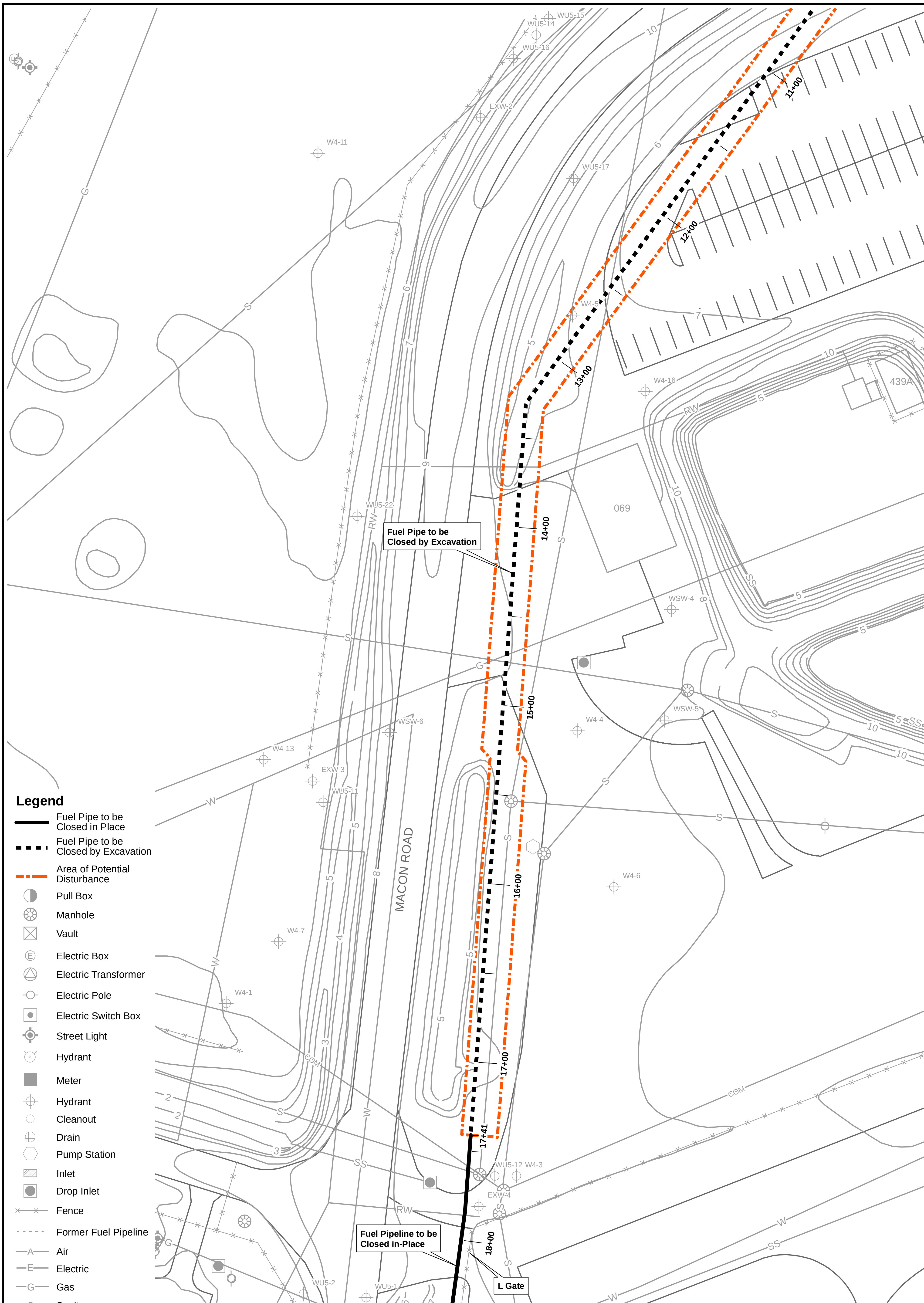


**Legend**

- Fuel Pipe to be Closed in Place
- Fuel Pipe to be Closed by Excavation
- Area of Potential Disturbance
- Pull Box
- Manhole
- Vault
- Electric Box
- Electric Transformer
- Electric Pole
- Electric Switch Box
- Street Light
- Hydrant
- Meter
- Hydrant
- Cleanout
- Drain
- Pump Station
- Inlet
- Drop Inlet
- Fence
- Former Fuel Pipeline
- A Air
- E Electric
- G Gas
- S Sanitary
- ST Steam
- SS Storm Sewer
- FD French Drain
- W Water
- RW Reclaimed Water
- 10 Contour
- Road/Paint Line
- 686 Building

0 25 50 75 100
Feet

DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 8
DAY TANK PIPELINE STA. 10+60 TO 18+40

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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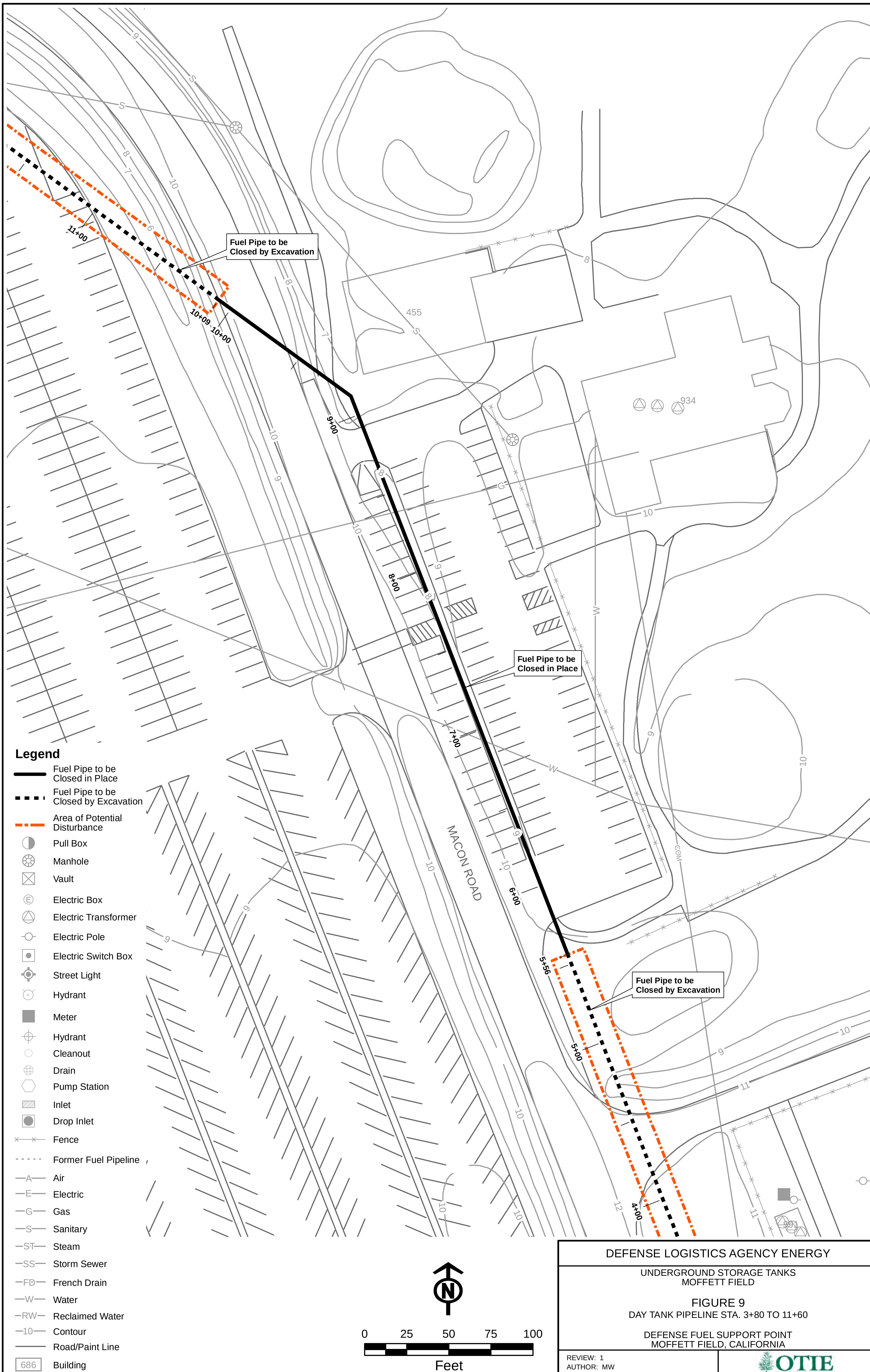


DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 9
DAY TANK PIPELINE STA. 3+80 TO 11+60

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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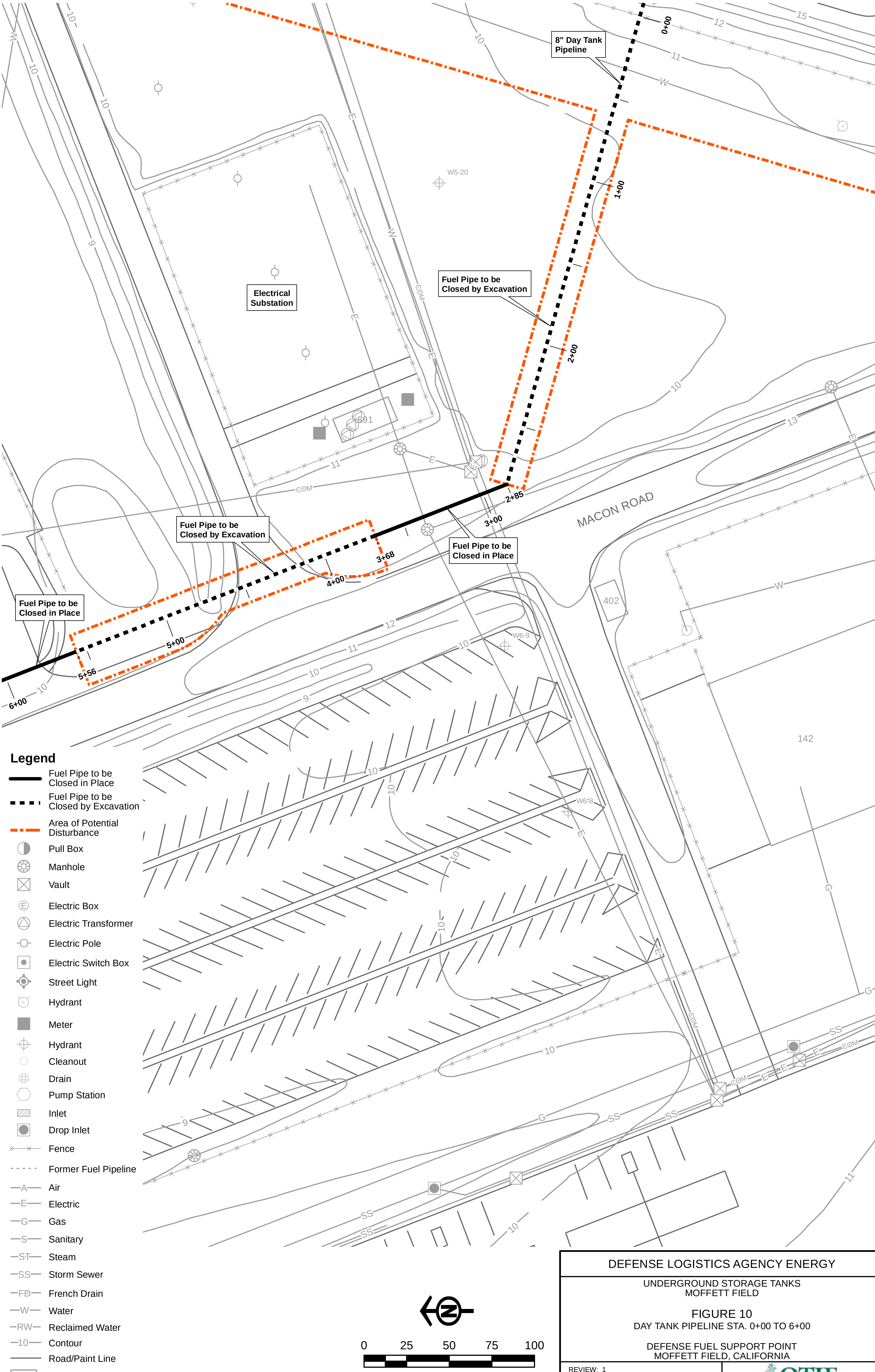


DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 10
DAY TANK PIPELINE STA. 0+00 TO 6+00

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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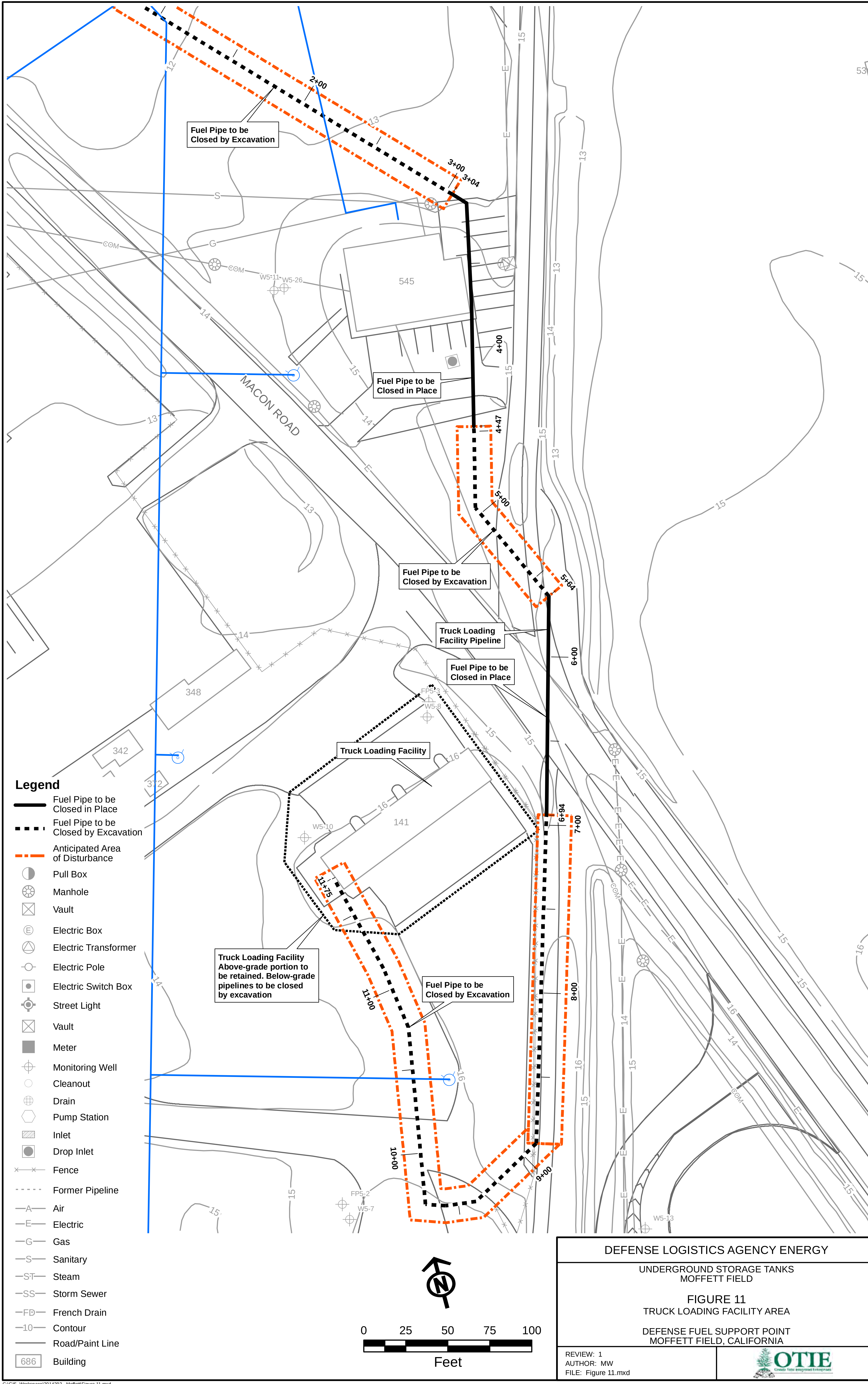


DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 11
TRUCK LOADING FACILITY AREA

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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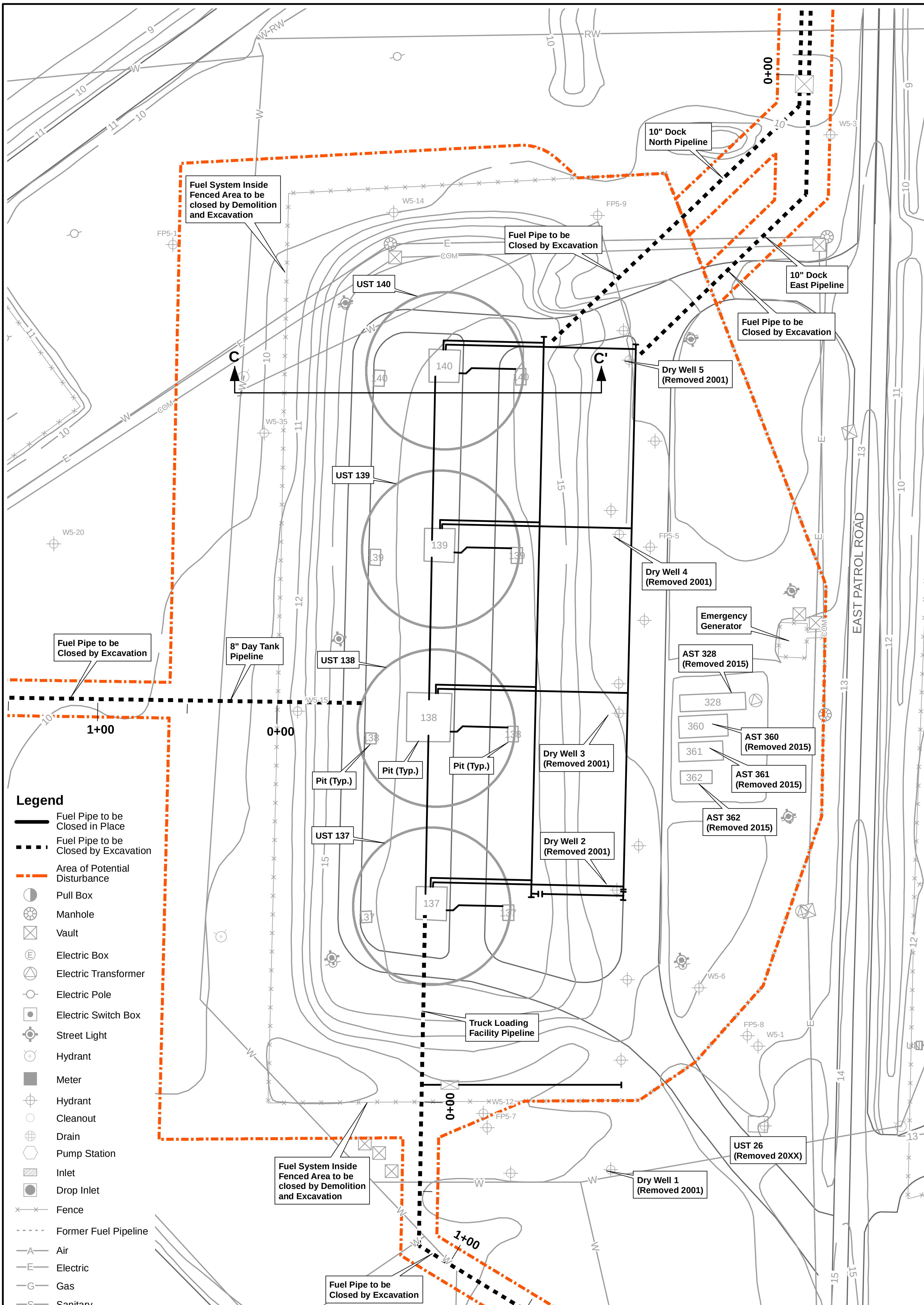


DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 12
FUEL FARM AREA

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

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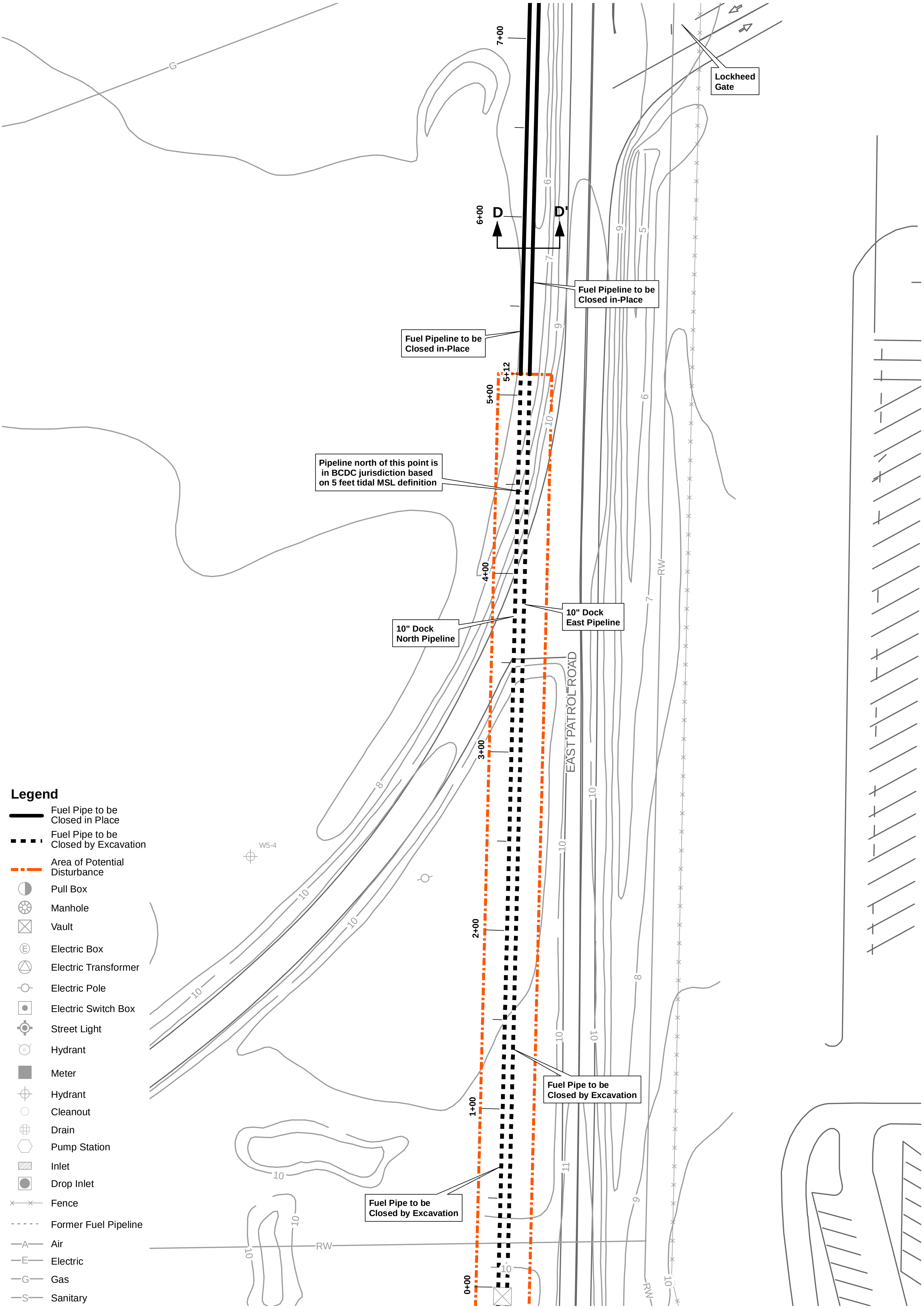



## Legend

- Fuel Pipe to be Closed in Place
- Fuel Pipe to be Closed by Excavation
- Area of Potential Disturbance
- Pull Box
- Manhole
- Vault
- Electric Box
- Electric Transformer
- Electric Pole
- Electric Switch Box
- Street Light
- Hydrant
- Meter
- Hydrant
- Cleanout
- Drain
- Pump Station
- Inlet
- Drop Inlet
- Fence
- Former Fuel Pipeline
- A — Air
- E — Electric
- G — Gas
- S — Sanitary
- ST — Steam
- SS — Storm Sewer
- FD — French Drain
- W — Water
- RW — Reclaimed Water
- 10 — Contour
- Road/Paint Line
- 686 — Building

DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

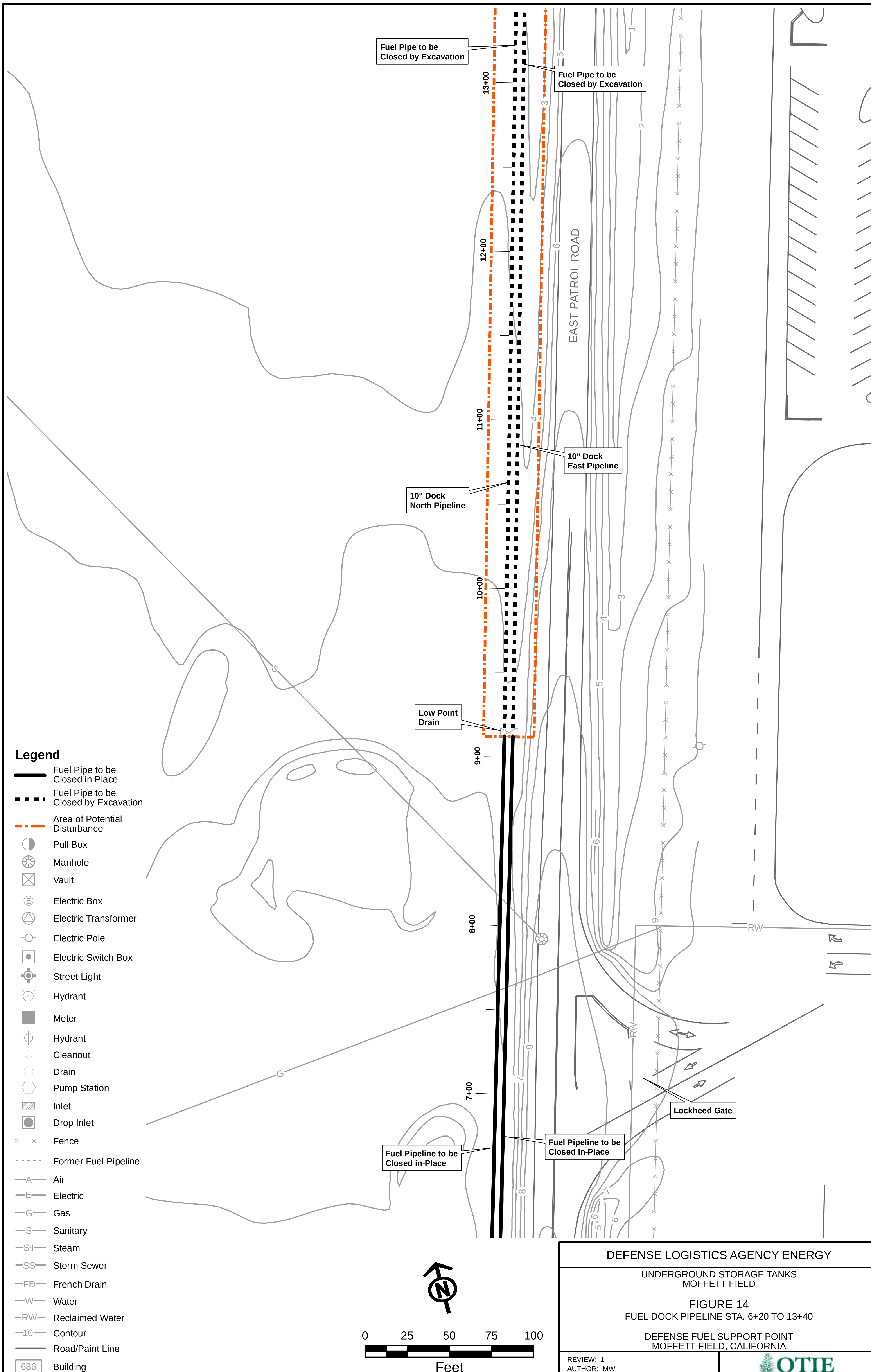
FIGURE 13
FUEL DOCK PIPELINE STA. 0+00 TO 7+00

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

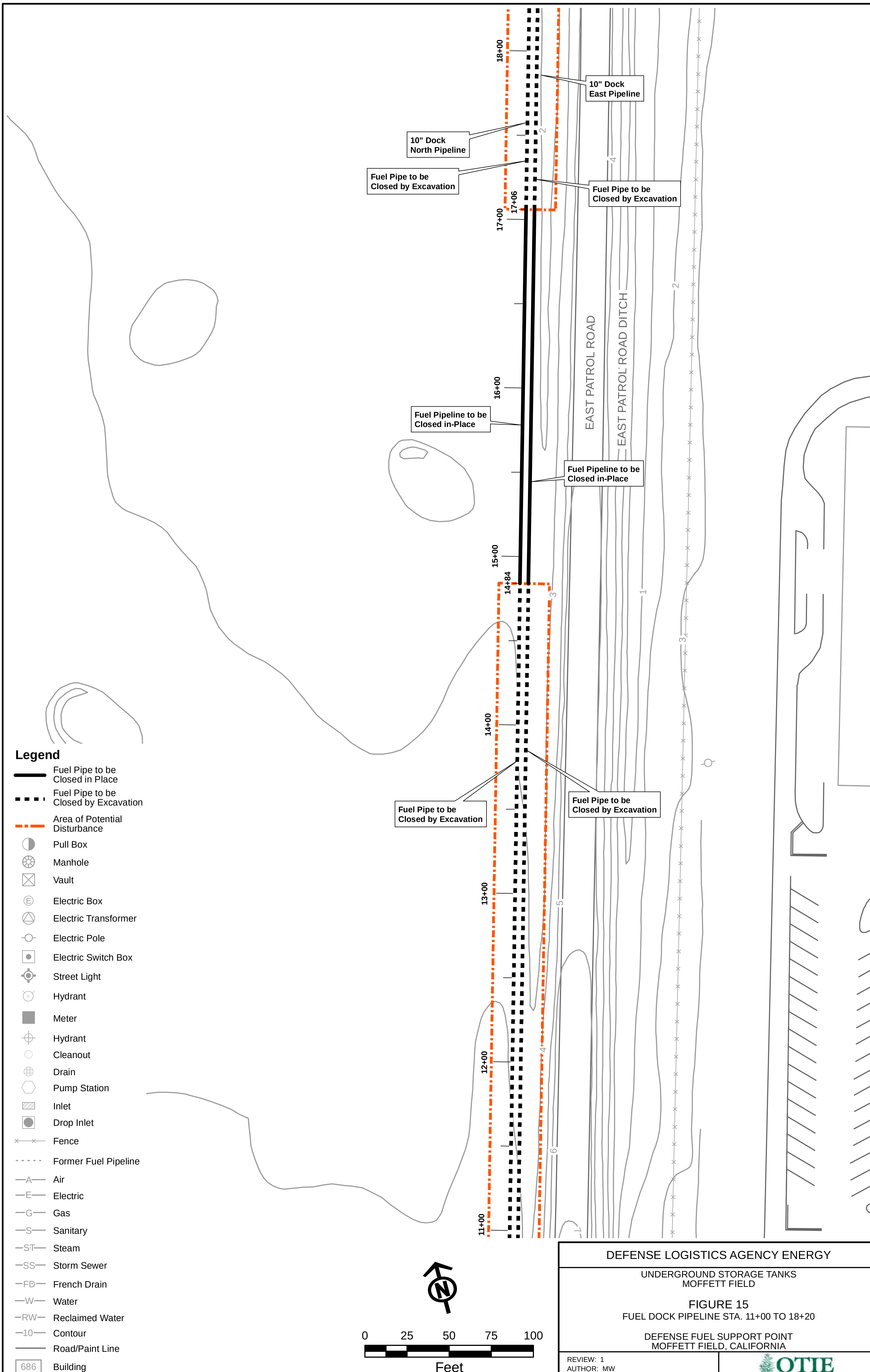
REVIEW: 1
AUTHOR: MW
FILE: Figure 13.mxd

OTIE

G:\GIS_Workspace\2014292 - Moffett\Figure 13.mxd




G:\GIS_Workspace\2014292 - Moffett\Figure 14.mxd




DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

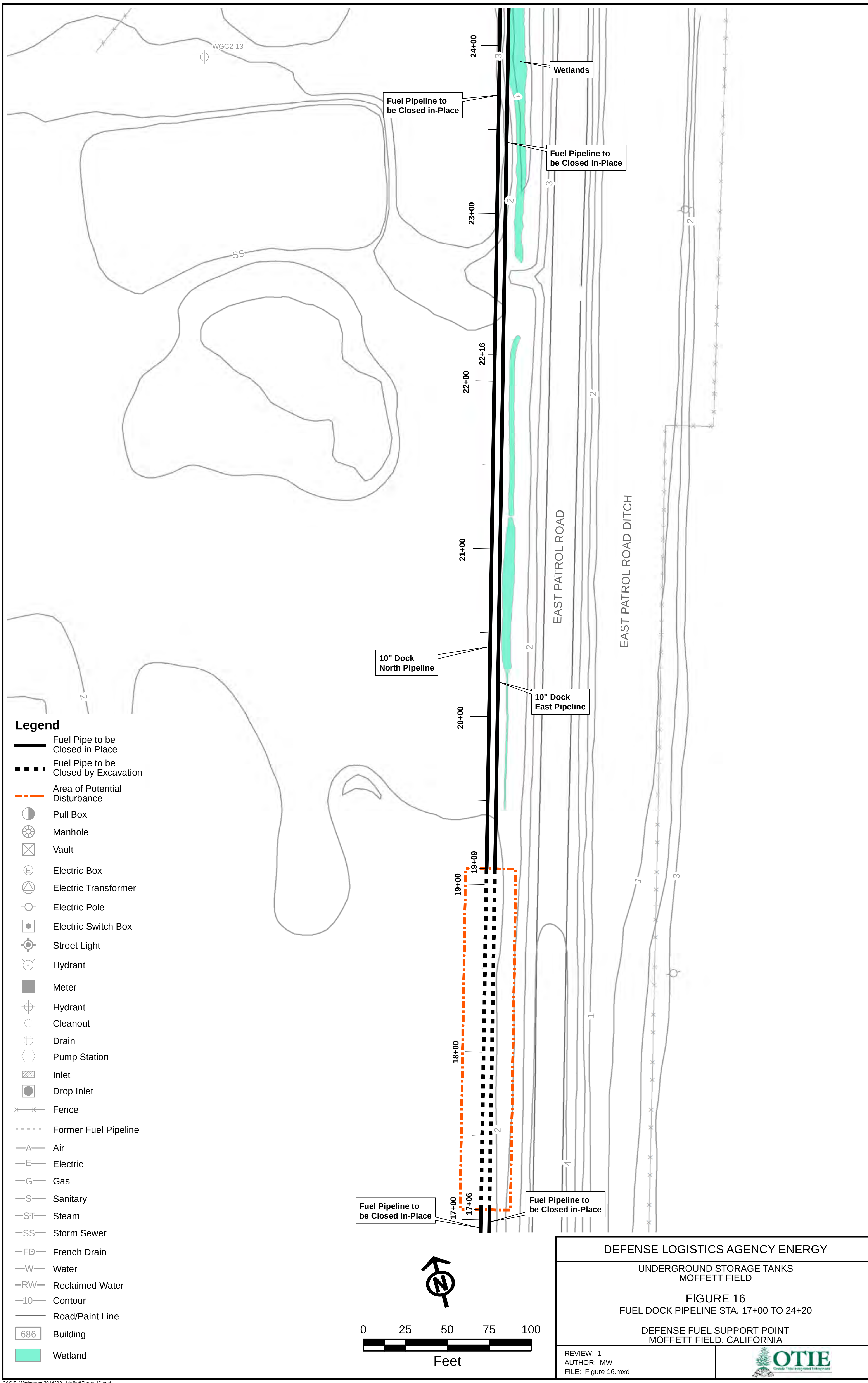
FIGURE 15
FUEL DOCK PIPELINE STA. 11+00 TO 18+20

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

REVIEW: 1
AUTHOR: MW
FILE: Figure 15.mxd

OTIE

G:\GIS_Workspace\2014292 - Moffett\Figure 15.mxd




DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

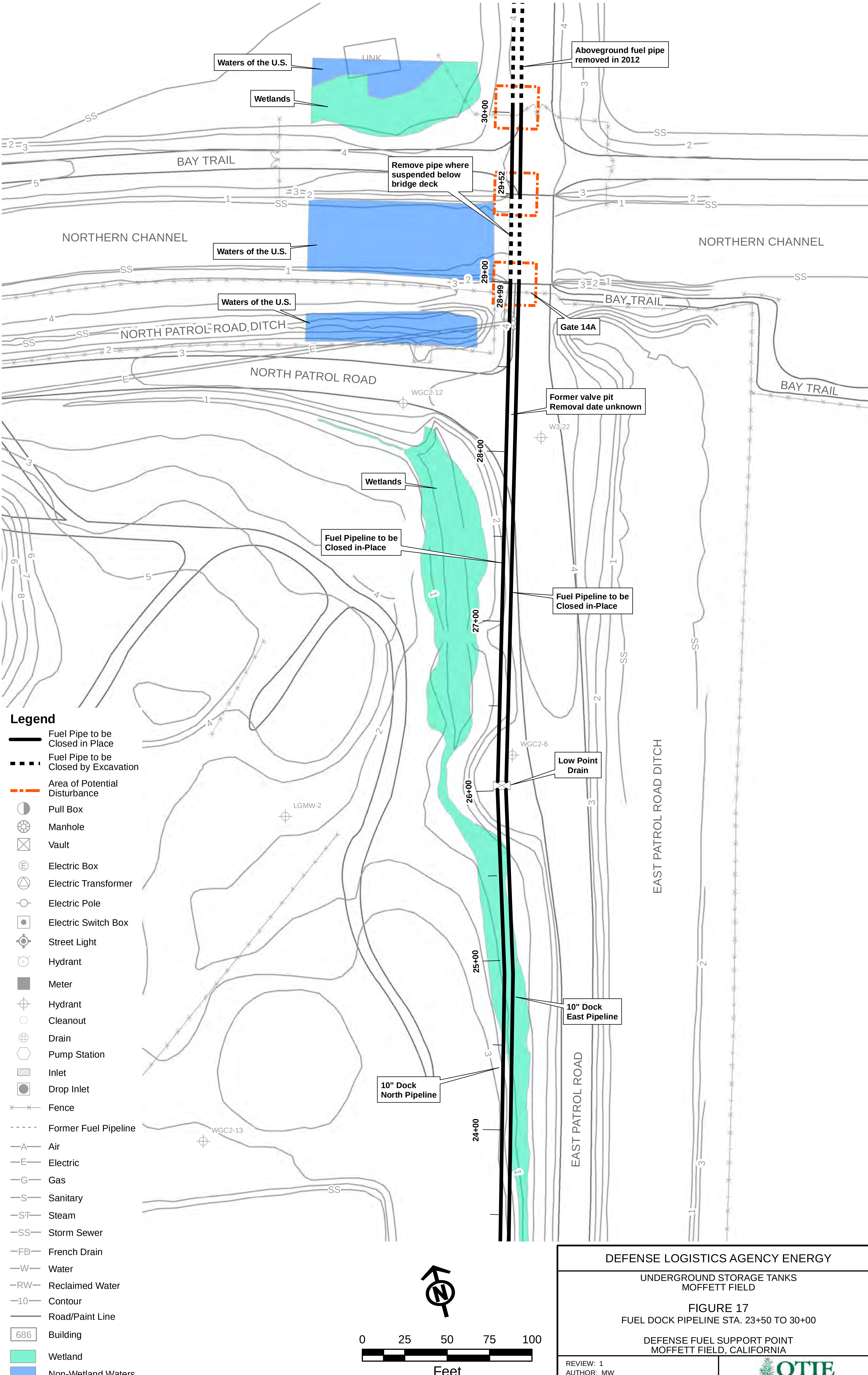
FIGURE 16
FUEL DOCK PIPELINE STA. 17+00 TO 24+20

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

REVIEW: 1
AUTHOR: MW
FILE: Figure 16.mxd

OTIE

G:\GIS_Workspace\2014292 - Moffett\Figure 16.mxd




DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

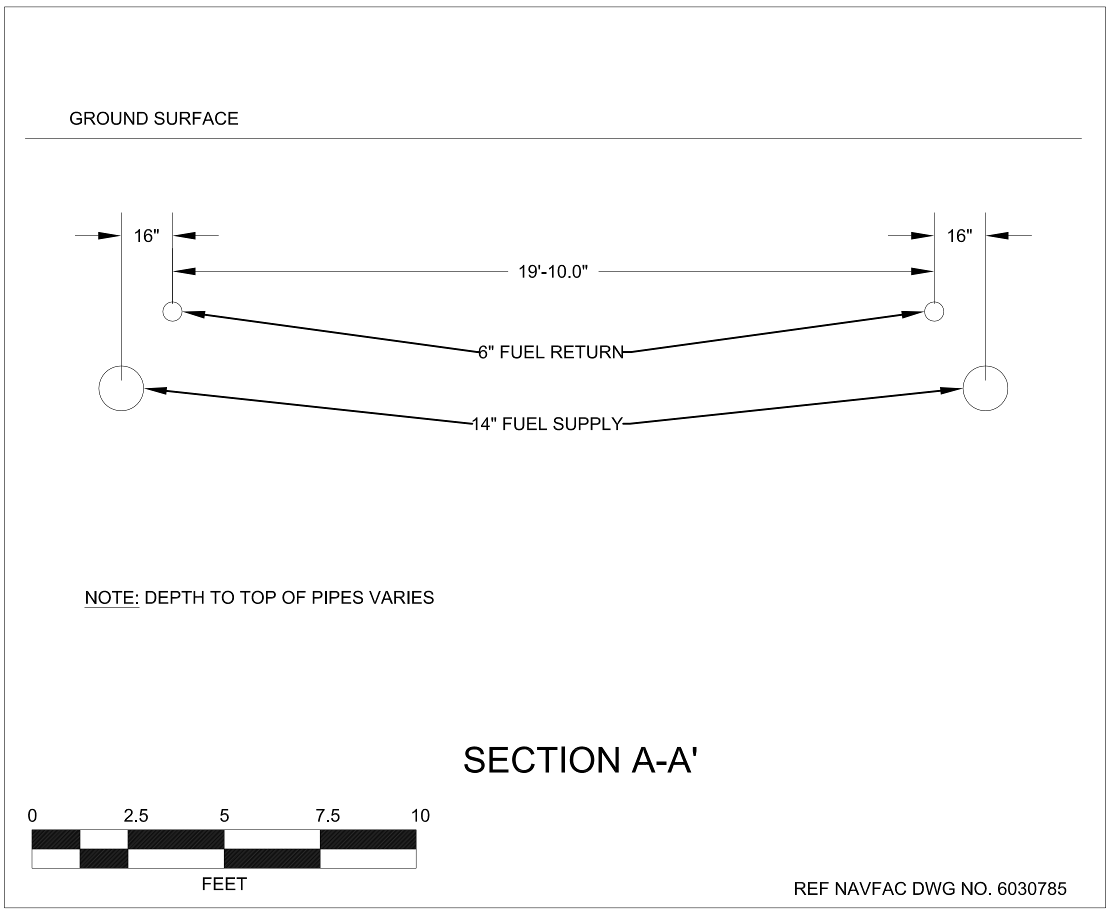
FIGURE 17
FUEL DOCK PIPELINE STA. 23+50 TO 30+00

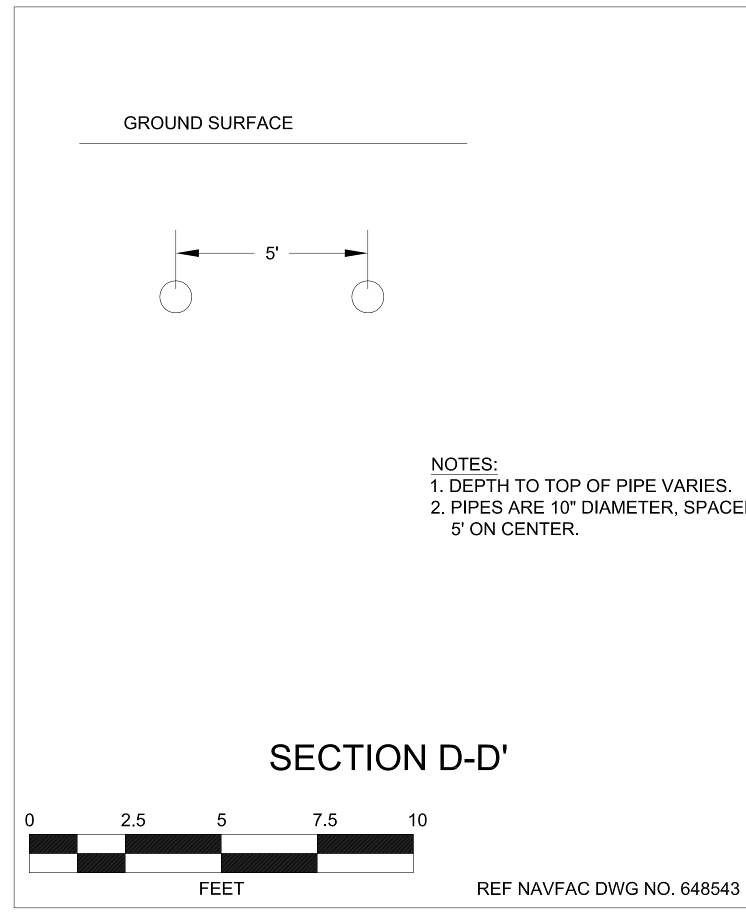
DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

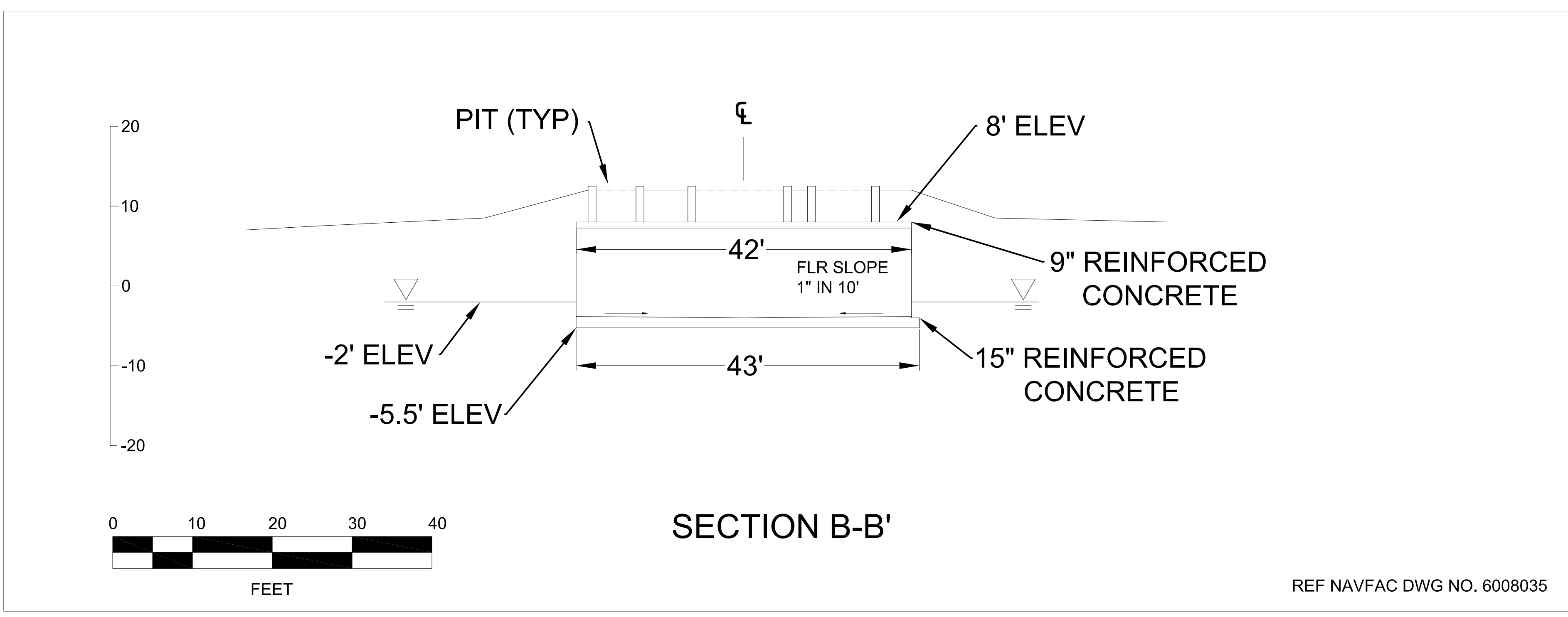
REVIEW: 1
AUTHOR: MW
FILE: Figure 17.mxd

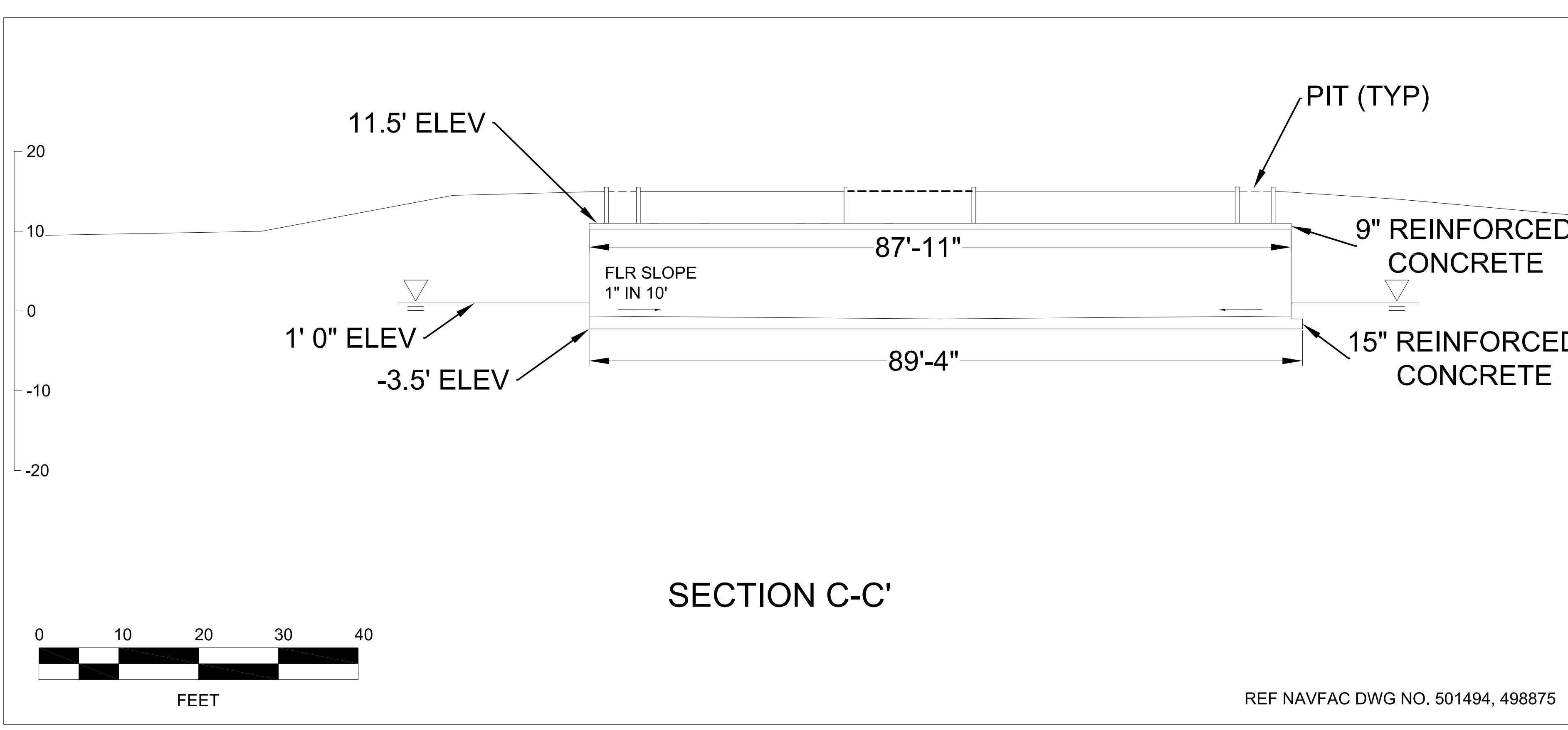
OTIE

G:\GIS_Workspace\2014292 - Moffett\Figure 17.mxd




NOTE:
WATER LEVEL DATA FROM SES-TECH (2013). ANNUAL WATER LEVEL VARIATION IS TYPICALLY 1 TO 2 FEET.

DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

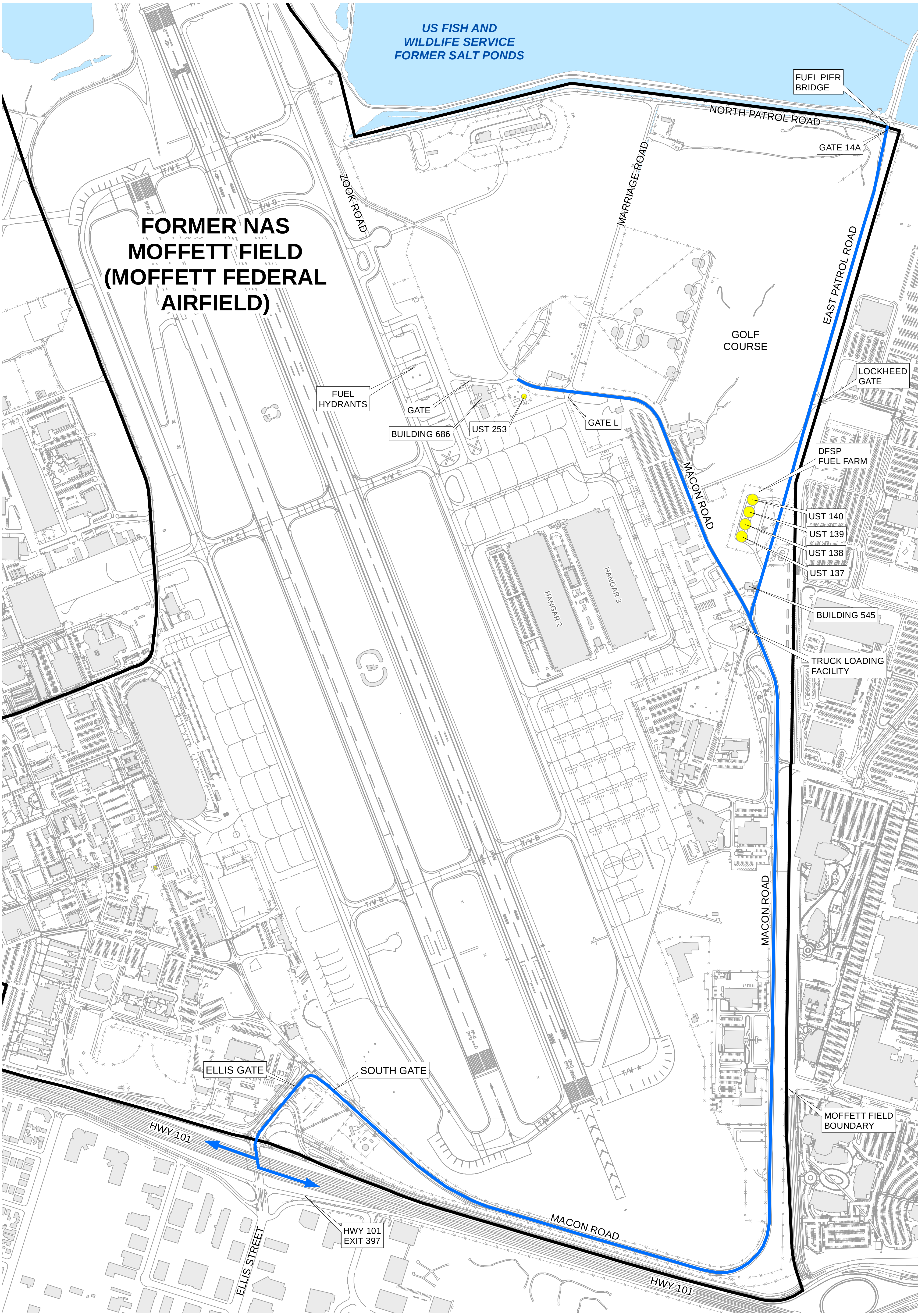
FIGURE 18
CROSS SECTIONS

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

REVIEW: 1
AUTHOR: MW
FILE: Figure 18.dwg

OTIE

G:\GIS_WORKSPACE\2014292 - MOFFETT\AUTOCAD FIGURES\Figure 18.dwg




**LEGEND**

- TRANSPORTATION ROUTE
- UST
- BUILDING
- MOFFETT FIELD BOUNDARY
- WATER

ABBREVIATIONS:

DFSP - DEFENSE FUEL SUPPORT POINT

NAS - NAVAL AIR STATION

UST - UNDERGOUND STORAGE TANK

NOTES:
FEATURELOCATIONS AND DIMENSIONS ARE APPROXIMATE

0 300 600 900 1,200
Feet

SOURCE: DLA CLOSURE PLAN (2013)

G:\GIS_Workspace\2014292 - Moffett\Figure 20.mxd

DEFENSE LOGISTICS AGENCY ENERGY

UNDERGROUND STORAGE TANKS
MOFFETT FIELD

FIGURE 20
PRIMARY TRANSPORTATION ROUTE

DEFENSE FUEL SUPPORT POINT
MOFFETT FIELD, CALIFORNIA

REVIEW: 1
AUTHOR: MW
FILE: Figure 20.mxd

# Appendix B. Agency Coordination Letters and Responses

FORMAT PAGE

| | |
|---|---|
| **From:** | Peter Merz |
| **To:** | Galacatos, Katerina SPN |
| **Cc:** | James, Bruce R. SPL; Rosenberg, Diane A SPL; Thomas Mulder |
| **Subject:** | [EXTERNAL] information and documents to USACE SPA for PJD |
| **Date:** | Monday, March 28, 2016 4:04:45 PM |
| **Attachments:** | 2016-03-09_MFA_Delineation FNL-rfs.pdf<br>2015-10-30_MFA_CP-WorkingDraft-Rev85%.pdf<br>Figures1to21-05Nov15.pdf |

Katerina,

As discussed at the scoping meeting convened on Wednesday 23 March at your office; Oneida Total Integrated Enterprises (OTIE), in collaboration with USACE Los Angles District (SPL), is requesting a preliminary Jurisdictional Determination for select areas associated with the removal and closure of the Underground Storage Tanks and appurtenances of the former Defense Fuel Support Point (DFSP) Moffett Field, Moffett Field, CA.

Please find the attached information and documents for the PJD effort for the former DFSP.

The attached documents include:

1]-Delineation of Water of the United States (WRA Inc., 2016)

2]-Closure Plan- Former DFSP Moffett Field, Moffett Field CA (OTIE, 2015)

3]-Closure Plan Figures- Former DFSP Moffett Field, Moffett Field CA (OTIE, 2015)

I understand that this information is sufficient to define the task and ask for your confirmation of clairification.

To move forward, I respectfully request a proposed date and time for the field effort.

When provided, OTIE will coordinate the meeting time and location for the attending parties and provide notice to the Owner (NASA-ARC) and Operator (DLA), as necessary.

If you have any questions or comments, please contact Diane Rosenberg (USACE, SPL) or me at your earliest convenience.

VR, Peter

Peter F. Merz, P.E.

Oneida Total Integrated Enterprises (OTIE)

619.230.1712 x30 office

619.546.2890 cell

619.291.8100 fax

www.otie.com

**County of Santa Clara**
**Department of Environmental Health**
**Hazardous Materials Compliance Division**
1555 Berger Drive, Suite 300
San Jose, CA 95112-2716
(408) 918-3400; Fax (408) 280-6479
www.EHinfo.org/hazmat

*Agency Use Only*

Received by: ____________________; Date: ______________

Fee Received: $_________________; Date: ______________

Receipt No.: ___________; SR No.: ___________; PE: **2336**

# UNDERGROUND STORAGE TANK SYSTEM CLOSURE PERMIT APPLICATION

*For use by Unidocs Member Agencies or where approved by your Local Jurisdiction*

1. Facility Name (Tank Site): DFSP Moffett Field Bldg. No.: 545

   Address: PO Box 92 City: Moffett Field Zip: 94035

   EPA ID No.: TBD Contact Person: Joseph Vogel Phone No.: (703) 767-8781

2. Tank Owner's Name: NASA Ames Moffet Feild

   Address: Mail Stop 204-15 Bldg. N204 City: Moffett Field Zip: 94035

3. Tank Operator's Name: DLA Energy

   Address: 8725 John J Kingman Rd Suite 2828 City: Fort Belvoir, VA Zip: 22060

4. Applicant's Name: DLA Installation Support for Energy

   Address: 8725 John J Kingman Rd Suite 2828 City: Fort Belvoir, VA Zip: 22060

   Contact Person: Laura Fleming Phone No.: (703) 767- 8308

5. Tank Closure Contractor Business Name: Onieda Total Integrated Environmental LLC (OTIE)
   (As registered with the Contractors State License Board at **www.cslb.ca.gov**)

   Address: 2247 San Diego Avenue, Suite 238 City: San Diego Zip: 92110

   CSLB License No.: 974167 Contact Person: Peter Merz Phone No.: (619) 230.1712 x30

   Business License *(if required)*: ☐ on file; ☐ attached; ☒ not applicable

6. Firm that will take soil/water samples: Onieda Total Integrated Environmental Phone No.: (610) 230-1712x30

7. State-certified laboratory that will analyze samples: TBD Phone No.: ( )

***This box is for agency use only***

Laboratory analyses shall test for:

| | TPHG | TPHD | BTEX, MTBE, TAME, ETBE, DIPE, TBA, EDB, EDC (EPA 8260) | Organic Lead (DHS-LUFT) | O&G | Cl HC | Metals (Cd, Cr, Pb, Ni, Zn (ICAP or AA) | PCB, PCP, PNA, Creosote (EPA 8270) | pH | Other (Specify) |
|---|---|---|---|---|---|---|---|---|---|---|
| Tank 1 | | | | | | | | | | |
| Tank 2 | | | | | | | | | | |
| Tank 3 | | | | | | | | | | |
| Tank 4 | | | | | | | | | | |
| Tank 5 | | | | | | | | | | |
| Tank 6 | | | | | | | | | | |

*Additional analyses may be required by inspector in field.*

 Tank Site Address (from page 1): DFSP Moffett Field BLDG 545

8. Name of Licensed Transporter of Tanks: TBD

EPA ID No.: TBD Phone No.: ( )

9. Destination of Tanks and Piping: TBD

10. Tank System: Size (gallons) Substance(s) Previously Contained

| | Size (gallons) | Substance(s) Previously Contained |
|---|---|---|
| Tank 1 | 160,000 | Tank 253, JP-8 |
| Tank 2 | | |
| Tank 3 | | |
| Tank 4 | | |
| Tank 5 | | |
| Tank 6 | | |

If the owner/operator does not have a current Hazardous Materials Business Plan (HMBP) which includes these tanks on file with the local agency, provide an 8-1/2" x 11" plot plan of the tanks to be closed. Indicate the nearest cross street to the facility, buildings immediately adjacent to the tanks, location(s) of tanks to be closed, and location of nearby utilities.

This Underground Tank Closure Permit expires 6 months from the date of application. If tanks have not been closed within 6 months, a new closure permit application and appropriate fees may be required.

Facility closure inspections must be scheduled at least 48 hours in advance. Call the appropriate local agency to make necessary arrangements.

**I certify that I have read the tank closure guidelines and declare that the above information is correct to the best of my knowledge. The owner of the tank(s) described above is aware of the pending closure. I agree to comply with all applicable city and county ordinances and state laws relating to hazardous materials/wastes, and hereby authorize representatives of local agencies to enter upon the within mentioned property for inspection purposes.**

| Laura A. Fleming | | 5/19/2015 |
|---|---|---|
| Applicant/Agent's Name (Print) | Applicant/Agent's Signature | Date |

***These boxes are for agency use only***

THIS APPROVAL CONSTITUTES A PERMIT FOR REMOVAL OF THE ABOVE LISTED TANKS.

Agency: ______ Date: ______

Print Name: ______ Sign Name: ______

THIS CERTIFIES THAT ALL TANK SYSTEM CLOSURE ACTIVITIES ARE COMPLETE.*

Agency: ______ Date: ______

Print Name: ______ Sign Name: ______

* If contamination of any detectable concentration is found, contact the leaking underground storage tank Local Oversight Program (LOP) and/or Regional Water Quality Control Board for cleanup and/or remediation requirements.

# County of Santa Clara
**Department of Environmental Health**
**Hazardous Materials Compliance Division**
1555 Berger Drive, Suite 300
San Jose, CA 95112-2716
(408) 918-3400; Fax (408) 280-6479
www.EHinfo.org/hazmat


*Agency Use Only*

Received by: ____________________; Date: _______________

Fee Received: $_________________; Date: _______________

Receipt No.: ___________; SR No.: ___________; PE: **2336**

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   Address: PO Box 92 City: Moffett Field Zip: 94035

   EPA ID No.: TBD Contact Person: Joe Vogel Phone No.: (703) 767-8781

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   Address: Mail Stop 204-15 Bldg. N204 City: Moffett Field Zip: 94035

3. Tank Operator's Name: DLA Energy

   Address: 8725 John J Kingman Rd Suite 2828 City: Fort Belvoir, VA Zip: 22060

4. Applicant's Name: DLA Installation Support for Energy

   Address: 8725 John J Kingman Rd Suite 2828 City: Fort Belvoir, VA Zip: 22060

   Contact Person: Laura Fleming Phone No.: (703) 767- 8308

5. Tank Closure Contractor Business Name: Onieda Total Integrated Environmental LLC (OTIE)
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7. State-certified laboratory that will analyze samples: TBD Phone No.: ( )

***This box is for agency use only***

Laboratory analyses shall test for:

| | TPHG | TPHD | BTEX, MTBE, TAME, ETBE, DIPE, TBA, EDB, EDC (EPA 8260) | Organic Lead (DHS-LUFT) | O&G | Cl HC | Metals (Cd, Cr, Pb, Ni, Zn (ICAP or AA) | PCB, PCP, PNA, Creosote (EPA 8270) | pH | Other (Specify) |
|---|---|---|---|---|---|---|---|---|---|---|
| Tank 1 | | | | | | | | | | |
| Tank 2 | | | | | | | | | | |
| Tank 3 | | | | | | | | | | |
| Tank 4 | | | | | | | | | | |
| Tank 5 | | | | | | | | | | |
| Tank 6 | | | | | | | | | | |

*Additional analyses may be required by inspector in field.*

 Tank Site Address (from page 1): DFSP Moffett Field BLDG 545

8. Name of Licensed Transporter of Tanks: TBD

   EPA ID No.: TBD Phone No.: (      )

9. Destination of Tanks and Piping: TBD

10. Tank System:

| | Size (gallons) | Substance(s) Previously Contained |
|---|---|---|
| Tank 1 | 560,000 | Tank 137, JP-8 |
| Tank 2 | 560,000 | Tank 138, JP-5 |
| Tank 3 | 560,000 | Tank 139, JP-5 |
| Tank 4 | 560,000 | Tank 140, JP-5 |
| Tank 5 | | |
| Tank 6 | | |

If the owner/operator does not have a current Hazardous Materials Business Plan (HMBP) which includes these tanks on file with the local agency, provide an 8-1/2" x 11" plot plan of the tanks to be closed. Indicate the nearest cross street to the facility, buildings immediately adjacent to the tanks, location(s) of tanks to be closed, and location of nearby utilities.

This Underground Tank Closure Permit expires 6 months from the date of application. If tanks have not been closed within 6 months, a new closure permit application and appropriate fees may be required.

Facility closure inspections must be scheduled at least 48 hours in advance. Call the appropriate local agency to make necessary arrangements.

**I certify that I have read the tank closure guidelines and declare that the above information is correct to the best of my knowledge. The owner of the tank(s) described above is aware of the pending closure. I agree to comply with all applicable city and county ordinances and state laws relating to hazardous materials/wastes, and hereby authorize representatives of local agencies to enter upon the within mentioned property for inspection purposes.**

| Laura A. Fleming | | 5/19/2015 |
|---|---|---|
| Applicant/Agent's Name (Print) | Applicant/Agent's Signature | Date |

***These boxes are for agency use only***

THIS APPROVAL CONSTITUTES A PERMIT FOR REMOVAL OF THE ABOVE LISTED TANKS.

Agency: ______________________ Date: ______________

Print Name: ______________________ Sign Name: ______________________

THIS CERTIFIES THAT ALL TANK SYSTEM CLOSURE ACTIVITIES ARE COMPLETE.*

Agency: ______________________ Date: ______________

Print Name: ______________________ Sign Name: ______________________

* If contamination of any detectable concentration is found, contact the leaking underground storage tank Local Oversight Program (LOP) and/or Regional Water Quality Control Board for cleanup and/or remediation requirements.

DEFENSE LOGISTICS AGENCY
ENERGY
8725 JOHN J. KINGMAN ROAD
FORT BELVOIR, VIRGINIA 22060-6222

April 20, 2016

San Francisco Bay Conservation and Development Commission
Attn: Ms. Jaime Michaels, Chief of Permits
455 Golden Gate Avenue, Suite 10600
San Francisco, California 94102

Dear Ms. Michaels:

Attached is the Bay Conservation and Development Commission (BCDC) application for the closure activities at Defense Fuel Support Point (DFSP) Moffett Field located in Santa Clara County, California. The DFSP was operated by the Defense Logistics Agency and comprises five bulk fuel underground storage tanks, pipelines and dispensers. Closure will involve demolition and removal of the fuel facility and restoration of the area to match the surrounding landscape. The determination and the application are being submitted in advance of the Environmental Assessment and Preliminary Jurisdictional Determination from the United States Army Corps of Engineers.

If you have any questions you may contact Mr. Patrick Brown at (703) 767-8309 or Patrick.Brown@dla.mil.

Sincerely,

Laura A. Fleming
Chief, Environmental Division
DLA Installation Support for Energy

Enclosure
BCDC Application

cc: Don Chuck, Environmental Branch Chief, NASA ARC

National Aeronautics and Space Administration

**Ames Research Center**
Moffett Field, California 94035

April 19, 2016

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

Attn: Mr. Mark Beason

Subject: NASA Section 106 Consultation: Defense Fuel Support Point Closure Project at Ames Research Center, Moffett Field, California

Dear Ms. Polanco:

As part of its responsibilities under Section 106 of the National Historic Preservation Act (NHPA), the National Aeronautics and Space Administration (NASA) is requesting consultation for the Defense Fuel Support Point (DFSP) Closure Project (project or undertaking) located at Ames Research Center (ARC) at Moffett Field, California. NASA, as the lead agency under NHPA, has determined that this project constitutes an undertaking. NASA requests review and consultation concerning the project as described in the attached *Historic Property Survey Report for the Defense Fuel Support Point Closure Project at Ames Research Center, Moffett Field, California*. NASA requests the State Historic Preservation Officer's (SHPO) concurrence on NASA's determinations of eligibility for resources identified in the report, and that NASA's finding of no adverse effect is appropriate for this project, pursuant to 36 Code of Federal Regulations (CFR) 800.5(b).

The Defense Logistics Agency (DLA) proposes to permanently close the DFSP, a fuel storage and distribution facility at Moffett Federal Airfield that is owned by NASA and has not been in use since 2003. As a result of this project, 4,443 lineal feet of pipeline corridor would be closed by excavation and removal, and 4,102 lineal feet of pipeline corridor would be closed in place. The existing fuel facility infrastructure would be physically disconnected, abandoned in place, dismantled, and/or demolished based on consultation with the County of Santa Clara's Hazardous Materials Compliance Division and pursuant to the *State of California Underground Storage Tank Requirements*, CCR Title 23, Division 3, Chapter 16, Article 7. In areas where excavation of pipelines would impact sensitive landscape features, pipelines would be closed in place, specifically those sections where removal by excavation/demolition may damage structures such as nearby underground utilities, aircraft ramps and taxiways, mature vegetation, and wetlands or U.S. waters.

NASA has delineated the Area of Potential Effects (APE) to include the project footprint and adjacent areas where historic properties may be indirectly impacted. An archaeological pedestrian survey and intensive built environment survey were conducted. No archaeological resources in the APE. The APE is located within Moffett Federal Airfield, which was determined to be contributing to the NAS Sunnyvale Historic District in 2013. Other NRHP-listed contributors to the district in the APE include Hangars 2 and 3, and Building 55. Features of the airfield are also located in the APE and were evaluated for significance.

Based on the cultural resources study, NASA has determined that the aircraft parking apron (MF1002) and aircraft taxiway (MF1016) are character-defining features of the airfield, which contributes to the NAS Sunnyvale Historic District. NASA has also determined that Building 69, Building 439, and the DFSP, including several individual DFSP components are not individually eligible, character-defining features of the airfield, or contributors to the NAS Sunnyvale Historic District. NASA is seeking the SHPO's concurrence with these determinations.

NASA, in applying the Criteria of Adverse Effect on the proposed project activities, has determined that the undertaking's impact would not constitute an adverse effect due to its minimal impact on the ability of the adjacent historic properties in the APE to convey their historical associations that make them eligible for the NRHP. In the event there is an inadvertent discovery of archaeological resources during the Undertaking, NASA will comply with best management practices as outlined in the 2014 Draft Integrated Cultural Resources Management Plan Standard Operating Procedure 8: Inadvertent Discovery of Archaeological Resources.

Pursuant to 36 CFR 800.5(c), NASA will make its finding of no adverse effect for this undertaking available to the public and any consulting parties, as specified in 36 CFR 800.11(e). Currently, there are no federally recognized Native American Tribes associated with the geographic boundaries of the APE. Under the National Environmental Policy Act (NEPA) environmental review process for this project, DLA will publish a Notice of Availability in the *San Jose Mercury News* newspaper for the Environmental Assessment for the project, including the attached cultural resources report. DLA will also make the Environmental Assessment available to the public online, in the Federal Register, and at the Mountain View Public Library.

NASA is seeking the SHPO's concurrence with NASA's finding that the proposed undertaking will have no adverse effect on historic properties. NASA requests the SHPO's concurrence within 30 days of receipt of this letter, as specified in 36 CFR 800.5(c).

Please contact me at keith.venter@nasa.gov or at (650) 604-6408 with your comments or questions.

Sincerely,

Keith Venter
Historic Preservation Officer

1 **Appendix C. Record of Non-Applicability and Air Emissions Calculations**

2

FORMAT PAGE

**RECORD OF NON-APPLICABILITY**

FORMAT PAGE

**DEPARTMENT OF DEFENSE**
**DEFENSE LOGISTICS AGENCY ENERGY**

**CLEAN AIR ACT GENERAL CONFORMITY RULE**
**RECORD OF NON-APPLICABILITY (RONA)**

**FOR**

**CLOSURE FOR FORMER DEFENSE FUEL SUPPORT POINT MOFFETT FIELD**

**SANTA CLARA COUNTY, CALIFORNIA**

---

**Summary**

Projected air emissions associated with the Proposed Action are below *de minimis* levels, are not regionally significant, and do not require further conformity analysis.

**Introduction**

The Clean Air Act (CAA) as amended requires Federal actions to conform to an approved State implementation plan (SIP). The SIP is designed to achieve or maintain an attainment designation for air pollutants as defined by the National Ambient Air Quality Standards (NAAQSs). The General Conformity Rule (40 CPR Parts 51 and 93) implements these requirements for Federal actions occurring in air quality non-attainment and maintenance areas.

The CAA designates six pollutants as criteria pollutants for which NAAQSs have been promulgated to protect public health and welfare: particulate matter ($PM_{10}$ and $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), lead (Pb), and ozone ($O_3$). Areas that do not meet NAAQSs are designated as "non-attainment" for those criteria pollutants exceeding their respective NAAQS. Non-attainment status is further classified by the extent to which the standard is exceeded. There are six classifications of ozone non-attainment status- transitional, marginal, moderate, serious, severe, and extreme; and two classifications of CO and $PM_{10}$ non-attainment status- moderate and serious. An area which has been redesignated from non-attainment to attainment is referred to as a "maintenance" area.

The activities proposed under this action at DFSP Moffett are located in Santa Clara County, California, within the San Francisco Bay Area Basin (BAAQMD) designated by the United States Environmental Protection Agency (USEPA) as attainment for the $PM_{2.5}$ and 8-hour $O_3$ standards, and non-attainment for the PM2 standard, also in attainment for the $PM_{2.5}$ and 8-hour $O_3$ standards, and is a maintenance area for the $PM_{10}$ standard. While $PM_{2.5}$ is in attainment for the 8-hour $O_3$ standard, it was previously a maintenance area with respect to the 1-hour $O_3$ standard. Therefore, this analysis would include the $O_3$ precursors of $NO_x$ and VOCs to ensure this action would not interfere with statewide $O_3$ standard implementation efforts.

A Federal action is exempt from applicability of the General Conformity Rule requirements if the action's total net emissions are below the *de minimis* levels specified in the rule (see Table 1) and are not regionally significant (i.e., the emissions represent 10 percent or less of a non-attainment or maintenance area's total emission inventory of that pollutant), that are not otherwise exempt per 40 CFR 51.153. Total net emissions include direct and indirect emissions from all stationary point and area sources, construction sources, and/or mobile sources caused by the Federal action that are not covered by another permitting program. To determine if an exemption is applicable to this action, emissions of $PM_{10}$ were evaluated.

Ozone does not occur directly from any source, but results from a series of reactions between oxides of nitrogen (NO.) and volatile organic compounds (VOCs) in sunlight. Therefore, *de minimis* levels of $NO_x$ and VOCs are used to determine exemption from the General Conformity Rule for emissions that would affect ozone levels in an area of non-attainment for ozone.

**Proposed Action**

A total of five (5) underground storage tanks (USTs) and associated pipelines, fueling hydrants, truck fill stands, and associated infrastructure and appurtenances would be closed in accordance with UFC 3-460-01 and the *State of California Underground Storage Tank Requirements,* CCR Title 23, Division 3, Chapter 16, Article 7. UST closure permit applications were submitted to the appropriate agencies for approval in May 2015.

Within the fence boundaries of the fuel farm area and day tank area, all tanks, pipelines, buildings, and associated infrastructure and appurtenances would be cleaned, abated, and/or removed by demolition and excavation. Contaminated soil encountered during the removal operation would be excavated and properly disposed of as hazardous waste in accordance with the Closure Plan to be reviewed and approved by the HMCD. The reinforced concrete tank floors would be and left in place. The Proposed Action would only handle the amount of contaminated soil necessary to accomplish removal project. Further excavations would be no larger than necessary, and bulk of contaminated soil, if any, would be left in place for potential cleanup during a later action.

- After removal, the area would be filled using on-site soil, supplemented by imported soil as necessary, to restore the topography to match the surrounding grade. Backfilled excavations would be compacted to engineering standards, and vegetation would be restored by hydroseeding with a local, native seed mix.

- Within the pipeline corridors, aboveground pipelines would be cleaned, abated, and demolished.

- Within the pipeline corridors, underground pipelines would be cleaned, abated, and removed by demolition and excavation where practical. In areas where demolition and excavation of pipelines would impact sensitive site features, pipelines would be closed in place. Certain sections of pipeline would be closed (abandoned) in place, specifically those sections where removal by excavation/demolition may damage structures such as nearby underground utilities, aircraft ramps and taxiways, mature vegetation that is part of the golf course recreation facility, and wetlands or waters of the U.S. Those underground pipeline segments closed in place would be cleaned, and sealed at each end. After pipeline removal is complete, the area would be filled using on-site soil, supplemented by imported soil as necessary, to restore the topography to match the surrounding grade. Backfilled excavations would be compacted to engineering standards, and vegetation would be restored to match surrounding vegetation.

- The truck loading facility would be saved due to its historical significance. The aboveground portion of the fuel system would be abated and cleaned. The below grade pipeline would be closed in place. The hardscape (e.g., pavement, pads, and curbing) would be left in place.
- Four fuel hydrants will be cleaned, abated and demolished. The hardscape (e.g., pavement, pads, and curbing) would be left in place because it is part of the active airfield.
- Utilities that serviced the fuel system would be disconnected and secured.
- Earthwork would consist of approximately 24,432 bank cubic yards (CY) of cut and 28,149 CY of fill. Approximately 3,717 CY of soil would be imported. The total area disturbed would be 294,861 square feet (approximately 7 acres). It is estimated that 3,210 tons of petroleum-contaminated soil would be removed and disposed of at the Altamont Landfill in Livermore, California, 51 miles from the work site.
- In summary, 8,480, lineal feet of pipeline corridor would be closed by excavation/ demolition and 6,510 lineal feet of pipeline corridor would be closed in place.
- A Closure Plan has been be prepared to describe the work to be performed and the environmental closure commitments. The Closure Plan would be submitted to the HMCD, the lead agency overseeing tank closure under the *State of California Underground Storage Tank Requirements,* CCR Title 23, Division 3, Chapter 16, Article 7.

**Projected Air Emissions**

The summary of annual and daily emissions associated with the Proposed Action is presented below in Tables 1 and 2 respectively. The detailed emissions inventory spreadsheet is located in Appendix C of the EA for the Closure of the Former Defense Fuel Support Point at Moffett Field, Santa Clara County, CA. The *de minimis* thresholds applicable to the SFBAAB are 50 tons per year for ROGs (VOCs) and 100 tons per year for $PM_{2.5}$, $NO_x$, and CO. The Proposed

Action's total emissions should not degrade air quality significantly or prevent the attainment or maintenance of NAAQS and the more stringent CAAQs.

**Table 1. Summary of Proposed Action Annual Emissions Data (Tons per Year)**

| Alternative | Pollutant | Project Total Air Emissions (tons per year) | | | | Total |
|---|---|---|---|---|---|---|
| | | Mobile Tailpipe Emissions | Unpaved Road Emissions | Paved Road Emissions | Local Construction Site Emissions | |
| Proposed Action | $PM_{10}$ | 0.59 | 0.98 | 0.58 | 2.01 | 4.16 |
| | $PM_{2.5}$ | 0.54 | 0.10 | 0.14 | 0.20 | 0.98 |
| | $NO_x$ | 14.87 | NA | NA | NA | 14.87 |
| | VOC | 1.04 | NA | NA | NA | 1.04 |
| | CO | 9.13 | NA | NA | NA | 9.13 |
| | $SO_2$ | 0.01 | NA | NA | NA | 0.01 |
| | $CO_2$ | 1,386 | NA | NA | NA | 1,386 |
| No Action | $PM_{10}$ | 0 | 0 | 0 | 0 | 0 |
| | $PM_{2.5}$ | 0 | 0 | 0 | 0 | 0 |
| | $NO_x$ | 0 | 0 | 0 | 0 | 0 |
| | VOC | 0 | 0 | 0 | 0 | 0 |
| | CO | 0 | 0 | 0 | 0 | 0 |
| | $SO_2$ | 0 | 0 | 0 | 0 | 0 |
| | $CO_2$ | 0 | 0 | 0 | 0 | 0 |

**$PM_{10}$** – fine particulate matter: **$PM_{2.5}$** – very fine particulate matter; **NOx** – nitrogen oxides; **N/A** – not applicable; **VOC** – volatile organic compound; **CO** – carbon monoxide; **$SO_2$** – sulfur dioxide; **$CO_2$** – carbon dioxide

**Table 2. Summary of Proposed Action Daily Emissions Data (Pounds per Day)**

| Alternative | Pollutant | Project Total Air Emissions (pounds per day) | | | | Total |
|---|---|---|---|---|---|---|
| | | Mobile Tailpipe Emissions | Unpaved Road Emissions | Paved Road Emissions | Local Construction Site Emissions | |
| Proposed Action | $PM_{10}$ | 44.24 | 142.79 | 71.67 | 88.21 | 346.90 |
| | $PM_{2.5}$ | 38.29 | 14. 28 | 17.59 | 8.82 | 78.98 |
| | $NO_x$ | 941.54 | NA | NA | NA | 941.54 |
| | VOC | 67.98 | NA | NA | NA | 67.98 |
| | CO | 613.61 | NA | NA | NA | 613.61 |
| | $SO_2$ | 0.94 | NA | NA | NA | 0.94 |
| | $CO_2$ | 102,270 | NA | NA | NA | 102,270 |
| No Action | $PM_{10}$ | 0 | 0 | 0 | 0 | 0 |
| | $PM_{2.5}$ | 0 | 0 | 0 | 0 | 0 |
| | $NO_x$ | 0 | 0 | 0 | 0 | 0 |
| | VOC | 0 | 0 | 0 | 0 | 0 |
| | CO | 0 | 0 | 0 | 0 | 0 |
| | $SO_2$ | 0 | 0 | 0 | 0 | 0 |

**$PM_{10}$** – fine particulate matter: **$PM_{2.5}$** – very fine particulate matter; **NOx** – nitrogen oxides; **N/A** – not applicable; **VOC** – volatile organic compound; **CO** – carbon monoxide; **$SO_2$** – sulfur dioxide; **$CO_2$** – carbon dioxide

## Conclusion

Total direct and indirect emissions of $PM_{10}$ for all years evaluated are below the *de minimis* threshold of 100 tons per year for $PM_{10}$ moderate non-attainment and maintenance areas. These emission levels are also less than 10% of the air district's total inventory of $PM_{10}$ emissions; thus, they are not regionally significant. Therefore, the proposed Federal action is exempt from further analysis under the General Conformity Rule.

To the best of my knowledge, the information presented in this RONA is correct and accurate, and I concur in the finding that implementation of the Proposed Action would conform to the SIP.

____________________________ ____________________________

**LAURA FLEMING** Date
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FORMAT PAGE

**AIR QUALITY TABLES**

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## Table C-1. 2013 California and National Ambient Air Quality Standards

| Pollutant | Averaging Time | California[1] | | National[2] | |
|---|---|---|---|---|---|
| | | Concentration | Attainment Status | Concentration[3] Primary/Secondary | Attainment Status |
| Ozone ($O_3$) | 1 hour | 0.070 ppm (137.0 $\mu g/m^3$) | N[9] | NA | N[4] |
| | 8 hours (primary and secondary) | 0.09 ppm (180.0 $\mu g/m^3$) | N | 0.075 ppm (147.0 $\mu g/m^3$) | ([5]) |
| $PM_{10}$ | 24 hours (primary and secondary) | 50.0 $\mu g/m^3$ | N | 150.0 $\mu g/m^3$ | U |
| | Annual arithmetic mean | 20.0 $\mu g/m^3$ | N[7] | NA | NA |
| $PM_{2.5}$ | 24 hours (primary and secondary) | NA | NA | 35.0 $\mu g/m^3$ ([10]) | U |
| | Annual arithmetic mean | 12.0 $\mu g/m^3$ | N[7] | primary 12.0 $\mu g/m^3$ ([15])/secondary15.0 $\mu g/m^3$ | U, A |
| Carbon Monoxide (CO) | 1 hour (primary) | 20 ppm (23 $mg/m^3$) | A | 35 ppm (40.0 $mg/m^3$) | A |
| | 8 hours (primary) | 9.0 ppm (10 $mg/m^3$) | A | 9 ppm (10.0 $mg/m^3$) | A[6] |
| Nitrogen Dioxide ($NO_2$) | 1 hour (primary) | 0.18 ppm (339.0 $\mu g/m^3$) | A | 100 ppb (188.0 $\mu g/m^3$) ([11]) | U |
| | Annual arithmetic mean (primary and secondary) | 0.030 ppm (57.0 $\mu g/m^3$) | NA | 0.053 ppm (100.0 $\mu g/m^3$) | NA |
| Sulfur Dioxide ($SO_2$)[12] | primary 1 hour/secondary 3 hours | 0.25 ppm (655.0 $\mu g/m^3$) | A | primary 75 ppb (196.0 $\mu g/m^3$)/secondary 0.5 ppm | A |
| | 24 hours | 0.04 ppm (105.0 $\mu g/m^3$) | A | 0.14 ppm (for certain areas) | A |
| | Annual arithmetic mean | NA | NA | 0.030 ppm (for certain areas) | A |
| Lead (Pb)[12] | Calendar quarter | NA | NA | 1.5 $\mu g/m^3$ (for certain areas) | NA |
| | Rolling 3-month average[14] (primary and secondary) | NA | NA | 0.15 $\mu g/m^3$ | ([14]) |
| | 30-day average | 1.5 ($\mu g/m^3$) | NA | NA | A |
| Sulfates | 24 hours | 25 $\mu g/m^3$ | A | NA | NA |

| Pollutant | Averaging Time | California[1] | | National[2] | |
|---|---|---|---|---|---|
| | | Concentration | Attainment Status | Concentration[3] Primary/Secondary | Attainment Status |
| Hydrogen Sulfide | 1 hour | 0.03 ppm (42 $\mu g/m^3$) | U | NA | NA |
| Vinyl Chloride (Chloroethene) | 24 hours | 0.010 ppm (26 $\mu g/m^3$) | No information available | NA | NA |
| Visibility Reducing Particulates | 8 hours (1000 to 1800 hours PST) | ([8]) | U | NA | NA |

Source: Bay Area Air Quality Management District Air Quality Standards and Attainment Status. 2015
**$O_3$** – ozone; **ppm** – parts per million; **$\mu g/m^3$** – micrograms per cubic meter; **$PM_{10}$** – fine particulate matter; **$PM_{2.5}$** – very fine particulate matter; **CO** – carbon monoxide; **$mg/m^3$** – milligrams per cubic meter; **$NO_2$** – nitrogen dioxide; **$SO_2$** – sulfur dioxide; **ppb –** parts per billion; **Pb** – lead; **PST** – Pacific Standard Time
Attainment status: **A** – Attainment; **N** – Nonattainment; **U** – Unclassified; **NA** – Not Applicable

### Notes on Table C-1: 2013 California and National Ambient Air Quality Standards

California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended fine particulate matter ($PM_{10}$), and visibility-reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average (i.e., all standards except for lead and the $PM_{10}$ annual standard), then some measurements may be excluded. In particular, measurements are excluded that the California Air Resources Board (CARB) determines would occur less than once per year on the average. The Lake Tahoe carbon monoxide standard is 6.0 parts per million (ppm), a level one-half the national standard and two-thirds the State of California standard.

The national "primary standards" are designed to protect public health. National standards other than for ozone, particulates, and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the 3-year average of the fourth highest daily concentrations is 0.075 ppm (75 parts per billion) or less. The 24-hour $PM_{10}$ standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than150 micrograms per cubic meter ($\mu g/m^3$). The 24-hour very fine particulate matter ($PM_{2.5}$) standard is attained when the 3-year average of 98th percentiles is less than 35 $\mu g/m^3$.

1. Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for $PM_{10}$ is met if the 3-year average falls below the standard at every site. The annual

$PM_{2.5}$ standard is met if the 3-year average of annual averages spatially-averaged across officially designed clusters of sites falls below the standard.

2. National air quality standards are set by the United States Environmental Protection Agency (EPA) at levels determined to be protective of public health with an adequate margin of safety.
3. Final designations effective July 20, 2012.
4. The national 1-hour ozone standard was revoked by the EPA on June 15, 2005.
5. In April 1998, the San Francisco Bay Area was redesignated to attainment for the national 8-hour carbon monoxide standard.
6. In June 2002, CARB established new annual standards for $PM_{2.5}$ and $PM_{10}$.
7. Statewide Visibility Reducing Particles Standard (except for the Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.
8. The 8-hour California ozone standard was approved by the Air Resources Board on April 28, 2005, and became effective on May 17, 2006.
9. On January 9, 2013, the EPA issued a final rule to determine that the San Francisco Bay Area attains the 24-hour PM2.5 national standard. This EPA rule suspends key State Implementation Plan requirements as long as monitoring data continue to show that the Bay Area attains the standard. Despite this EPA action, the Bay Area will continue to be designated as “nonattainment” for the national 24-hour $PM_{2.5}$ standard until such time as the BAAQMD submits a “redesignation request” and a “Maintenance Plan” to the EPA, and the EPA approves the proposed redesignation.
10. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
11. On June 2, 2010, the EPA established a new 1-hour sulfur dioxide standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The existing 0.030 ppm annual and 0.14 ppm 24-hour sulfur dioxide National Ambient Air Quality Standards (NAAQS), however, must continue to be used until 1 year following the EPA’s initial designations of the new 1-hour sulfur dioxide NAAQS. The EPA expects to designate areas by June 2012.

12. Air Resources Board has identified lead and vinyl chloride as “toxic air contaminants” with no threshold level of exposure below which there are no adverse health effects.

13. National lead standard, rolling 3-month average: final rule signed October 15, 2008. Final designations effective December 31, 2011.

14. In December 2012, the EPA strengthened the annual $PM_{2.5}$ NAAQS from 15.0 to 12.0 $\mu g/m^3$. In December 2014, EPA issued final area designations for the 2012 primary annual $PM_{2.5}$ NAAQS. Areas designated “unclassifiable/attainment” must continue to take steps to prevent their air quality from deteriorating to unhealthy levels. The effective date of this standard is April 15, 2015.

1

2 **Table C-2. Moffett Environmental Assessment**
3 **Summary of Project Total Air Emissions Estimates**

| Alternative | Pollutant | Project Total Air Emissions (tons per year) | | | | Total Emissions |
|---|---|---|---|---|---|---|
| | | Mobile Tailpipe Emissions | Unpaved Road Emissions | Paved Road Emissions | Local Construction Site Emissions | |
| Proposed Action | $PM_{10}$ | 0.59 | 0.98 | 0.58 | 2.01 | 4.16 |
| | $PM_{2.5}$ | 0.54 | 0.10 | 0.14 | 0.20 | 0.98 |
| | $NO_X$ | 14.87 | NA | NA | NA | 14.87 |
| | VOC | 1.04 | NA | NA | NA | 1.04 |
| | CO | 9.13 | NA | NA | NA | 9.13 |
| | $SO_2$ | 0.01 | NA | NA | NA | 0.01 |
| | $CO_2$ | 1,386 | NA | NA | NA | 1,386 |
| No Action Alternative | $PM_{10}$ | 0 | 0 | 0 | 0 | 0 |
| | $PM_{2.5}$ | 0 | 0 | 0 | 0 | 0 |
| | $NO_X$ | 0 | 0 | 0 | 0 | 0 |
| | VOC | 0 | 0 | 0 | 0 | 0 |
| | CO | 0 | 0 | 0 | 0 | 0 |
| | $SO_2$ | 0 | 0 | 0 | 0 | 0 |
| | $CO_2$ | 0 | 0 | 0 | 0 | 0 |

4 **$PM_{10}$** – particulate matter (fine); **$PM_{2.5}$** – particulate matter (very fine); **$NO_X$** –nitrogen oxides; **NA** – not applicable;
5 **VOC** – volatile organic compound; **CO** – carbon monoxide; **$SO_2$** – sulfur dioxide; **$CO_2$** – carbon dioxide

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**Table C-3. Moffett Environmental Assessment
Summary of Daily Air Emissions Estimates**

| Alternative | Pollutant | Daily Air Emissions (lb/day) | | | | Total Emissions |
|---|---|---|---|---|---|---|
| | | Mobile Tailpipe Emissions | Unpaved Road Emissions | Paved Road Emissions | Local Construction Site Emissions | |
| Proposed Action | $PM_{10}$ | 44.24 | 142.79 | 71.67 | 88.21 | 346.90 |
| | $PM_{2.5}$ | 38.29 | 14.28 | 17.59 | 8.82 | 78.98 |
| | $NO_X$ | 941.54 | NA | NA | NA | 941.54 |
| | VOC | 67.98 | NA | NA | NA | 67.98 |
| | CO | 613.61 | NA | NA | NA | 613.61 |
| | $SO_2$ | 0.94 | NA | NA | NA | 0.94 |
| | $CO_2$ | 102,270 | NA | NA | NA | 102,270 |
| No Action Alternative | $PM_{10}$ | 0 | 0 | 0 | 0 | 0 |
| | $PM_{2.5}$ | 0 | 0 | 0 | 0 | 0 |
| | $NO_X$ | 0 | 0 | 0 | 0 | 0 |
| | VOC | 0 | 0 | 0 | 0 | 0 |
| | CO | 0 | 0 | 0 | 0 | 0 |
| | $SO_2$ | 0 | 0 | 0 | 0 | 0 |
| | $CO_2$ | 0 | 0 | 0 | 0 | 0 |

**$PM_{10}$** – particulate matter (fine); **$PM_{2.5}$** – particulate matter (very fine); **$NO_X$** –nitrogen oxides; **VOC** – volatile organic compound; **CO** – carbon monoxide; **$SO_2$** – sulfur dioxide; **$CO_2$** – carbon dioxide

1 **Table C-4. Moffett Environmental Assessment Mobile Equipment Tailpipe Emissions - Proposed Action (Operating Parameters, Operation Schedule, $PM_{10}$)**

| Equipment | Operating Parameters | | | | Operation Schedule | | | | | | $PM_{10}$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HP | Brake-Specific Fuel Consumption[1] gal/Hp-hr | Brake-Specific Fuel Consumption g/Hp-hr | Fuel Consumption gal/hr | VMT/day | VMT/year | EPA Tier Level | hrs/day | days/wk | Total Equipment Days | Emission Factor[2] | Emission Factor Units | lb/hr | lb/day | tons/yr |
| **Well Destruction** | | | | | | | | | | | | | | | |
| Low Side Truck | 325 | NA | NA | NA | 21 | 63 | Tier 2 | 12 | 3 | 3 | 0.003 | g/mile | 1.1E-05 | 1.3E-04 | 2.0E-07 |
| Hollow Stem Auger Drill | 45 | 0.042 | 118.44 | 1.89 | NA | NA | Tier 2 | 12 | 3 | 3 | 0.450 | g/hp-hr | 0.045 | 0.536 | 0.001 |
| **Demolition Fuel Farm** | | | | | | | | | | | | | | | |
| Large Track Excavator | 472 | 0.042 | 118.44 | 19.82 | NA | NA | Tier 2 | 12 | 5 | 70 | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.066 |
| Large Track Excavator with Shear | 472 | 0.042 | 118.44 | 19.82 | NA | NA | Tier 2 | 12 | 5 | 35 | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.033 |
| Large Track Excavator with Hydraulic Hammer | 472 | 0.042 | 118.44 | 19.82 | NA | NA | Tier 2 | 12 | 5 | 35 | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.033 |
| Motor Grader | 221 | 0.035 | 98.70 | 7.74 | NA | NA | Tier 2 | 12 | 5 | 35 | 0.150 | g/hp-hr | 0.073 | 0.877 | 0.015 |
| Medium Track Dozer | 166 | 0.042 | 118.44 | 6.97 | NA | NA | Tier 2 | 12 | 5 | 70 | 0.220 | g/hp-hr | 0.081 | 0.966 | 0.034 |
| Medium Wheel Loader | 386 | 0.036 | 101.52 | 13.90 | NA | NA | Tier 2 | 12 | 5 | 70 | 0.150 | g/hp-hr | 0.128 | 1.532 | 0.054 |
| Large Wheel Loader | 699 | 0.036 | 101.52 | 25.16 | NA | NA | Tier 2 | 12 | 5 | 70 | 0.150 | g/hp-hr | 0.231 | 2.774 | 0.097 |
| Articulated Dump Truck | 400 | NA | NA | NA | 222 | 15,515 | Tier 2 | 12 | 5 | 70 | 0.003 | g/mile | 1.2E-04 | 1.4E-03 | 5.1E-05 |
| Soil Compactor | 66 | 0.042 | 118.44 | 2.77 | NA | NA | Tier 2 | 12 | 5 | 35 | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.009 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | NA | NA | Tier 2 | 12 | 5 | 70 | 0.150 | g/hp-hr | 0.083 | 0.992 | 0.035 |
| Low Side Truck | 325 | NA | NA | NA | 63 | 4,431 | Tier 2 | 12 | 5 | 210 | 0.003 | g/mile | 3.3E-05 | 3.9E-04 | 1.4E-05 |
| **Demolition Day Tank** | | | | | | | | | | | | | | | |
| Large Track Excavator | 472 | 0.042 | 118.44 | 19.82 | NA | NA | Tier 2 | 12 | 5 | 30 | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.028 |
| Large Track Excavator with Shear | 472 | 0.042 | 118.44 | 19.82 | NA | NA | Tier 2 | 12 | 5 | 15 | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.014 |
| Large Track Excavator with Hydraulic Hammer | 472 | 0.042 | 118.44 | 19.82 | NA | NA | Tier 2 | 12 | 5 | 15 | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.014 |
| Medium Track Dozer | 166 | 0.042 | 118.44 | 6.97 | NA | NA | Tier 2 | 12 | 5 | 30 | 0.220 | g/hp-hr | 0.081 | 0.966 | 0.014 |
| Medium Wheel Loader | 386 | 0.036 | 101.52 | 13.90 | NA | NA | Tier 2 | 12 | 5 | 30 | 0.150 | g/hp-hr | 0.128 | 1.532 | 0.023 |
| Large Wheel Loader | 699 | 0.036 | 101.52 | 25.16 | NA | NA | Tier 2 | 12 | 5 | 30 | 0.150 | g/hp-hr | 0.231 | 2.774 | 0.042 |
| Articulated Dump Truck | 400 | NA | NA | NA | 222 | 6,649 | Tier 2 | 12 | 5 | 30 | 0.003 | g/mile | 1.2E-04 | 1.4E-03 | 2.2E-05 |
| Soil Compactor | 66 | 0.042 | 118.44 | 2.77 | NA | NA | Tier 2 | 12 | 5 | 15 | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.004 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | NA | NA | Tier 2 | 12 | 5 | 30 | 0.150 | g/hp-hr | 0.083 | 0.992 | 0.015 |
| Low Side Truck | 325 | NA | NA | NA | 63 | 1,899 | Tier 2 | 12 | 5 | 90 | 0.003 | g/mile | 3.3E-05 | 3.9E-04 | 5.9E-06 |
| **Demolition Truck Loading** | | | | | | | | | | | | | | | |
| Backhoe Loader | 87 | 0.042 | 118.44 | 3.65 | NA | NA | Tier 2 | 12 | 2.5 | 3 | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.001 |
| Small Track Excavator | 113 | 0.042 | 118.44 | 4.75 | NA | NA | Tier 2 | 12 | 2.5 | 3 | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.001 |

| Equipment | Operating Parameters | | | | Operation Schedule | | | | | | $PM_{10}$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HP | Brake-Specific Fuel Consumption[1] gal/Hp-hr | Brake-Specific Fuel Consumption g/Hp-hr | Fuel Consumption gal/hr | VMT/day | VMT/year | EPA Tier Level | hrs/day | days/wk | Total Equipment Days | Emission Factor[2] | Emission Factor Units | lb/hr | lb/day | tons/yr |
| Small Track Excavator with Hydraulic Hammer | 113 | 0.042 | 118.44 | 4.75 | NA | NA | Tier 2 | 12 | 2.5 | 3 | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.001 |
| Large Track Excavator with Shear | 472 | 0.042 | 118.44 | 19.82 | NA | NA | Tier 2 | 12 | 5 | 10 | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.009 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | NA | NA | Tier 2 | 12 | 2.5 | 3 | 0.150 | g/hp-hr | 0.083 | 0.992 | 0.001 |
| 10 Wheel Dump Truck | 400 | NA | NA | NA | 211 | 2,106 | Tier 2 | 12 | 2.5 | 3 | 0.003 | g/mile | 1.1E-04 | 1.3E-03 | 6.6E-06 |
| Low Side Truck | 325 | NA | NA | NA | 169 | 422 | Tier 2 | 12 | 5 | 20 | 0.003 | g/mile | 8.8E-05 | 1.1E-03 | 1.3E-06 |
| **Demolition Fuel Hydrants** | | | | | | | | | | | | | | | |
| Low Side Truck | 325 | NA | NA | NA | 42 | 211 | Tier 2 | 12 | 5 | 10 | 0.003 | g/mile | 2.2E-05 | 2.6E-04 | 6.6E-07 |
| **Demolition Fuel Dock Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 87 | 0.042 | 118.44 | 3.65 | NA | NA | Tier 2 | 12 | 5 | 16 | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.006 |
| Small Track Excavator | 113 | 0.042 | 118.44 | 4.75 | NA | NA | Tier 2 | 12 | 5 | 16 | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.005 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | NA | NA | Tier 2 | 12 | 5 | 4 | 0.150 | g/hp-hr | 0.083 | 0.992 | 0.002 |
| Small Track Asphalt Paver | 46 | 0.042 | 118.44 | 1.93 | NA | NA | Tier 2 | 12 | 1 | 1 | 0.450 | g/hp-hr | 0.046 | 0.548 | 0.0003 |
| Small Asphalt Compactor | 66 | 0.042 | 118.44 | 2.77 | NA | NA | Tier 2 | 12 | 1 | 1 | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.0003 |
| 10 Wheel Dump Truck | 400 | NA | NA | NA | 843 | 13,481 | Tier 2 | 12 | 5 | 16 | 0.003 | g/mile | 4.4E-04 | 5.3E-03 | 4.2E-05 |
| Low Side Truck | 325 | NA | NA | NA | 42 | 675 | Tier 2 | 12 | 5 | 32 | 0.003 | g/mile | 2.2E-05 | 2.6E-04 | 2.1E-06 |
| **Demolition Day Tank Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 87 | 0.042 | 118.44 | 3.65 | NA | NA | Tier 2 | 12 | 5 | 17 | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.006 |
| Small Track Excavator | 113 | 0.042 | 118.44 | 4.75 | NA | NA | Tier 2 | 12 | 5 | 17 | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.006 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | NA | NA | Tier 2 | 12 | 4 | 4 | 0.150 | g/hp-hr | 0.083 | 0.992 | 0.002 |
| Small Track Asphalt Paver | 46 | 0.042 | 118.44 | 1.93 | NA | NA | Tier 2 | 12 | 1 | 1 | 0.450 | g/hp-hr | 0.046 | 0.548 | 0.0003 |
| Small Asphalt Compactor | 66 | 0.042 | 118.44 | 2.77 | NA | NA | Tier 2 | 12 | 1 | 1 | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.0003 |
| 10 Wheel Dump Truck | 400 | NA | NA | NA | 843 | 14,324 | Tier 2 | 12 | 5 | 17 | 0.003 | g/mile | 4.4E-04 | 5.3E-03 | 4.5E-05 |
| Low Side Truck | 325 | NA | NA | NA | 42 | 717 | Tier 2 | 12 | 5 | 34 | 0.003 | g/mile | 2.2E-05 | 2.6E-04 | 2.2E-06 |
| **Demolition Truck loading Fac. Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 87 | 0.042 | 118.44 | 3.65 | NA | NA | Tier 2 | 12 | 5 | 11 | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.004 |
| Small Track Excavator | 113 | 0.042 | 118.44 | 4.75 | NA | NA | Tier 2 | 12 | 5 | 11 | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.004 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | NA | NA | Tier 2 | 12 | 3 | 3 | 0.150 | g/hp-hr | 0.083 | 0.992 | 0.001 |
| Small Track Asphalt Paver | 46 | 0.042 | 118.44 | 1.93 | NA | NA | Tier 2 | 12 | 1 | 1 | 0.450 | g/hp-hr | 0.046 | 0.548 | 0.0003 |
| Small Asphalt Compactor | 66 | 0.042 | 118.44 | 2.77 | NA | NA | Tier 2 | 12 | 1 | 1 | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.0003 |
| 10 Wheel Dump Truck | 400 | NA | NA | NA | 843 | 9,268 | Tier 2 | 12 | 5 | 11 | 0.003 | g/mile | 4.4E-04 | 5.3E-03 | 2.9E-05 |
| Low Side Truck | 325 | NA | NA | NA | 42 | 464 | Tier 2 | 12 | 5 | 22 | 0.003 | g/mile | 2.2E-05 | 2.6E-04 | 1.4E-06 |
| **Demolition Fuel Hydrant Pipeline** | | | | | | | | | | | | | | | |

| Equipment | Operating Parameters | | | | Operation Schedule | | | | | | $PM_{10}$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HP | Brake-Specific Fuel Consumption[1] gal/Hp-hr | Brake-Specific Fuel Consumption g/Hp-hr | Fuel Consumption gal/hr | VMT/day | VMT/year | EPA Tier Level | hrs/day | days/wk | Total Equipment Days | Emission Factor[2] | Emission Factor Units | lb/hr | lb/day | tons/yr |
| Backhoe Loader | 87 | 0.042 | 118.44 | 3.65 | NA | NA | Tier 2 | 12 | 5 | 5 | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.002 |
| Small Track Excavator | 113 | 0.042 | 118.44 | 4.75 | NA | NA | Tier 2 | 12 | 5 | 5 | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.002 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | NA | NA | Tier 2 | 12 | 1.25 | 1 | 0.150 | g/hp-hr | 0.083 | 0.992 | 0.001 |
| 10 Wheel Dump Truck | 400 | NA | NA | NA | 843 | 4,213 | Tier 2 | 12 | 5 | 5 | 0.003 | g/mile | 4.4E-04 | 5.3E-03 | 1.3E-05 |
| Low Side Truck | 325 | NA | NA | NA | 42 | 211 | Tier 2 | 12 | 5 | 10 | 0.003 | g/mile | 2.2E-05 | 2.6E-04 | 6.6E-07 |
| **Environmental Drilling Sample of Pipeline** | | | | | | | | | | | | | | | |
| Low Side Truck | 325 | NA | NA | NA | 21 | 506 | Tier 2 | 12 | 5 | 24 | 0.003 | g/mile | 1.1E-05 | 1.3E-04 | 1.6E-06 |
| Direct Push Drill Rig | 45 | 0.042 | 118.44 | 1.89 | NA | NA | Tier 2 | 12 | 5 | 24 | 0.450 | g/hp-hr | 0.045 | 0.536 | 0.006 |
| | | | | | | | | | | | | **Totals:** | **3.69** | **44.24** | **0.59** |

**HP** – horsepower; **gal** or **g** – gallon; **hr** – hour; **VMT** – vehicle miles traveled; **EPA** – United States Environmental Protection Agency; **wk** – week; **lb** – pounds; **yr** – year; **NA** - not applicable; **Fac.** – facility

[1] Fuel consumption estimates for offroad equipment is based on data provided in *Construction Equipment for Engineers, Estimators, and Owners* (Douglas D. Gransberg, Calin M. Popescu, Richard Ryan, 2006)

[2] Emission factors from the United States Environmental Protection Agency's *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling* for nonroad vehicles and EMFAC database for onroad vehicles

[3] Emission Factors from the United States Environmental Protection Agency's greenhouse gas emission requirements for heavy-duty engines

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1 **Table C-5. Moffett Environmental Assessment Mobile Equipment Tailpipe Emissions - Proposed Action ($PM_{2.5}$, NOx, HC)**

| Equipment | $PM_{2.5}$ | | | | | NOx | | | | | HC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission Factor(2) | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor(2) | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor(2) | Emission Factor Units | lb/hr | lb/day | tons/yr |
| **Well Destruction** | | | | | | | | | | | | | | | |
| Low Side Truck | 0.003 | g/mile | 1.1E-05 | 1.3E-04 | 1.9E-07 | 0.028 | g/mile | 1.1E-04 | 1.3E-03 | 2.0E-06 | 0.016 | g/mile | 6.3E-05 | 7.5E-04 | 1.1E-06 |
| Hollow Stem Auger Drill | 0.450 | g/hp-hr | 0.045 | 0.536 | 0.001 | 5.200 | g/hp-hr | 0.516 | 6.190 | 0.009 | 0.400 | g/hp-hr | 0.040 | 0.476 | 0.001 |
| **Demolition Fuel Farm** | | | | | | | | | | | | | | | |
| Large Track Excavator | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.066 | 4.500 | g/hp-hr | 4.683 | 56.190 | 1.967 | 0.300 | g/hp-hr | 0.312 | 3.746 | 0.131 |
| Large Track Excavator with Shear | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.033 | 4.500 | g/hp-hr | 4.683 | 56.190 | 0.983 | 0.300 | g/hp-hr | 0.312 | 3.746 | 0.066 |
| Large Track Excavator with Hydraulic Hammer | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.033 | 4.500 | g/hp-hr | 4.683 | 56.190 | 0.983 | 0.300 | g/hp-hr | 0.312 | 3.746 | 0.066 |
| Motor Grader | 0.150 | g/hp-hr | 0.073 | 0.877 | 0.015 | 4.500 | g/hp-hr | 2.192 | 26.310 | 0.460 | 0.400 | g/hp-hr | 0.195 | 2.339 | 0.041 |
| Medium Track Dozer | 0.220 | g/hp-hr | 0.081 | 0.966 | 0.034 | 4.500 | g/hp-hr | 1.647 | 19.762 | 0.692 | 0.400 | g/hp-hr | 0.146 | 1.757 | 0.061 |
| Medium Wheel Loader | 0.150 | g/hp-hr | 0.128 | 1.532 | 0.054 | 4.500 | g/hp-hr | 3.829 | 45.952 | 1.608 | 0.300 | g/hp-hr | 0.255 | 3.063 | 0.107 |
| Large Wheel Loader | 0.150 | g/hp-hr | 0.231 | 2.774 | 0.097 | 4.500 | g/hp-hr | 6.935 | 83.214 | 2.913 | 0.300 | g/hp-hr | 0.462 | 5.548 | 0.194 |
| Articulated Dump Truck | 0.003 | g/mile | 1.1E-04 | 1.4E-03 | 4.7E-05 | 0.615 | g/mile | 2.5E-02 | 3.0E-01 | 1.1E-02 | 0.053 | g/mile | 2.2E-03 | 2.6E-02 | 9.1E-04 |
| Soil Compactor | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.009 | 5.200 | g/hp-hr | 0.757 | 9.079 | 0.159 | 0.400 | g/hp-hr | 0.058 | 0.698 | 0.012 |
| 10 Wheel Water Truck | 0.003 | g/hp-hr | 0.002 | 0.018 | 0.001 | 0.027 | g/hp-hr | 0.015 | 0.176 | 0.006 | 0.011 | g/hp-hr | 0.006 | 0.074 | 0.003 |
| Low Side Truck | 0.003 | g/mile | 3.2E-05 | 3.9E-04 | 1.4E-05 | 0.028 | g/mile | 3.3E-04 | 3.9E-03 | 1.4E-04 | 0.016 | g/mile | 1.9E-04 | 2.3E-03 | 7.9E-05 |
| **Demolition Day Tank** | | | | | | | | | | | | | | | |
| Large Track Excavator | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.028 | 4.500 | g/hp-hr | 4.683 | 56.190 | 0.843 | 0.300 | g/hp-hr | 0.312 | 3.746 | 0.056 |
| Large Track Excavator with Shear | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.014 | 4.500 | g/hp-hr | 4.683 | 56.190 | 0.421 | 0.300 | g/hp-hr | 0.312 | 3.746 | 0.028 |
| Large Track Excavator with Hydraulic Hammer | 0.150 | g/hp-hr | 0.156 | 1.873 | 0.014 | 4.500 | g/hp-hr | 4.683 | 56.190 | 0.421 | 0.300 | g/hp-hr | 0.312 | 3.746 | 0.028 |
| Medium Track Dozer | 0.220 | g/hp-hr | 0.081 | 0.966 | 0.014 | 4.500 | g/hp-hr | 1.647 | 19.762 | 0.296 | 0.400 | g/hp-hr | 0.146 | 1.757 | 0.026 |
| Medium Wheel Loader | 0.150 | g/hp-hr | 0.128 | 1.532 | 0.023 | 4.500 | g/hp-hr | 3.829 | 45.952 | 0.689 | 0.300 | g/hp-hr | 0.255 | 3.063 | 0.046 |
| Large Wheel Loader | 0.150 | g/hp-hr | 0.231 | 2.774 | 0.042 | 4.500 | g/hp-hr | 6.935 | 83.214 | 1.248 | 0.300 | g/hp-hr | 0.462 | 5.548 | 0.083 |
| Articulated Dump Truck | 0.003 | g/mile | 1.1E-04 | 1.4E-03 | 2.0E-05 | 0.615 | g/mile | 2.5E-02 | 3.0E-01 | 4.5E-03 | 0.053 | g/mile | 2.2E-03 | 2.6E-02 | 3.9E-04 |
| Soil Compactor | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.004 | 5.200 | g/hp-hr | 0.757 | 9.079 | 0.068 | 0.400 | g/hp-hr | 0.058 | 0.698 | 0.005 |
| 10 Wheel Water Truck | 0.003 | g/hp-hr | 0.002 | 0.018 | 0.000 | 0.027 | g/hp-hr | 0.015 | 0.176 | 0.003 | 0.011 | g/hp-hr | 0.006 | 0.074 | 0.001 |
| Low Side Truck | 0.003 | g/mile | 3.2E-05 | 3.9E-04 | 5.8E-06 | 0.028 | g/mile | 3.3E-04 | 3.9E-03 | 5.9E-05 | 0.016 | g/mile | 1.9E-04 | 2.3E-03 | 3.4E-05 |
| **Demolition Truck Loading** | | | | | | | | | | | | | | | |
| Backhoe Loader | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.001 | 5.200 | g/hp-hr | 0.997 | 11.968 | 0.015 | 0.400 | g/hp-hr | 0.077 | 0.921 | 0.001 |
| Small Track Excavator | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.001 | 4.500 | g/hp-hr | 1.121 | 13.452 | 0.017 | 0.400 | g/hp-hr | 0.100 | 1.196 | 0.001 |
| Small Track Excavator with Hydraulic Hammer | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.001 | 4.500 | g/hp-hr | 1.121 | 13.452 | 0.017 | 0.400 | g/hp-hr | 0.100 | 1.196 | 0.001 |
| Large Track Excavator with Shear | 0.220 | g/hp-hr | 0.229 | 2.747 | 0.014 | 4.500 | g/hp-hr | 4.683 | 56.190 | 0.281 | 0.300 | g/hp-hr | 0.312 | 3.746 | 0.019 |
| 10 Wheel Water Truck | 0.003 | g/hp-hr | 0.002 | 0.018 | 0.000 | 0.027 | g/hp-hr | 0.015 | 0.176 | 0.000 | 0.011 | g/hp-hr | 0.006 | 0.074 | 0.000 |

| Equipment | PM2.5 | | | | | NOx | | | | | HC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission Factor(2) | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor(2) | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor(2) | Emission Factor Units | lb/hr | lb/day | tons/yr |
| 10 Wheel Dump Truck | 0.003 | g/mile | 1.1E-04 | 1.3E-03 | 6.4E-06 | 0.615 | g/mile | 2.4E-02 | 2.9E-01 | 1.4E-03 | 0.053 | g/mile | 2.1E-03 | 2.5E-02 | 1.2E-04 |
| Low Side Truck | 0.003 | g/mile | 8.6E-05 | 1.0E-03 | 1.3E-06 | 0.028 | g/mile | 8.7E-04 | 1.0E-02 | 1.3E-05 | 0.016 | g/mile | 5.0E-04 | 6.0E-03 | 7.5E-06 |
| **Demolition Fuel Hydrants** | | | | | | | | | | | | | | | |
| Low Side Truck | 0.003 | g/mile | 2.1E-05 | 2.6E-04 | 6.4E-07 | 0.028 | g/mile | 2.2E-04 | 2.6E-03 | 6.5E-06 | 0.016 | g/mile | 1.3E-04 | 1.5E-03 | 3.8E-06 |
| **Demolition Fuel Dock Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.006 | 5.200 | g/hp-hr | 0.997 | 11.968 | 0.096 | 0.400 | g/hp-hr | 0.077 | 0.921 | 0.007 |
| Small Track Excavator | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.005 | 4.500 | g/hp-hr | 1.121 | 13.452 | 0.108 | 0.400 | g/hp-hr | 0.100 | 1.196 | 0.010 |
| 10 Wheel Water Truck | 0.003 | g/hp-hr | 0.002 | 0.018 | 0.000 | 0.027 | g/hp-hr | 0.015 | 0.176 | 0.000 | 0.011 | g/hp-hr | 0.006 | 0.074 | 0.000 |
| Small Track Asphalt Paver | 0.450 | g/hp-hr | 0.046 | 0.548 | 0.000 | 5.200 | g/hp-hr | 0.527 | 6.328 | 0.003 | 0.400 | g/hp-hr | 0.041 | 0.487 | 0.000 |
| Small Asphalt Compactor | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.000 | 5.200 | g/hp-hr | 0.757 | 9.079 | 0.005 | 0.400 | g/hp-hr | 0.058 | 0.698 | 0.000 |
| 10 Wheel Dump Truck | 0.003 | g/mile | 4.3E-04 | 5.2E-03 | 4.1E-05 | 0.615 | g/mile | 9.5E-02 | 1.1E+00 | 9.1E-03 | 0.053 | g/mile | 8.2E-03 | 9.8E-02 | 7.9E-04 |
| Low Side Truck | 0.003 | g/mile | 2.1E-05 | 2.6E-04 | 2.1E-06 | 0.028 | g/mile | 2.2E-04 | 2.6E-03 | 2.1E-05 | 0.016 | g/mile | 1.3E-04 | 1.5E-03 | 1.2E-05 |
| **Demolition Day Tank Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.006 | 5.200 | g/hp-hr | 0.997 | 11.968 | 0.102 | 0.400 | g/hp-hr | 0.077 | 0.921 | 0.008 |
| Small Track Excavator | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.006 | 4.500 | g/hp-hr | 1.121 | 13.452 | 0.114 | 0.400 | g/hp-hr | 0.100 | 1.196 | 0.010 |
| 10 Wheel Water Truck | 0.003 | g/hp-hr | 0.002 | 0.018 | 0.000 | 0.027 | g/hp-hr | 0.015 | 0.176 | 0.000 | 0.011 | g/hp-hr | 0.006 | 0.074 | 0.000 |
| Small Track Asphalt Paver | 0.450 | g/hp-hr | 0.046 | 0.548 | 0.000 | 5.200 | g/hp-hr | 0.527 | 6.328 | 0.003 | 0.400 | g/hp-hr | 0.041 | 0.487 | 0.000 |
| Small Asphalt Compactor | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.000 | 5.200 | g/hp-hr | 0.757 | 9.079 | 0.005 | 0.400 | g/hp-hr | 0.058 | 0.698 | 0.000 |
| 10 Wheel Dump Truck | 0.003 | g/mile | 4.3E-04 | 5.2E-03 | 4.4E-05 | 0.615 | g/mile | 9.5E-02 | 1.1E+00 | 9.7E-03 | 0.053 | g/mile | 8.2E-03 | 9.8E-02 | 8.4E-04 |
| Low Side Truck | 0.003 | g/mile | 2.1E-05 | 2.6E-04 | 2.2E-06 | 0.028 | g/mile | 2.2E-04 | 2.6E-03 | 2.2E-05 | 0.016 | g/mile | 1.3E-04 | 1.5E-03 | 1.3E-05 |
| **Demolition Truck loading Fac. Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.004 | 5.200 | g/hp-hr | 0.997 | 11.968 | 0.066 | 0.400 | g/hp-hr | 0.077 | 0.921 | 0.005 |
| Small Track Excavator | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.004 | 4.500 | g/hp-hr | 1.121 | 13.452 | 0.074 | 0.400 | g/hp-hr | 0.100 | 1.196 | 0.007 |
| 10 Wheel Water Truck | 0.003 | g/hp-hr | 0.002 | 0.018 | 0.000 | 0.027 | g/hp-hr | 0.015 | 0.176 | 0.000 | 0.011 | g/hp-hr | 0.006 | 0.074 | 0.000 |
| Small Track Asphalt Paver | 0.450 | g/hp-hr | 0.046 | 0.548 | 0.000 | 5.200 | g/hp-hr | 0.527 | 6.328 | 0.003 | 0.400 | g/hp-hr | 0.041 | 0.487 | 0.000 |
| Small Asphalt Compactor | 0.300 | g/hp-hr | 0.044 | 0.524 | 0.000 | 5.200 | g/hp-hr | 0.757 | 9.079 | 0.005 | 0.400 | g/hp-hr | 0.058 | 0.698 | 0.000 |
| 10 Wheel Dump Truck | 0.003 | g/mile | 4.3E-04 | 5.2E-03 | 2.8E-05 | 0.615 | g/mile | 9.5E-02 | 1.1E+00 | 6.3E-03 | 0.053 | g/mile | 8.2E-03 | 9.8E-02 | 5.4E-04 |
| Low Side Truck | 0.003 | g/mile | 2.1E-05 | 2.6E-04 | 1.4E-06 | 0.028 | g/mile | 2.2E-04 | 2.6E-03 | 1.4E-05 | 0.016 | g/mile | 1.3E-04 | 1.5E-03 | 8.3E-06 |
| **Demolition Fuel Hydrant Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 0.300 | g/hp-hr | 0.058 | 0.690 | 0.002 | 5.200 | g/hp-hr | 0.997 | 11.968 | 0.030 | 0.400 | g/hp-hr | 0.077 | 0.921 | 0.002 |
| Small Track Excavator | 0.220 | g/hp-hr | 0.055 | 0.658 | 0.002 | 4.500 | g/hp-hr | 1.121 | 13.452 | 0.034 | 0.400 | g/hp-hr | 0.100 | 1.196 | 0.003 |
| 10 Wheel Water Truck | 0.003 | g/hp-hr | 0.002 | 0.018 | 0.000 | 0.027 | g/hp-hr | 0.015 | 0.176 | 0.000 | 0.011 | g/hp-hr | 0.006 | 0.074 | 0.000 |
| 10 Wheel Dump Truck | 0.003 | g/mile | 4.3E-04 | 5.2E-03 | 1.3E-05 | 0.615 | g/mile | 9.5E-02 | 1.1E+00 | 2.9E-03 | 0.053 | g/mile | 8.2E-03 | 9.8E-02 | 2.5E-04 |

| Equipment | $PM_{2.5}$ | | | | | NOx | | | | | HC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission Factor[(2)] | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor[(2)] | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor[(2)] | Emission Factor Units | lb/hr | lb/day | tons/yr |
| Low Side Truck | 0.003 | g/mile | 2.1E-05 | 2.6E-04 | 6.4E-07 | 0.028 | g/mile | 2.2E-04 | 2.6E-03 | 6.5E-06 | 0.016 | g/mile | 1.3E-04 | 1.5E-03 | 3.8E-06 |
| **Environmental Drilling Sample of Pipeline** | | | | | | | | | | | | | | | |
| Low Side Truck | 0.003 | g/mile | 1.1E-05 | 1.3E-04 | 1.5E-06 | 0.028 | g/mile | 1.1E-04 | 1.3E-03 | 1.6E-05 | 0.016 | g/mile | 6.3E-05 | 7.5E-04 | 9.0E-06 |
| Direct Push Drill Rig | 0.450 | g/hp-hr | 0.045 | 0.536 | 0.006 | 5.200 | g/hp-hr | 0.516 | 6.190 | 0.074 | 0.400 | g/hp-hr | 0.040 | 0.476 | 0.006 |
| | | **Totals:** | **3.19** | **38.29** | **0.54** | | **Totals:** | **78.46** | **941.54** | **14.87** | | **Totals:** | **5.67** | **67.98** | **1.04** |

**HP** – horsepower; **gal** or **g** – gallon; **hr** – hour; **VMT** – vehicle miles traveled; **EPA** – United States Environmental Protection Agency; **wk** – week; **lb** – pounds; **yr** – year; **NA** - not applicable; **Fac.** – facility

[1] Fuel consumption estimates for offroad equipment is based on data provided in *Construction Equipment for Engineers, Estimators, and Owners* (Douglas D. Gransberg, Calin M. Popescu, Richard Ryan. 2006)

[2] Emission factors from the United States Environmental Protection Agency's *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling f*or nonroad vehicles and EMFAC database for on-road vehicles

[3] Emission factors from the United States Environmental Protection Agency's greenhouse gas emission requirements for heavy-duty engines

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**Table C-6. Moffett Environmental Assessment Mobile Equipment Tailpipe Emissions - Proposed Action (CO, $CO_2$, $SO_2$)**

| Equipment | CO | | | | | $CO_2$ | | | | | $SO_2$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission Factor[2] | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor[3] | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor | Emission Factor Units | lb/hr | lb/day | tons/yr |
| **Well Destruction** | | | | | | | | | | | | | | | |
| Low Side Truck | 0.094 | g/mile | 3.6E-04 | 4.4E-03 | 6.6E-06 | 358.3 | g/mile | 1.39 | 16.66 | 0.02 | 0.003 | g/mile | 1.3E-05 | 1.6E-04 | 2.4E-07 |
| Hollow Stem Auger Drill | 4.100 | g/hp-hr | 0.407 | 4.881 | 0.007 | 376.6 | g/hp-hr | 37.4 | 448.3 | 0.7 | 0.003 | g/hp-hr | 0.0003 | 0.0041 | 6.2E-06 |
| **Demolition Fuel Farm** | | | | | | | | | | | | | | | |
| Large Track Excavator | 2.600 | g/hp-hr | 2.705 | 32.466 | 1.136 | 376.9 | g/hp-hr | 392.2 | 4,705.9 | 164.7 | 0.003 | g/hp-hr | 0.0036 | 0.0433 | 1.5E-03 |
| Large Track Excavator with Shear | 2.600 | g/hp-hr | 2.705 | 32.466 | 0.568 | 376.9 | g/hp-hr | 392.2 | 4,705.9 | 82.4 | 0.003 | g/hp-hr | 0.0036 | 0.0433 | 7.6E-04 |
| Large Track Excavator with Hydraulic Hammer | 2.600 | g/hp-hr | 2.705 | 32.466 | 0.568 | 376.9 | g/hp-hr | 392.2 | 4,705.9 | 82.4 | 0.003 | g/hp-hr | 0.0036 | 0.0433 | 7.6E-04 |
| Motor Grader | 2.600 | g/hp-hr | 1.267 | 15.201 | 0.266 | 313.6 | g/hp-hr | 152.8 | 1,833.4 | 32.1 | 0.003 | g/hp-hr | 0.0014 | 0.0169 | 2.9E-04 |
| Medium Track Dozer | 3.700 | g/hp-hr | 1.354 | 16.249 | 0.569 | 376.6 | g/hp-hr | 137.8 | 1,653.6 | 57.9 | 0.003 | g/hp-hr | 0.0013 | 0.0152 | 5.3E-04 |
| Medium Wheel Loader | 2.600 | g/hp-hr | 2.213 | 26.550 | 0.929 | 322.9 | g/hp-hr | 274.8 | 3,297.3 | 115.4 | 0.003 | g/hp-hr | 0.0025 | 0.0303 | 1.1E-03 |
| Large Wheel Loader | 2.600 | g/hp-hr | 4.007 | 48.079 | 1.683 | 322.9 | g/hp-hr | 497.6 | 5,971.0 | 209.0 | 0.003 | g/hp-hr | 0.0046 | 0.0549 | 1.9E-03 |
| Articulated Dump Truck | 0.275 | g/mile | 1.1E-02 | 1.3E-01 | 4.7E-03 | 1483.9 | g/mile | 60.42 | 725.06 | 25.38 | 0.014 | g/mile | 5.7E-04 | 6.8E-03 | 2.4E-04 |
| Soil Compactor | 3.700 | g/hp-hr | 0.538 | 6.460 | 0.113 | 376.6 | g/hp-hr | 54.8 | 657.5 | 11.5 | 0.003 | g/hp-hr | 0.0005 | 0.0060 | 1.1E-04 |
| 10 Wheel Water Truck | 0.154 | g/hp-hr | 0.085 | 1.018 | 0.036 | 332.8 | g/hp-hr | 183.4 | 2,201.1 | 77.0 | 0.003 | g/hp-hr | 0.0017 | 0.0202 | 7.1E-04 |
| Low Side Truck | 0.094 | g/mile | 1.1E-03 | 1.3E-02 | 4.6E-04 | 358.3 | g/mile | 4.17 | 49.99 | 1.75 | 0.003 | g/mile | 4.0E-05 | 4.8E-04 | 1.7E-05 |
| **Demolition Day Tank** | | | | | | | | | | | | | | | |
| Large Track Excavator | 2.600 | g/hp-hr | 2.705 | 32.466 | 0.487 | 376.9 | g/hp-hr | 392.2 | 4,705.9 | 70.6 | 0.003 | g/hp-hr | 0.0036 | 0.0433 | 6.5E-04 |
| Large Track Excavator with Shear | 2.600 | g/hp-hr | 2.705 | 32.466 | 0.243 | 376.9 | g/hp-hr | 392.2 | 4,705.9 | 35.3 | 0.003 | g/hp-hr | 0.0036 | 0.0433 | 3.2E-04 |
| Large Track Excavator with Hydraulic Hammer | 2.600 | g/hp-hr | 2.705 | 32.466 | 0.243 | 376.9 | g/hp-hr | 392.2 | 4,705.9 | 35.3 | 0.003 | g/hp-hr | 0.0036 | 0.0433 | 3.2E-04 |
| Medium Track Dozer | 3.700 | g/hp-hr | 1.354 | 16.249 | 0.244 | 376.6 | g/hp-hr | 137.8 | 1,653.6 | 24.8 | 0.003 | g/hp-hr | 0.0013 | 0.0152 | 2.3E-04 |
| Medium Wheel Loader | 2.600 | g/hp-hr | 2.213 | 26.550 | 0.398 | 322.9 | g/hp-hr | 274.8 | 3,297.3 | 49.5 | 0.003 | g/hp-hr | 0.0025 | 0.0303 | 4.5E-04 |
| Large Wheel Loader | 2.600 | g/hp-hr | 4.007 | 48.079 | 0.721 | 322.9 | g/hp-hr | 497.6 | 5,971.0 | 89.6 | 0.003 | g/hp-hr | 0.0046 | 0.0549 | 8.2E-04 |
| Articulated Dump Truck | 0.275 | g/mile | 1.1E-02 | 1.3E-01 | 2.0E-03 | 1483.9 | g/mile | 60.42 | 725.06 | 10.88 | 0.014 | g/mile | 5.7E-04 | 6.8E-03 | 1.0E-04 |
| Soil Compactor | 3.700 | g/hp-hr | 0.538 | 6.460 | 0.048 | 376.6 | g/hp-hr | 54.8 | 657.5 | 4.9 | 0.003 | g/hp-hr | 0.0005 | 0.0060 | 4.5E-05 |
| 10 Wheel Water Truck | 0.154 | g/hp-hr | 0.085 | 1.018 | 0.015 | 332.8 | g/hp-hr | 183.4 | 2,201.1 | 33.0 | 0.003 | g/hp-hr | 0.0017 | 0.0202 | 3.0E-04 |
| Low Side Truck | 0.094 | g/mile | 1.1E-03 | 1.3E-02 | 2.0E-04 | 358.3 | g/mile | 4.17 | 49.99 | 0.75 | 0.003 | g/mile | 4.0E-05 | 4.8E-04 | 7.2E-06 |
| **Demolition Truck Loading** | | | | | | | | | | | | | | | |
| Backhoe Loader | 3.700 | g/hp-hr | 0.710 | 8.516 | 0.011 | 376.6 | g/hp-hr | 72.2 | 866.7 | 1.1 | 0.003 | g/hp-hr | 0.0007 | 0.0080 | 1.0E-05 |
| Small Track Excavator | 3.700 | g/hp-hr | 0.922 | 11.061 | 0.014 | 376.6 | g/hp-hr | 93.8 | 1,125.7 | 1.4 | 0.003 | g/hp-hr | 0.0009 | 0.0103 | 1.3E-05 |
| Small Track Excavator with Hydraulic Hammer | 3.700 | g/hp-hr | 0.922 | 11.061 | 0.014 | 376.6 | g/hp-hr | 93.8 | 1,125.7 | 1.4 | 0.003 | g/hp-hr | 0.0009 | 0.0103 | 1.3E-05 |
| Large Track Excavator with Shear | 3.700 | g/hp-hr | 3.850 | 46.201 | 0.231 | 376.9 | g/hp-hr | 392.2 | 4,705.9 | 23.5 | 0.003 | g/hp-hr | 0.0036 | 0.0433 | 2.2E-04 |
| 10 Wheel Water Truck | 0.154 | g/hp-hr | 0.085 | 1.018 | 0.001 | 332.8 | g/hp-hr | 183.4 | 2,201.1 | 2.8 | 0.003 | g/hp-hr | 0.0017 | 0.0202 | 2.5E-05 |

| Equipment | CO | | | | | $CO_2$ | | | | | $SO_2$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission Factor(2) | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor(3) | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor | Emission Factor Units | lb/hr | lb/day | tons/yr |
| 10 Wheel Dump Truck | 0.275 | g/mile | 1.1E-02 | 1.3E-01 | 6.4E-04 | 1483.9 | g/mile | 57.42 | 689.08 | 3.45 | 0.014 | g/mile | 5.4E-04 | 6.5E-03 | 3.3E-05 |
| Low Side Truck | 0.094 | g/mile | 2.9E-03 | 3.5E-02 | 4.4E-05 | 358.3 | g/mile | 11.11 | 133.32 | 0.17 | 0.003 | g/mile | 1.1E-04 | 1.3E-03 | 1.6E-06 |
| **Demolition Fuel Hydrants** | | | | | | | | | | | | | | | |
| Low Side Truck | 0.094 | g/mile | 7.3E-04 | 8.8E-03 | 2.2E-05 | 358.3 | g/mile | 2.78 | 33.33 | 0.08 | 0.003 | g/mile | 2.7E-05 | 3.2E-04 | 8.0E-07 |
| **Demolition Fuel Dock Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 3.700 | g/hp-hr | 0.710 | 8.516 | 0.068 | 376.6 | g/hp-hr | 72.2 | 866.7 | 6.9 | 0.003 | g/hp-hr | 0.0007 | 0.0080 | 6.4E-05 |
| Small Track Excavator | 3.700 | g/hp-hr | 0.922 | 11.061 | 0.088 | 376.6 | g/hp-hr | 93.8 | 1,125.7 | 9.0 | 0.003 | g/hp-hr | 0.0009 | 0.0103 | 8.3E-05 |
| 10 Wheel Water Truck | 0.154 | g/hp-hr | 0.085 | 1.018 | 0.002 | 332.8 | g/hp-hr | 183.4 | 2,201.1 | 4.4 | 0.003 | g/hp-hr | 0.0017 | 0.0202 | 4.0E-05 |
| Small Track Asphalt Paver | 4.100 | g/hp-hr | 0.416 | 4.989 | 0.002 | 376.6 | g/hp-hr | 38.2 | 458.2 | 0.2 | 0.003 | g/hp-hr | 0.0004 | 0.0042 | 2.1E-06 |
| Small Asphalt Compactor | 3.700 | g/hp-hr | 0.538 | 6.460 | 0.003 | 376.6 | g/hp-hr | 54.8 | 657.5 | 0.3 | 0.003 | g/hp-hr | 0.0005 | 0.0060 | 3.0E-06 |
| 10 Wheel Dump Truck | 0.275 | g/mile | 4.3E-02 | 5.1E-01 | 4.1E-03 | 1483.9 | g/mile | 229.69 | 2,756.33 | 22.05 | 0.014 | g/mile | 2.2E-03 | 2.6E-02 | 2.1E-04 |
| Low Side Truck | 0.094 | g/mile | 7.3E-04 | 8.8E-03 | 7.0E-05 | 358.3 | g/mile | 2.78 | 33.33 | 0.27 | 0.003 | g/mile | 2.7E-05 | 3.2E-04 | 2.5E-06 |
| **Demolition Day Tank Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 3.700 | g/hp-hr | 0.710 | 8.516 | 0.072 | 376.6 | g/hp-hr | 72.2 | 866.7 | 7.4 | 0.003 | g/hp-hr | 0.0007 | 0.0080 | 6.8E-05 |
| Small Track Excavator | 3.700 | g/hp-hr | 0.922 | 11.061 | 0.094 | 376.6 | g/hp-hr | 93.8 | 1,125.7 | 9.6 | 0.003 | g/hp-hr | 0.0009 | 0.0103 | 8.8E-05 |
| 10 Wheel Water Truck | 0.154 | g/hp-hr | 0.085 | 1.018 | 0.002 | 332.8 | g/hp-hr | 183.4 | 2,201.1 | 4.7 | 0.003 | g/hp-hr | 0.0017 | 0.0202 | 4.3E-05 |
| Small Track Asphalt Paver | 4.100 | g/hp-hr | 0.416 | 4.989 | 0.002 | 376.6 | g/hp-hr | 38.2 | 458.2 | 0.2 | 0.003 | g/hp-hr | 0.0004 | 0.0042 | 2.1E-06 |
| Small Asphalt Compactor | 3.700 | g/hp-hr | 0.538 | 6.460 | 0.003 | 376.6 | g/hp-hr | 54.8 | 657.5 | 0.3 | 0.003 | g/hp-hr | 0.0005 | 0.0060 | 3.0E-06 |
| 10 Wheel Dump Truck | 0.275 | g/mile | 4.3E-02 | 5.1E-01 | 4.3E-03 | 1483.9 | g/mile | 229.69 | 2,756.33 | 23.43 | 0.014 | g/mile | 2.2E-03 | 2.6E-02 | 2.2E-04 |
| Low Side Truck | 0.094 | g/mile | 7.3E-04 | 8.8E-03 | 7.4E-05 | 358.3 | g/mile | 2.78 | 33.33 | 0.28 | 0.003 | g/mile | 2.7E-05 | 3.2E-04 | 2.7E-06 |
| **Demolition Truck loading Fac. Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 3.700 | g/hp-hr | 0.710 | 8.516 | 0.047 | 376.6 | g/hp-hr | 72.2 | 866.7 | 4.8 | 0.003 | g/hp-hr | 0.0007 | 0.0080 | 4.4E-05 |
| Small Track Excavator | 3.700 | g/hp-hr | 0.922 | 11.061 | 0.061 | 376.6 | g/hp-hr | 93.8 | 1,125.7 | 6.2 | 0.003 | g/hp-hr | 0.0009 | 0.0103 | 5.7E-05 |
| 10 Wheel Water Truck | 0.154 | g/hp-hr | 0.085 | 1.018 | 0.001 | 332.8 | g/hp-hr | 183.4 | 2,201.1 | 3.0 | 0.003 | g/hp-hr | 0.0017 | 0.0202 | 2.8E-05 |
| Small Track Asphalt Paver | 4.100 | g/hp-hr | 0.416 | 4.989 | 0.002 | 376.6 | g/hp-hr | 38.2 | 458.2 | 0.2 | 0.003 | g/hp-hr | 0.0004 | 0.0042 | 2.1E-06 |
| Small Asphalt Compactor | 3.700 | g/hp-hr | 0.538 | 6.460 | 0.003 | 376.6 | g/hp-hr | 54.8 | 657.5 | 0.3 | 0.003 | g/hp-hr | 0.0005 | 0.0060 | 3.0E-06 |
| 10 Wheel Dump Truck | 0.275 | g/mile | 4.3E-02 | 5.1E-01 | 2.8E-03 | 1483.9 | g/mile | 229.69 | 2,756.33 | 15.16 | 0.014 | g/mile | 2.2E-03 | 2.6E-02 | 1.4E-04 |
| Low Side Truck | 0.094 | g/mile | 7.3E-04 | 8.8E-03 | 4.8E-05 | 358.3 | g/mile | 2.78 | 33.33 | 0.18 | 0.003 | g/mile | 2.7E-05 | 3.2E-04 | 1.7E-06 |
| **Demolition Fuel Hydrant Pipeline** | | | | | | | | | | | | | | | |
| Backhoe Loader | 3.700 | g/hp-hr | 0.710 | 8.516 | 0.021 | 376.6 | g/hp-hr | 72.2 | 866.7 | 2.2 | 0.003 | g/hp-hr | 0.0007 | 0.0080 | 2.0E-05 |
| Small Track Excavator | 3.700 | g/hp-hr | 0.922 | 11.061 | 0.028 | 376.6 | g/hp-hr | 93.8 | 1,125.7 | 2.8 | 0.003 | g/hp-hr | 0.0009 | 0.0103 | 2.6E-05 |
| 10 Wheel Water Truck | 0.154 | g/hp-hr | 0.085 | 1.018 | 0.001 | 332.8 | g/hp-hr | 183.4 | 2,201.1 | 1.4 | 0.003 | g/hp-hr | 0.0017 | 0.0202 | 1.3E-05 |
| 10 Wheel Dump Truck | 0.275 | g/mile | 4.3E-02 | 5.1E-01 | 1.3E-03 | 1483.9 | g/mile | 229.69 | 2,756.33 | 6.89 | 0.014 | g/mile | 2.2E-03 | 2.6E-02 | 6.5E-05 |

| Equipment | CO | | | | | $CO_2$ | | | | | $SO_2$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission Factor[2] | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor[3] | Emission Factor Units | lb/hr | lb/day | tons/yr | Emission Factor | Emission Factor Units | lb/hr | lb/day | tons/yr |
| Low Side Truck | 0.094 | g/mile | 7.3E-04 | 8.8E-03 | 2.2E-05 | 358.3 | g/mile | 2.78 | 33.33 | 0.08 | 0.003 | g/mile | 2.7E-05 | 3.2E-04 | 8.0E-07 |
| **Environmental Drilling Sample of Pipeline** | | | | | | | | | | | | | | | |
| Low Side Truck | 0.094 | g/mile | 3.6E-04 | 4.4E-03 | 5.3E-05 | 358.3 | g/mile | 1.39 | 16.66 | 0.20 | 0.003 | g/mile | 1.3E-05 | 1.6E-04 | 1.9E-06 |
| Direct Push Drill Rig | 4.100 | g/hp-hr | 0.407 | 4.881 | 0.059 | 376.6 | g/hp-hr | 37.4 | 448.3 | 5.4 | 0.003 | g/hp-hr | 0.0003 | 0.0041 | 4.9E-05 |
| | | **Totals:** | **51.13** | **613.61** | **9.13** | | **Totals:** | **8,523** | **102,270** | **1,386** | | **Totals:** | **0.08** | **0.94** | **0.01** |

**HP** – horsepower; **gal** or **g** – gallon; **hr** – hour; **VMT** – vehicle miles traveled; **EPA** – United States Environmental Protection Agency; **wk** – week; **lb** – pounds; **yr** – year; **NA** - not applicable

[1] Fuel consumption estimates for offroad equipment is based on data provided in *Construction Equipment for Engineers, Estimators, and Owners* (Douglas D. Gransberg, Calin M. Popescu, Richard Ryan. 2006)

[2] Emission factors from the United States Environmental Protection Agency's *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling f*or nonroad vehicles and EMFAC database for onroad vehicles

[3] Emission factors from the United States Environmental Protection Agency's greenhouse gas emission requirements for heavy-duty engines

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**Table C-7. Moffett Environmental Assessment Vehicle Dust Emissions for Travel Over Paved Roads**

| Action | Vehicle Type | Vehicle Weight (tons) | Operation Schedule | | $PM_{10}$ | | | $PM_{2.5}$ | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | VMT/day | VMT/Year | Emission Factor [1] | lb/day | Project Total (tons) | Emission Factor | lb/day | Project Total (tons) |
| Proposed Action | Articulated Dump Truck | 21 | 2 | 109 | 1.188 | 2.58 | 0.06 | 0.119 | 0.26 | 0.01 |
| | 10 Wheel Dump Truck | 22 | 96 | 1,168 | 1.213 | 116.93 | 0.71 | 0.121 | 11.69 | 0.07 |
| | Low Side Truck | 3.5 | 44 | 768 | 0.530 | 23.28 | 0.20 | 0.053 | 2.33 | 0.02 |
| | **Totals:** | | | | --- | **142.8** | **1.0** | --- | **4.9** | **0.04** |
| No Action Alternative | Articulated Dump Truck | 21 | 0 | 0 | 1.188 | 0 | 0 | 0.119 | 0 | 0 |
| | 10 Wheel Dump Truck | 22 | 0 | 0 | 1.213 | 0 | 0 | 0.121 | 0 | 0 |
| | Low Side Truck | 3.5 | 0 | 0 | 0.530 | 0 | 0 | 0.053 | 0 | 0 |
| | **Totals:** | | | | --- | **0** | **0** | --- | **0** | **0** |

**VMT** – vehicle miles traveled; **lb** – pound

[1] Emission factor is derived from AP-42, Section 13.2.2, *Unpaved Roads* (United States Environmental Protection Agency 2006). The equation for uncontrolled particulate emissions from vehicle travel on unpaved roads is,

$E = k * (s/12)^a * (W/3)^b$

where,

k = Aerodynamic particle size multiplier, unitless (1.5 for $PM_{10}$ and 0.15 for $PM_{2.5}$)

s = silt content, percent (assumed to be 8.5% typical of a construction site (Countess, 2006, Table 6-1)

a, b = particle size multipliers, unitless (0.9 and 0.45, respectively)

W = vehicle weight, tons

Mitigation measures are assumed to include watering the roads which can achieve control efficiencies of approximately 55% (Countess 2006: Table 6-6)

**Table C-8. Moffett Environmental Assessment Vehicle Dust Emissions for Travel over Paved Roads**

| Action | Vehicle Type | Vehicle Weight (tons) | Operation Schedule | | $PM_{10}$ | | | $PM_{2.5}$ | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | VMT/day | Annual | Emission Factor [1] | lb/day | Project Total (tons) | Emission Factor | lb/day | Project Total (tons) |
| Proposed Action | Articulated Dump Truck | 21 | 441 | 22,055 | 0.017 | 7.57 | 0.19 | 0.004 | 1.86 | 0.05 |
| | 10 Wheel Dump Truck | 22 | 3,485 | 42,224 | 0.018 | 62.70 | 0.38 | 0.004 | 15.39 | 0.09 |
| | Low Side Truck | 3.5 | 505 | 8,832 | 0.003 | 1.39 | 0.01 | 0.001 | 0.34 | 0.003 |
| | | | | **Totals:** | --- | **71.67** | **0.58** | --- | **17.59** | **0.14** |
| No Action Alternative | Articulated Dump Truck | 21 | 0 | 0 | 0.017 | 0 | 0 | 0.004 | 0 | 0 |
| | 10 Wheel Dump Truck | 22 | 0 | 0 | 0.018 | 0 | 0 | 0.004 | 0 | 0 |
| | Low Side Truck | 3.5 | 0 | 0 | 0.003 | 0 | 0 | 0.001 | 0 | 0 |
| | | | | **Totals:** | --- | **0** | **0** | --- | **0** | **0** |

**VMT** – vehicle miles traveled; **lb** – pound
[1] Emission factor is derived from AP-42, Section 13.2.1, *Paved Roads* (United States Environmental Protection Agency 2006).
https://www3.epa.gov/ttn/chief/ap42/ch13/index.html. Accessed: May 10 2016.

The equation for uncontrolled particulate emissions from vehicle travel on unpaved roads is,
$E = k *(sL)^{0.91} * W^{1.02}$
where,
k = Aerodynamic particle size multiplier, unitless (0.0022 for $PM_{10}$ and 0.00054 for $PM_{2.5}$)
s = silt content, Assumed to be 0.315 grains/ft$^2$
W = vehicle weight in tons (Average of all Vehicles according to AP 42 Section 13.2.1.3)

**Table C-9. Moffett Environmental Assessment Construction Site Emissions**

| Alternative | Total Temporary Disturbed Acreage | Total Cut/Fill Quantity | Monthly Cut/Fill Quantity | Schedule | $PM_{10}$ | | | | | | $PM_{2.5}$ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CY | CY/Month | Disturbed Acreage/Month | Duration (wks) | Emission Factor [1] (ton/acre-month) | lb/hr | lb/day | Tons/ Month | Project Total (tons) | Emission Factor [1] (ton/acre-month) | lb/hr | lb/day | Tons/ Month | Project Total (tons) |
| **Proposed Action** | 7.63 | 52,581 | 8,764 | 7.63 | 26 | 0.5280 | 11.03 | 88.21 | 4.03 | 2.01 | 0.0528 | 1.10 | 8.82 | 0.40 | 0.20 |
| **No Action Alternative** | 0 | 0 | 0 | 0 | 26 | 0.0110 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0011 | 0.00 | 0.00 | 0.00 | 0.00 |

**CY** – cubic yards; **wks** – weeks; **lb** – pound; **hr** – hour

[1] Emission factor is based on a construction emission factors for site preparation, earth moving, and the cubic yards of on-site cut/fill. The emission factors are from the Western Regional Air Partnership (WRAP) *Fugitive Dust Handbook* (Countess 2006: Table 3-2). $PM_{2.5}$ emissions are based on a $PM_{2.5}/PM_{10}$ ratio of 0.1 which is based on analyses conducted for WRAP (WRAP Fugitive Dust Handbook, Prepared by Countess Environmental. 2006: Page 3-8).

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1 **Table C-10. Moffett Environmental Assessment Equipment Tailpipe and Emission Factor Data**

| Equipment List | Estimated Horsepower | Brake-Specific Fuel Consumption gal/hp-hr | Brake-Specific Fuel Consumption g/hp-hr | Fuel Consumption[1] gal/hr | Assumed EPA Tier Level | Emission Factors | | | | | | | Units | Sources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | HC | CO | $CO_2$ | $SO_2$ | | |
| Backhoe Loader | 87 | 0.042 | 118.44 | 3.65 | Tier 2 | 0.300 | 0.300 | 5.200 | 0.400 | 3.700 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Small Track Excavator | 113 | 0.042 | 118.44 | 4.75 | Tier 2 | 0.220 | 0.220 | 4.500 | 0.400 | 3.700 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Small Track Excavator with Hydraulic Hammer | 113 | 0.042 | 118.44 | 4.75 | Tier 2 | 0.220 | 0.220 | 4.500 | 0.400 | 3.700 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Large Track Excavator | 472 | 0.042 | 118.44 | 19.82 | Tier 2 | 0.150 | 0.150 | 4.500 | 0.300 | 2.600 | 376.9 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Large Track Excavator with Shear | 472 | 0.042 | 118.44 | 19.82 | Tier 2 | 0.150 | 0.150 | 4.500 | 0.300 | 2.600 | 376.9 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Large Track Excavator with Hydraulic Hammer | 472 | 0.042 | 118.44 | 19.82 | Tier 2 | 0.150 | 0.150 | 4.500 | 0.300 | 2.600 | 376.9 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Motor Grader | 221 | 0.035 | 98.70 | 7.74 | Tier 2 | 0.150 | 0.150 | 4.500 | 0.400 | 2.600 | 313.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Medium Track Dozer | 166 | 0.042 | 118.44 | 6.97 | Tier 2 | 0.220 | 0.220 | 4.500 | 0.400 | 3.700 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Medium Wheel Loader | 386 | 0.036 | 101.52 | 13.90 | Tier 2 | 0.150 | 0.150 | 4.500 | 0.300 | 2.600 | 322.9 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Large Wheel Loader | 699 | 0.036 | 101.52 | 25.16 | Tier 2 | 0.150 | 0.150 | 4.500 | 0.300 | 2.600 | 322.9 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Articulated Dump Truck | 400 | NA | NA | NA | Tier 2 | 0.003 | 0.003 | 0.615 | 0.053 | 0.275 | 1483.9 | 0.014 | g/mile | EMFAC Database for on-road vehicles |
| Soil Compactor | 66 | 0.042 | 118.44 | 2.77 | Tier 2 | 0.300 | 0.300 | 5.200 | 0.400 | 3.700 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| 10 Wheel Water Truck | 250 | 0.037 | 104.34 | 9.25 | Tier 2 | 0.150 | 0.150 | 4.500 | 0.400 | 2.600 | 331.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| Small Track Asphalt Paver | 46 | 0.042 | 118.44 | 1.93 | Tier 2 | 0.450 | 0.450 | 5.200 | 0.400 | 4.100 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |

| Equipment List | Estimated Horsepower | Brake-Specific Fuel Consumption gal/hp-hr | Brake-Specific Fuel Consumption g/hp-hr | Fuel Consumption[1] gal/hr | Assumed EPA Tier Level | Emission Factors | | | | | | | Units | Sources |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | HC | CO | $CO_2$ | $SO_2$ | | |
| Small Asphalt Compactor | 66 | 0.042 | 118.44 | 2.77 | Tier 2 | 0.300 | 0.300 | 5.200 | 0.400 | 3.700 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010); Caterpillar 2015 |
| 10 Wheel Dump Truck | 400 | NA | NA | NA | Tier 2 | 0.003 | 0.003 | 0.615 | 0.053 | 0.275 | 1483.9 | 0.014 | g/mile | EMFAC Database for on-road vehicles |
| Low Side Truck (e.g., Pickup) | 325 | NA | NA | NA | Tier 2 | 0.003 | 0.003 | 0.028 | 0.016 | 0.094 | 358.3 | 0.003 | g/mile | EMFAC Database for on-road vehicles |
| Hollow Stem Auger Drill | 45 | 0.042 | 118.44 | 1.89 | Tier 2 | 0.450 | 0.450 | 5.200 | 0.400 | 4.100 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010) |
| Direct Push Drill Rig | 45 | 0.042 | 118.44 | 1.89 | Tier 2 | 0.450 | 0.450 | 5.200 | 0.400 | 4.100 | 376.6 | 0.003 | g/hp-hr | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA 2010) |

**gal** or **g** – gallon; **hp** – horsepower; **hr** – hour; **EPA** – United States Environmental Protection Agency; **$PM_{10}$** – particulate matter (fine); **$PM_{2.5}$** – particulate matter (very fine); **$NO_X$** –nitrogen oxides; **HC** – hydrocarbons; **CO** – carbon monoxide; **$CO_2$** – carbon dioxide; **$SO_2$** – sulfur dioxide

[1] Fuel consumption estimates for offroad equipment is based on data provided in *Construction Equipment for Engineers, Estimators, and Owners Construction Equipment for Engineers, Estimators, and Owners* (Douglas D. Gransberg, Calin M. Popescu, Richard Ryan. 2006).

1 **Table C-11. Moffett Environmental Assessment Estimated Vehicle Miles Travelled**

| Equipment List | Number of Work-Equipment Days for Project Phase | Project Total VMT | Project total VMT over Unpaved Roads | Daily VMT | Daily VMT over Unpaved Roads |
|---|---|---|---|---|---|
| **Well Destruction** | **3** | | | | |
| Low Side Truck | 3 | 63.3 | 5.1 | 21.1 | 1.7 |
| **Demolition Fuel Farm** | **70** | | | | |
| Articulated Dump Truck | 70 | 15,514.8 | 76.0 | 221.6 | 1.1 |
| Low Side Truck | 210 | 4,430.8 | 354.5 | 63.3 | 5.1 |
| **Demolition Day Tank Area** | **30** | | | | |
| Articulated Dump Truck | 30 | 6,649.2 | 32.6 | 221.6 | 1.1 |
| Low Side Truck | 90 | 1,898.9 | 151.9 | 63.3 | 5.1 |
| **Demolition Truck Loading Facility** | **10** | | | | |
| 10 Wheel Dump Truck | 2.5 | 2,106.4 | 56.7 | 210.6 | 5.7 |
| Low Side Truck | 20 | 422.0 | 33.8 | 168.8 | 13.5 |
| **Demolition Fuel Hydrants** | **5** | | | | |
| Low Side Truck | 10 | 211.0 | 16.9 | 42.2 | 3.4 |
| **Demolition Fuel Dock Pipeline** | **16** | | | | |
| 10 Wheel Dump Truck | 16 | 13,481.0 | 362.9 | 842.6 | 22.7 |
| Low Side Truck | 32 | 675.2 | 54.0 | 42.2 | 3.4 |
| **Demolition Day Tank Pipeline** | **17** | | | | |
| 10 Wheel Dump Truck | 17 | 14,323.6 | 385.6 | 842.6 | 22.7 |
| Low Side Truck | 34 | 717.4 | 57.4 | 42.2 | 3.4 |
| **Demolition Truck loading Fac. Pipeline** | **11** | | | | |
| 10 Wheel Dump Truck | 11 | 9,268.2 | 249.5 | 842.6 | 22.7 |

| Equipment List | Number of Work-Equipment Days for Project Phase | Project Total VMT | Project total VMT over Unpaved Roads | Daily VMT | Daily VMT over Unpaved Roads |
|---|---|---|---|---|---|
| Low Side Truck | 22 | 464.2 | 37.1 | 42.2 | 3.4 |
| **Demolition Fuel Hydrant Pipeline** | **5** | | | | |
| 10 Wheel Dump Truck | 5 | 4,212.8 | 113.4 | 842.6 | 22.7 |
| Low Side Truck | 10 | 211.0 | 16.9 | 42.2 | 3.4 |
| **Environmental Drilling, Sampling of Piping CIP** | **24** | | | | |
| Low Side Truck | 24 | 506.4 | 40.5 | 21.1 | 1.7 |

**VMT** – vehicle miles traveled; **Fac.** – facility; **CIP** – Clean in Place

## Table C-12. Vehicle Travel Data

| Total Project Values | Assumed Vehicle Used for Operation | Truck Trips | One-Way Distance (miles) | One-Way Distance over Unpaved Roads (miles) |
|---|---|---|---|---|
| Import Soil/AC | 10 Wheel Dump Truck | 472 | 36 | 1 |
| Export Scrap Steel | 10 Wheel Dump Truck | 112 | 42 | 1 |
| Export Concrete/AC Debris | Articulated Dump Truck | 101 | 36 | 1 |
| Export Petroleum-Contaminated Soil | Articulated Dump Truck | 146 | 51 | 1 |
| Miscellaneous Trucking | Low Side Truck | 192 | 25 | 2 |
| | | **Total VMT:** | **75,156** | |

**AC** – asphaltic concrete; **VMT** –vehicle miles traveled
Assumptions: The number of truck trips was distributed to each project phase based on scaling by the estimated number of work days for each phase.
Total days used each vehicle type:

Articulated Dump Truck: 100 days
10 Wheel Dump Truck: 51.5 days

Low Side Truck: 455 days

# Appendix D. Mitigation Measures

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**Table D-1. Draft Impact Avoidance, Minimization and Mitigation Measures for the Proposed Action**

| Number | Avoidance and Minimization Measures |
|---|---|
| **General** | |
| G-1 | The contractor would be required to prepare an Environmental Protection Plan that would describe how the contractor would implement the mitigation impact, avoidance and minimization measures presented in this table. |
| G-2 | The contractor would be required to prepare the following environmental plans under local, State and Federal regulations, each with general and project specific BMPs:<br>a. Work Plan contains following information:<br>i. Work Implementation Plan<br>ii. Traffic Control Plan<br>iii. Waste Management Plan<br>iv. Sampling and Analysis Plan<br>v. Environmental Protection Plan<br>b. Storm Water Pollution Prevention Plan (SWPPP)<br>c. Health and Safety Plan (HSP)<br>i. Accident Prevention Plan (APP)<br>ii. Health and Safety Plan<br>d. Quality Control Plan<br>e. Quality Assurance Surveillance Plan |
| **Air Quality** | |
| AIR -1 | Measures to control dust generation would reduce the impact associated with $PM_{10}$ to a level of less-than-significant. The following measures, including all control measures recommended by the BAAQMD, would be incorporated into construction contract specifications and be enforced by DLA. These measures include the following provisions. |
| AIR -1.a. | Use water on project areas at least twice daily and more often during windy periods. Watering is an effective measure to control dust emissions from construction sites. |
| AIR -1.b. | Cover all hauling trucks or maintain at least 0.6 meters (2 feet) of freeboard. |
| AIR -1.c. | Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas and sweep streets daily (with water sweepers) if visible soil material is deposited onto the adjacent roads. |
| AIR -1.d. | Limit traffic speeds on unpaved roads to 25 kilometers per hour (15 mph). |
| AIR -1.e. | Install wheel washers or rumble plates for all exiting trucks, or wash or brush off the tires or tracks of trucks and equipment leaving the site. |

| Number | Avoidance and Minimization Measures |
|---|---|
| AIR -1.f | Excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. |
| AIR -1.g | The occurrence of HAPs and TACs metals found in native soils would be minimized by controlling fugitive emissions through best management practices during construction. If contaminated soils are involved in the subsurface removal process, regulatory guidelines (and compliance orders to minimize the release of both HAP and TAC organic compounds) would be followed. |
| AIR -2 | Measures to reduce emissions of nitrogen oxides and particulate matter from diesel fuel combustion during construction should be evaluated and implemented where reasonable and feasible. The following measures would reduce the impacts from construction fuel combustion. |
| AIR -2.a. | Properly maintain construction equipment. This measure would reduce emissions of ROG, $NO_x$, and $PM_{10}$ by about 5% |
| AIR -2.b. | Where reasonable and feasible, use alternative diesel fuels. The CARB has verified reductions of $NO_x$ by almost 15%, and particulate matter by almost 63%, from use of alternative diesel fuels. However, the use of these fuels may not be appropriate for all diesel equipment. |
| AIR -2.c. | Diesel trucks and equipment are prohibited from idling more than 5 minutes by state law and the California Air Resources Board. See California Code of Regulations § 2485 (http://www.arb.ca.gov/msprog/truck-idling/2485.pdf) |
| AIR -2.d | Encourage contractors to use equipment that meets CARB's most recent certification standard for off-road heavy duty diesel engines. |
| **Biological Resources** | |
| BIO-1 | Prior to earth moving or construction activities, ground squirrel burrows would be inspected for occupancy (of squirrels or burrowing owls) and collapsed or occluded outside of burrowing owls breeding season by a qualified biologist approved by DLA and NASA ARC. (Burrowing owl breeding season is March 1-August 31). This process of passive relocation restricts (occludes) access to the burrow by burrowing owls (and squirrels) by fitting a one-way door over the burrow entrance/exit and waiting a defined period of time (ideally 72 hours) for the animal to leave. Once the animal has left the burrow, it cannot regain entrance and the animal must locate another burrow. After verifying burrows are empty by site monitoring and video scoping, the burrows can be destroyed. The one way door would be left on the burrow until it is destroyed to preclude animals from re-occupying the area. The collapsed and occluded burrows would be monitored on a bi-weekly basis until construction begins. The passive relocation of squirrels would be done outside of the breeding season and would only involve burrows that would otherwise be removed as a part of the UST and pipeline removal effort. Prior to collapsing or occluding burrows with one-way doors, the qualified biologist would inventory burrows (both natural and artificial) using a hand held GPS unit, documenting the location of each burrow to be removed. The method of passive relocation would not involve the handling of owls or ground squirrels. It would be a method for preventing impacts on owls throughout the construction phase of the project. |

| Number | Avoidance and Minimization Measures |
|---|---|
| BIO-2 | Preconstruction surveys for burrowing owls (by a qualified biologist approved by DLA and NASA ARC) would be conducted no more than 30 days prior to the initiation of ground-disturbing activities. If burrowing owls or signs of burrowing owls are observed, then California Department of Fish and Wildlife (CDFW) mitigation measures should be adopted (CDFW 2012). Another pre-construction survey would take place 24 hours before construction. Surveys would follow the survey protocols contained in the California Department of Fish and Game 2012 Staff Report on Burrowing Owl Mitigation. (CDFG 2012).<br>a. The locations of burrowing owls, as well as incidental observations of other wildlife would be recorded using a hand held GPS.<br>b. Results would be provided in a survey report submitted to DLA and NASA ARC. |
| BIO-3 | Prior to and during construction a biological monitor would be on-site. Biological monitors would present an Environmental Education Plan to construction staff and would be on site during construction to ensure that personnel comply with the avoidance and minimization measures in this document based on the requirements of the 2001 NASA AMES Burrowing Owl Management Plan as well as the general requirements of the Endangered Species Act, MBTA and the Clean Water Act. Once briefed by the biological monitor, construction personnel would be asked to sign and date the last page of this plan as an acknowledgement of the briefing. The biological monitor would maintain the list of personnel who have attended the briefing. |
| BIO-3a | Demolition and excavation activities would be monitored by qualified biologists to ensure compliance with the avoidance and minimization measures listed in this document. Should occupied owl burrows be located during construction, the biological monitor would place markers to ensure that equipment and other machinery do not collapse burrows. The biological monitor would record observations of burrowing owl and other species as well as potential non-compliance issues. The biologist would have the authority to temporarily halt the operation if a non-compliance issue is discovered. The non-compliance issue would then be reported to the work effort foreman, to determine how to resolve the issue.<br>Monitoring reports would be provided to DLA and NASA. The monitoring report would document all non-compliance issues observed by the biologist as well as observations of burrowing owl reactions to the disturbance (e.g., habituation, flushing, etc.). Disturbance of occupied owl burrows will be avoided during the nesting season (March 1st to August 31st). Should occupied owl burrows be located during construction then they will be marked to ensure they are not accidentally collapsed during closure. The biological monitor will record observations of burrowing owls. Reports will be provided to DLA and NASA. |
| BIO-3b | Should a sighting of any federally protected animal occur within the designated construction area during operations, the biological monitor shall be notified as soon as possible. If an animal is injured, the biological monitor must be notified immediately. |
| BIO-3c | All personnel shall leave animals undisturbed. Never chase or harass any wildlife. |
| BIO-3d | All drivers of construction vehicles would be informed of the established vehicle routes and made aware of the importance of avoiding occupied and potential habitat for western burrowing owls and salt marsh harvest mice. |
| BIO-3e | Under the MBTA nesting birds cannot be disturbed. If an occupied nest is encountered work will stop until biological monitor can make a determination. |
| BIO-3f | Avoid construction in wetlands and Waters of the U.S. |

| Number | Avoidance and Minimization Measures |
|---|---|
| BIO-3g | Sensitive resource areas within the project site will be delineated with flags or fencing. These areas will be avoided during closure/demolition activities. |
| BIO-3h | Staging areas are prohibited outside of identified areas within the limits of construction. To the degree feasible, staging areas would be located in already disturbed habitat. |
| BIO-3i | Vehicles must use existing access roads to the extent feasible. All access routes outside of existing roads or the demolition and excavation corridor would be delineated on plans. |
| BIO-3j | The contractor must collect of the crew's trash and dispose of it in a proper and covered location to prevent attracting scavengers. |
| BIO-3k | Use trash receptors that are animal resistant, and maintain a regular garbage disposal schedule. |
| BIO-3l | The contractor should avoid leaving open holes or trenches whenever possible, including trench plates lift holes. Any open holes left uncovered overnight must be inspected by the biological monitor before work can resume the following day |
| BIO-4 | Potentially contaminated runoff would be managed using stormwater BMPs. Swales would be constructed adjacent to wetlands in upland areas to intercept and filter runoff before it reaches the wetland. |
| BIO-5: | Limit night time demolition and excavation to avoid the use of lighting that may affect nocturnal species. |
| BIO-6: | Following completion of the DFSP closure project, the site would be restored to its preexcavation topography and hydroseeded with a local native species seed mix approved by DLA and NASA ARC. The site would also be restored with artificial burrows by a qualified biologist approved by DLA and NASA ARC. The artificial burrows that cannot be protected in place would be replaced at a 1:1 ratio for each artificial burrow removed. Original material may be reused if they are not damaged. Natural burrowing owl burrows of historical use that cannot be protected in place, and are destroyed, would be compensated with placement of artificial burrows at a 3:1 ratio within the project area. The qualified biologist would follow the *User's Guide to Installation of Artificial Burrows for Burrowing Owls* (D. Johnson et al 2013) or other guidance provided by NASA ARC. |
| **Cultural Resources** | |
| CUL-1 | In the event that human remains and/or cultural materials are found, all demolition and excavation would cease within a 15-meter (50-foot) radius in order to proceed with the testing and mitigation measures required pursuant to Section 7050.5 of the Health and Safety Code and Section 5097.94 of the Public Resources Code of the State of California. The SHPO and the NASA Historical Preservation Officer would be contacted as soon as possible. Demolition and excavation in the affected area would not resume until the regulations of the Advisory Council on Historic Preservation (36 CFR Part 800) have been satisfied (NASA 2014b). |
| CUL-2 | Should previously undiscovered archaeological materials be encountered during demolition and excavation or operation, work would cease and the site would be protected until an evaluation has been completed by a qualified archaeologist. Procedures in the ICRMP Would be followed. |

| Number | Avoidance and Minimization Measures |
|---|---|
| **Geology, Topography, Soils** | |
| GEO-1 | During demolition, contractors would be required to use a specified laydown area for vehicles and equipment, drive on existing roads as much as possible , use of stabilized construction entrance/exit to minimize sediment from being carried off-site by vehicle tires, and use erosion-prevention BMPs such as:<br>a. Covering soil piles at the work site;<br>b. Using silt barriers to prevent soil loss from runoff;<br>c. Revegetation reconstructed slopes to provide a surface cover to protect the soil from erosion;<br>d. Obtain a permit,<br>e. Prepare a SWPPP,<br>f. DLA will include in the Closure PWS. |
| **Hazards** | |
| HAZ-1 | Before the start of demolition activities, a site-specific HSP would be prepared and submitted for DLA's approval, and all necessary permits and approvals would be obtained. The HSP would include detailed precautionary measures to substantially reduce potential exposure of on-site personnel to petroleum waste, hazardous waste, and potentially explosive gases. All on-site personnel handling or working in the vicinity of the contaminated soil would be trained in accordance with OSHA regulations for hazardous waste operations. These regulations are based on CFR 1910.120 (e) and 8 CCR 5192, which states that "general site workers" would receive a minimum of 40 hours of classroom training and a minimum of three days of field training. This training provides precautions and protective measures to reduce or eliminate hazardous materials/waste hazards at the work place. The site-specific Waste Management Plan would describe the strategy for handling and disposing of all demolition debris. Part of this strategy would be to divert as much of the demolition waste from landfills as possible using demolition deconstruction techniques to reduce, reuse, or recycle the various types of waste. Any required asbestos, lead, or PCB abatement would be conducted before demolition activities begin. The removal methods, health and safety procedures, and disposal methods would conform to the applicable regulations of Federal, State, and local regulatory agencies, including any required notifications.<br>DLA would include these requirements in a PWS for Closure. |
| HAZ-2 | Before the start of demolition activities, DLA would coordinate with the Navy and NASA to determine whether demolition of underground and aboveground pipelines would potentially damage existing monitoring wells, remediation wells, and aboveground remediation equipment. In the event that such a scenario occurs, an environmental monitor, knowledgeable of on-site remediation equipment, would be present during underground pipeline demolition activities to verify that subsurface wells and remediation equipment are not damaged. |

| Number | Avoidance and Minimization Measures |
|---|---|
| **Hydrology/ Water Resources** | |
| HYD -1 | Appropriate BMPs would be implemented in accordance with the Construction General Permit and SWPPP that meet requirements for Best Available Technology and Best Conventional Pollutant Control Technology to reduce or eliminate pollutants from entering receiving waters. These BMPs generally fall into four main categories: erosion control, soil stabilization, sediment control, and non-stormwater management. BMPs may include but not be limited to the following:<br>a. Stabilize disturbed soils through erosion and sediment control measures.<br>b. Revegetate disturbed areas with native or naturalized plant species consistent with the surrounding vegetation once demolition is complete.<br>c. Protection of storm drains around the demolition sites with sediment control (e.g., fiber rolls and sediment traps).<br>d. Storage of hazardous materials with proper secondary containment, and establishment of designated vehicle and equipment maintenance areas.<br>e. Management of spills and leaks from vehicles and equipment through inspections and use of drip pans, absorbent pads, and spill kits.<br>DLA will include these requirements in the Closure PWS. |
| **Noise** | |
| NOI-1 | NASA and DLA would comply with all applicable laws and regulations, and would meet the substantive requirements of those laws and regulations that do not formally apply to NASA/DLA, to the fullest extent practicable. In addition, the following measure would be implemented. |
| NOI-2 | DLA would provide advanced notification of proposed demolition activities and associated demolition hours to the community. |
| NOI-3 | Demolition and excavation equipment would operate from 7:00 a.m. to 6:00 p.m. Monday through Friday. During demolition and excavation activities, BMPs such as placing mufflers on all equipment and limiting the hours of demolition and excavation activities would reduce public exposure to noise. |
| **Traffic and Circulation** | |
| TRA-1 | Prior to demolition and excavation activities commence, a Traffic Control Plan would be developed to minimize impacts to internal circulation near the project site. The plan would illustrate the transportation and hauling routes to and from the work site, contain maps of all areas likely to disrupt traffic flow, and illustrate detour routes, signage, sign placement, and/or use of worker signs. |

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# Appendix E. Summary of Estimated Demolition and Excavation Quantities

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**Table E-1. Summary of Estimated Demolition and Excavation Quantities***

| Item | Qty. | Units | Qty. | Units | Note |
|---|---|---|---|---|---|
| Cut | 24,432 | bank CY | | | Tank void volumes not included in estimate of grading cut |
| Fill | 28,149 | bank CY | | | |
| Import Soil/AC | 10,404 | tons | 472 | truck trips | Source: Vulcan, Pleasanton; 36 miles 1-way travel |
| Export Scrap Steel | 2,023 | tons | 112 | truck trips | Export to: Schnitzer, Oakland; 42 miles 1-way travel |
| Export Concrete/AC Debris | 2,226 | tons | 101 | truck trips | Export to: Vulcan, Pleasanton; 36 miles 1-way travel |
| Export Petroleum-Contaminated Soil | 3,210 | tons | 146 | truck trips | Export to: WM, Altamont; 51 miles 1-way travel |
| Area of Soil Disturbance | 294,861 | ft2 | 7 | acres | |
| Impervious Surface Removed | 37,645 | ft2 | 0.86 | acres | |
| AC Pavement Cut/Replaced | 1,524 | ft2 | | | Source of new AC material: Vulcan, Pleasanton ; 36 miles 1-way travel |
| Miscellaneous Trucking | | | 192 | truck trips | e.g. equip. drop-off, pick-up, fuel service, port-a-potty service, etc. (2 trips/day, mileage varies) |
| | | | 1,440 | Worker personal vehicle trips | |
| | | | 25.7 | trips per day | |

**AC** – asphalt concrete

* Demolition and excavation quantities in Table E-1 based on project description for proposed action Alternative 1. Truck trips calculated using typical load weights for the import and export volumes listed in Table E-1. Personal vehicle trips for commuting construction workers based on estimated 15 vehicle trips per day for the 5-month duration of construction

Not estimated: ACM waste, lead paint waste, non-ferrous scrap metal, scrap electrical equipment

Assume 10% of excavated soil in tank areas is contaminated

Projects inside NASA Property in County of Santa Clara

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## Appendix F. Estimated Demolition and Excavation Equipment Durations in Work Days

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**Table F-1. Estimated Demolition and Excavation Equipment Durations in Work Days**

| Equipment | Task: | Well Demo | Demo Fuel Farm Area | Demo Day Tank Area | Decommission Truck Loading Facility | Demo Fuel Hydrants | Demo Fuel Dock Pipeline | Demo Day Tank Pipeline | Demo Truck Loading Facility Pipeline | Demo Fuel Hydrant Pipeline | Environmental Drilling Sampling of Pipelines | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Backhoe Loader | | | | | 2.5 | | 16 | 17 | 11 | 5 | | 51.5 |
| Small Track Excavator | | | | | 2.5 | | 16 | 17 | 11 | 5 | | 51.5 |
| Small Track Excavator with Hydraulic Hammer | | | | | 2.5 | | | | | | | 2.5 |
| Large Track Excavator | | | 70 | 30 | | | | | | | | 100 |
| Large Track Excavator with Shear | | | 35 | 15 | 10 | | | | | | | 60 |
| Large Track Excavator with Hydraulic Hammer | | | 35 | 15 | | | | | | | | 50 |
| Motor Grader | | | 35 | | | | | | | | | 35 |
| Medium Track Dozer | | | 70 | 30 | | | | | | | | 100 |
| Medium Wheel Loader | | | 70 | 30 | | | | | | | | 100 |
| Large Wheel Loader | | | 70 | 30 | | | | | | | | 100 |
| Articulated Dump Truck | | | 70 | 30 | | | | | | | | 100 |
| Soil Compactor | | | 35 | 15 | | | | | | | | 50 |
| 10 Wheel Water Truck | | | 70 | 30 | 2.5 | | 4 | 4.25 | 2.75 | 1.25 | | 114.75 |
| Small Track Asphalt Paver | | | | | | | 1 | 1 | 1 | | | 3 |
| Small Asphalt Compactor | | | | | | | 1 | 1 | 1 | | | 3 |
| 10 Wheel Dump Truck | | | | | 2.5 | | 16 | 17 | 11 | 5 | | 51.5 |
| Low Side Truck (e.g., Pickup, Small – Medium Flatbed) | | 3 | 210 | 90 | 20 | 10 | 32 | 34 | 22 | 10 | 24 | 455 |
| Hollow Stem Auger Drill Rig | | 3 | | | | | | | | | | 3 |
| Direct push drill rig | | | | | | | | | | | 24 | 24 |
| | **Total Work Days** | **3** | **70** | **30** | **10** | **5** | **16** | **17** | **11** | **5** | **24** | **96** |

* Not included are trucks used to import and export from project site: 18 wheel dump trailer; 18 wheel flatbed trailer; 10 wheel roll off bin truck; 10 wheel roll off bin truck with pup roll off trailer; miscellaneous truck trips (e.g. equipment drop-off, pick-up, refueling service, etc.)

** Total field duration is estimated to be 96 work days. Individual tasks overlap, so sum of task work days exceeds total project work days.

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## Appendix G. Focused Burrowing Owl Survey Report

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# BURROWING OWL SURVEY AND MONITORING REPORT FOR CLOSURE OF DEFENSE FUEL SUPPLY POINT, MOFFETT FIELD, SANTA CLARA CALIFORNIA

Prepared for:

Defense Logistics Agency
Energy Division

National Aeronautics and
Space Administration
Ames Research Center

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October 2015

**COVER PHOTOGRAPHS**

Top Photograph: Alan Vernon. 2011. *Burrowing Owl.* Center for Biological Diversity Photo Database, Resource ID 10092. <http://www.biologicaldiversity.org/resourcespace/?c=334&k=36ef2e039c>. Accessed 14 September 2015.

Bottom Photograph: Terry Powers. 2015. *Aboveground Storage Tanks in Fuel Farm at Defense Fuel Supply Point Moffett Field.*

## EXECUTIVE SUMMARY

The Defense Logistics Agency, in conjunction with the National Aeronautics and Space Administration Ames Research Center proposes to decommission and close the former Defense Fuel Supply Point (DFSP) Moffett Field fuel facility in accordance with federal, state, and local laws and regulations. The first phase of removal and closure involved the removal of several aboveground fuel storage tanks (ASTs). Physical removal of the ASTs was completed on 11 September 2015. The second phase of removal and closure at DFSP will involve the removal of underground storage tanks (USTs) and appurtenances anticipated to begin in early spring 2016. This report serves two main purposes:

1. To state the presence or absence of burrowing owls within the AST work areas prior to and during AST removal, and to document the implementation of measures to avoid and minimize potential impacts to burrowing owls during the removal of ASTs.
2. To describe environmental baseline conditions and potential for burrowing owls within the proposed UST removal work area in support of an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA).

Vernadero Group Inc. (Vernadero) conducted two focused burrowing owl (*Athene cunicularia)* surveys on 14 August and 8 September 2015 in anticipation of AST and UST removal activities. The surveys were conducted within the AST and UST removal work areas and buffer. Vernadero also performed preconstruction surveys and biological monitoring for burrowing owls during the AST removal process from 9-11 September 2015. Burrowing owls are listed by the Bureau of Land Management as a sensitive species and are protected under federal law by the Migratory Bird Treaty Act. No burrowing owls or sign (evidence of owls such as white wash, molting feathers, or pellets) were observed throughout the process. Although the areas surrounding the AST and UST removal sites have the potential to provide habitat for burrowing owls (i.e., ground squirrel burrows), no earth disturbance was made nor were any burrows damaged throughout the process of removing the ASTs.

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ARC | Ames Research Center |
| AST | Aboveground Storage Tank |
| BUOW | Burrowing Owl |
| DFSP | Defense Fuel Supply Point |
| DLA | Defense Logistics Agency |
| °F | Degrees Fahrenheit |
| GIS | Geographic Information System |
| GPS | Global Positioning System |
| LED | Light-Emitting Diode |
| MBTA | Migratory Bird Treaty Act |
| NASA | National Aeronautics and Space Administration |
| OTIE | Oneida Total Integrated Enterprises |
| SDSFIE | Spatial Data Standards for Facilities, Infrastructure, and Environment |
| UST | Underground Storage Tank |
| Vernadero | Vernadero Group Inc. |

## 1.0 INTRODUCTION

The Defense Logistics Agency (DLA), in conjunction with the National Aeronautics and Space Administration (NASA) Ames Research Center (ARC), proposes to decommission and close the former Defense Fuel Supply Point (DFSP) Moffett Field facility in accordance with federal, state, and local laws and regulations. This would involve the removal of a series of aboveground storage tanks (AST) and underground storage tanks (UST) and associated infrastructure. Oneida Total Integrated Enterprises (OTIE) is under contract by the U.S. Army Corps of Engineers to remove the ASTs, USTs and appurtenances. The first phase of removal and closure involved the removal of several aboveground fuel storage tanks (ASTs). Physical removal of the ASTs was completed on 11 September 2015. The second phase of removal and closure at DFSP will involve the removal of underground storage tanks (USTs) and appurtenances anticipated to begin in early spring 2016.

Construction activities associated with removal of the ASTs and USTs such as use of power tools, and transportation of materials have the potential to impact burrowing owls (*Athene cunicularia), a* federally protected species. Burrowing owls are protected under the Migratory Bird Treaty Act (MBTA), which protects migratory bird nests from possession, sale, purchase, barter, transport, import, export, and collection. It is illegal to capture, pursue, hunt, or kill MBTA-protected species. The United States Fish and Wildlife Service administers the MBTA. While the law is not often enforced, penalties are severe and may include up to six months in jail and a fine of up to $15,000 for impacts to individual burrowing owls and their nests. Destruction of a burrowing owl nest could result in a stop-work order and possibly violation of the construction contract, dismissal, and criminal prosecution in addition to possible fines.

In support of the habitat management protocols at Moffett Field, DLA and NASA requested that two focused burrowing owl surveys be conducted; one survey two weeks before construction and another survey 24 hours prior to construction activities associated with AST removal. As part of the OTIE Project Team, Vernadero Group, Inc. (Vernadero) conducted the focused burrowing owl surveys on15 August 8 September 2015 before construction activities began. Preconstruction surveys and biological monitoring was conducted during construction from 9-11 September 2015.

### 1.1 Objective

The objective of the surveys was to determine the presence or absence of burrowing owls so appropriate avoidance and minimization measures could be applied in support of conservation of the species during the DFSP Moffett Field closure process. This survey report is intended to document the survey and biological monitoring effort and results to assist the DLA in better managing the species at DFSP Moffett Field. Construction crews and other personnel at the AST site were provided with an Environmental Education Plan (Appendix A) and presentation regarding the importance of protecting these species. The plan and presentation provided an understanding of the life history of the burrowing owl as well as regulatory requirements for their protection and the consequences for noncompliance to ensure that personnel comply with the avoidance and minimization measures in the Environmental Education Plan. These conservation measures were based on the requirements of NASA-ARC’s Burrowing Owl Habitat

Management Plan (2002) as well as the general requirements of the Endangered Species Act, MBTA, and the Clean Water Act.

This report serves two main purposes:

1. To state the presence or absence of burrowing owls within the AST work areas prior to and during AST removal, and to document the implementation of measures to avoid and minimize potential impacts to burrowing owls during the removal of ASTs.
2. To describe environmental baseline conditions and potential for burrowing owls within the proposed UST removal work area in support of an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA).

### 1.2 Location

DFSP Moffett Field is in Santa Clara County, California, and borders the cities of Mountain View and Sunnyvale (Figure 1-1).


**Figure 1-1. Vicinity Map**

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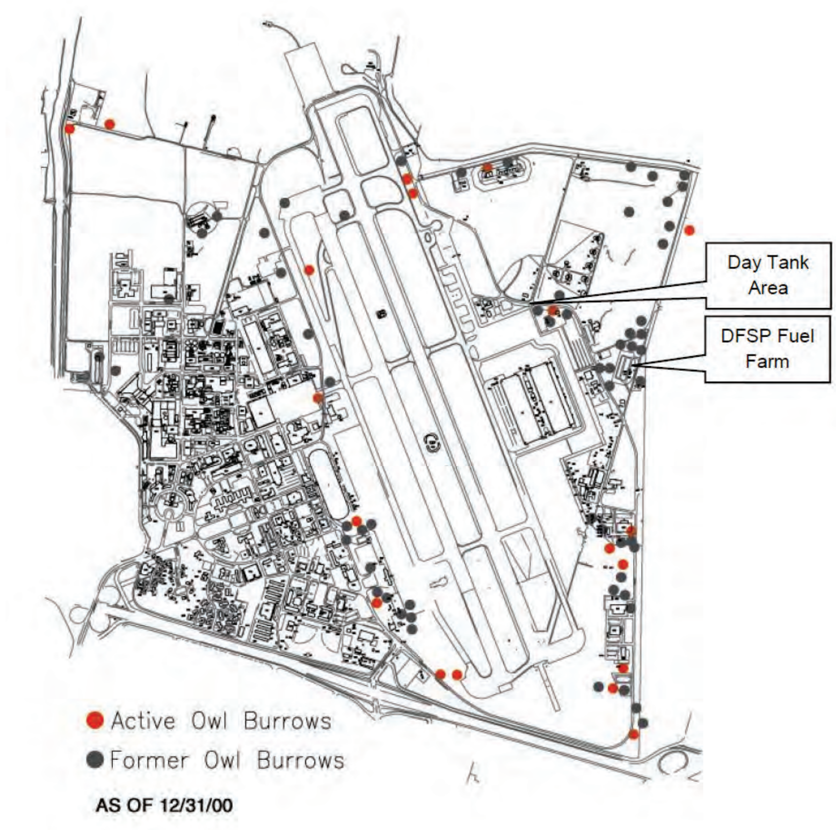
## 2.0 BURROWING OWLS AT MOFFETT FIELD

Burrowing owls are known to occupy undeveloped grassland areas fragmented throughout the 1,750-acre DFSP Moffett Field facility (NASA ARC 2014). The NASA ARC Burrowing Owl Mitigation Plan (2001) contains mapped locations of burrowing owls at the ARC from 1998 to 2000 (Figure 2-1). This same map shows the two locations where the ASTs were located in the day tank area and the fuel farm area. Although no owl observations were recorded in the day tank enclosure, the map shows a cluster of burrows labeled “Former Owl Burrows” near the fuel farm. This indicates that there were historic occurrences of burrowing owls predating 1998 near the AST removal site in the fuel farm. NASA ARC’s 2013 Burrowing Owl Ecology Study (NASA ARC 2013) contains a map (Figure 2-2) showing locations of burrowing owl nesting sites during the 2013 breeding season at Moffett Field. The red arrow in Figure 2-2 points to two attributes within the fuel farm, labeled “Unknown Pair at Nest Burrows – Abandoned Locations” and “Satellite Burrows or Previous Nest Burrows.”

Since there are documented historic observations of burrowing owls at the fuel farm, Vernadero took extra care to ensure the burrows were carefully examined during preconstruction surveys. Monitors verified that no heavy equipment came near the historic burrows during construction, since that equipment could damage or crush a burrow.




Source: NASA ARC 2001

**Figure 2-1. Locations of Owl Burrows, 1998-2001**


Estimated Number of Burrowing Owls and Active Burrow Locations
48 Burrowing Owls – 24 Adults (12 Pair) at 12 Nest Locations – 5 Pair Produced 24 Chicks

Ames Research Center
Moffett Field, CA 94035

April to July 2013
Prepared by Debra Chromczak

LEGEND
- 5 Successful Pair at Nest Burrows with Chicks
- 4 Failed Pair at Nest Burrows - No Chicks
- 3 Unknown Pair at Nest Burrows - Abandoned Locations
- 39 Satellite Burrows or Previous Nest Burrows

Source: NASA ARC 2013

**Figure 2-2. Estimated Number of Burrowing Owls and Active Burrow Locations**

## 3.0 STUDY AREA

Surveys of the study area involved walking transects within and adjacent to all AST enclosures (Figure 3-1). No burrowing owls or signs were observed during the two surveys conducted on 14 August and 8 September 2015. Note that in preparation for the future removal of underground storage tank (UST) and infrastructure removal, Vernadero also conducted focused burrowing owl surveys within the proposed UST removal work area, also shown in Figure 3-1. Although no burrowing owls or signs were observed within the UST study area, subsequent breeding season surveys will be required prior to UST removal.

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**Figure 3-1. Survey Locations**

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# 4.0 METHODOLOGY FOR DATA COLLECTION

This section describes the survey protocol and methodologies for conducting surveys. Survey and monitoring results are discussed in Section 5.

## 4.1 Burrowing Owl Survey Protocol

Vernadero followed the survey protocols contained in the California Department of Fish and Game 2012 Staff Report on Burrowing Owl Mitigation.

## 4.2 Burrowing Owl Survey Methodologies

Vernadero conducted two surveys at the request of NASA: One on 14 August 2015 during breeding season, and one on 8 September, during nonbreeding season, 24 hours before AST removal activities began. The surveys were conducted in suitable habitat within both the AST and UST project boundaries and adjacent areas of suitable habitat. The survey locations were mapped using a hand-held Trimble Global Positioning System (GPS) unit and iPad tablet preloaded with aerial photographs and locations of the historic locations of burrowing owl locations. The number of individuals were counted during each site visit and included in the geographic information system (GIS) files. Surveys were conducted between 0600 hours and 1100 hours Pacific Daylight Time. All potential burrows were carefully examined for occupancy and signs such as molted feathers, droppings, and pellets. Surveyors used a light-emitting diode (LED) flashlight to look inside accessible burrows and binoculars and digital camera with a telephoto optical focus lens to detect owls at distances beyond 5 meters. Field data collection sheets (Appendix B) were completed during each site visit for both focused surveys and during construction monitoring.

## 4.3 Mapping

Georeferenced photographs and data points were collected using a hand-held Trimble GPS unit as well as ArcGIS Collector© on an iPad. All data are compatible with Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) 3.0 geospatial data standards and are compatible with ArcGIS 9.2 or higher.

## 4.4 Surveyors

Terry Powers was Vernadero’s Project Manager and Principal Investigator for all surveys and monitoring conducted under this task order. Mr. Powers has more than 15 years of experience as a Project Manager for natural resource management and environmental planning projects. His expertise includes special status species surveys and biological monitoring, endangered species management, Section 7 consultation, restoration ecology, development of Integrated Natural Resource Management Plans (INRMPs), and management of habitat conservation lands.

Sean Turner, a biologist with Vernadero, performed the walking transects on the 15 August 2015 survey. Mr. Turner has experience with performing burrowing owl surveys and biological monitoring, as well as other special status species surveys and development of INRMPs.

## 5.0 SURVEY RESULTS

Table 5-1 shows the results from the two focused burrowing owl surveys and biological monitoring during AST removal.

**Table 5-1. Survey Summary**

| Date | Time (PDT) | Temperature (°F) | BUOW Observed |
|---|---|---|---|
| 15 August 2015 | 0639 - 1135 | 74 – 85 | 0 |
| 8 September 2015 | 0535 - 1037 | 71 – 78 | 0 |

**PDT** – Pacific Daylight Time; **°F** – degrees Fahrenheit; **BUOW** – burrowing owl

Table 5-2 shows the results from biological monitoring during AST removal.

**Table 5-2. Monitoring Summary**

| Date | Time (PDT) | Temperature (°F) | BUOW Observed | Burrows Damaged During Construction | Non-compliance Issues | Environmental Training Given to Construction Crew |
|---|---|---|---|---|---|---|
| 9 September 2015 | 0638 - 1456 | 70° to 91° | 0 | 0 | 0 | Yes |
| 10 September 2015 | 0628 - 1626 | 72° to 88° | 0 | 0 | 0 | Yes |
| 11 September 2015 | 0700 - 1110 | 70° to 78° | 0 | 0 | 0 | Yes |

**PDT** – Pacific Daylight Time; **°F** – degrees Fahrenheit; **BUOW** – burrowing owl

## 6.0 CONCLUSIONS

Focused burrowing owl surveys were conducted on 15 August and 8 September 2015 prior to AST removal in the both proposed AST and UST work areas. Preconstruction surveys and biological monitoring were conducted within and adjacent to the Bulk Storage Tank Area and Day Tank Area enclosures from 9 September through 11 September 2015. Although no burrowing owls were detected, NASA ARC has maintained historical records of burrowing owl observations since 1998 that demonstrate the potential for burrowing owls to occur within work areas associated with the AST and UST removal. Through worker education in combination with monitoring the effectiveness of avoidance measures; no burrowing owls were impacted during AST removal, nor was potential burrowing owl habitat removed or damaged throughout the AST removal process. Although no burrowing owls were detected within the UST work area, there are many active ground squirrel burrows in the immediate area that could potentially attract burrowing owls before UST construction begins. Avoidance and minimization measures for the UST removal effort will be discussed in a separate document.

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## 7.0 REFERENCES

California Department of Fish and Game Natural Resources Agency. 2012. Staff report on burrowing owl mitigation.

National Aeronautics and Space Administration Ames Research Center (NASA ARC). 2002. Burrowing owl habitat management plan. Appendix F in National Aeronautics and Space Administration Ames Development Plan, Final Programmatic Environmental Impact Statement.

National Aeronautics and Space Administration Ames Research Center (NASA ARC).2013. Burrowing owl ecology study, Moffett Field breeding season summary report.

National Aeronautics and Space Administration Ames Research Center (NASA ARC). 2014. Burrowing owl ecology study, Moffett Field breeding season summary report.

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# Appendix A. Environmental Education Plan

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# ENVIRONMENTAL EDUCATION PLAN FOR CLOSURE OF FORMER DEFENSE FUEL SUPPLY POINT FUEL FACILITY, MOFFETT FIELD, SANTA CLARA CALIFORNIA

**Prepared for:**

**Defense Logistics Agency**
**Energy Division**

**National Aeronautics and Space Administration**
**Ames Research Center**

**U.S. Army Corps of Engineers**
**Los Angeles District**

**Prepared by:**


**Oneida Total Integrated Enterprises**
**2247 San Diego Ave., Suite 238**
**San Diego, CA 92110**

**And**

VERNADERO GROUP INCORPORATED

**4422 E. Indian School Rd., Ste. 101**
**Phoenix, Arizona 85018**


**September 2015**

COVER PHOTOGRAPHS

Top Photograph: Burrowing Owl. Courtesy of Alan Vernon. Found at http://www.biologicaldiversity.org/resourcespace/?c=334&k=36ef2e039c.

Bottom Photograph: ASTs in Fuel Farm at DFSP Moffett Field. Terry Powers.

**Environmental Education Plan**
**Closure of Former Defense Fuel Supply Point Fuel Facility**
**Moffett Field, Santa Clara County, California**

**Background:** The Defense Logistics Agency, in conjunction with the National Aeronautics and Space Administration (NASA) Ames Research Center (ARC) propose to demolish, and remove the former Defense Fuel Supply Point (DFSP) Moffett Field fuel facility in accordance with Federal, State and local laws and regulations.

**Location:** DFSP Moffett Field is located in Santa Clara County, California and borders the adjacent cities of Mountain View and Sunnyvale (Figure 1).

**Aboveground Storage Tank (AST) Removal:** OTIE is scheduled to remove five ASTs from the DFSP Moffett Field (Figure 2). The ASTs will be deconstructed and detached from their saddles, loaded onto flatbed trucks using a crane. The ASTs will be transported using East Patrol Road to an appropriate metal recycling site. The AST removal process is scheduled to be completed in 3 to 4 days. Construction activities, including any earthwork, use of power tools, or transportation of materials, have the potential to impact Burrowing owls (*Athene cunicularia* [Figures 3 and 4]) and other birds protected under the Migratory Bird Treaty Act (MBTA) which are historically known to occur at Moffett Field.

**Objective:** This Environmental Education Plan is intended to inform construction crews, other personnel, and visitors at DFSP Moffett Field of the importance of protecting these species through an understanding of their life history as well as regulatory requirements for their protection and the consequences for noncompliance. Biological monitors will present this Environmental Education Plan to all construction staff and will be on site during all phases of construction to ensure that personnel comply with the avoidance and minimization measures in this document based on the requirements of the 2001 NASA AMES Burrowing Owl Management Plan as well as the general requirements of the Endangered Species Act, MBTA and the Clean Water Act. Once briefed by the biological monitor, all construction personnel will be asked to sign and date the last page of this plan as an acknowledgement of the briefing. The biological monitor will maintain the list of personnel who have attended the briefing.


**Figure 1 Vicinity Map**

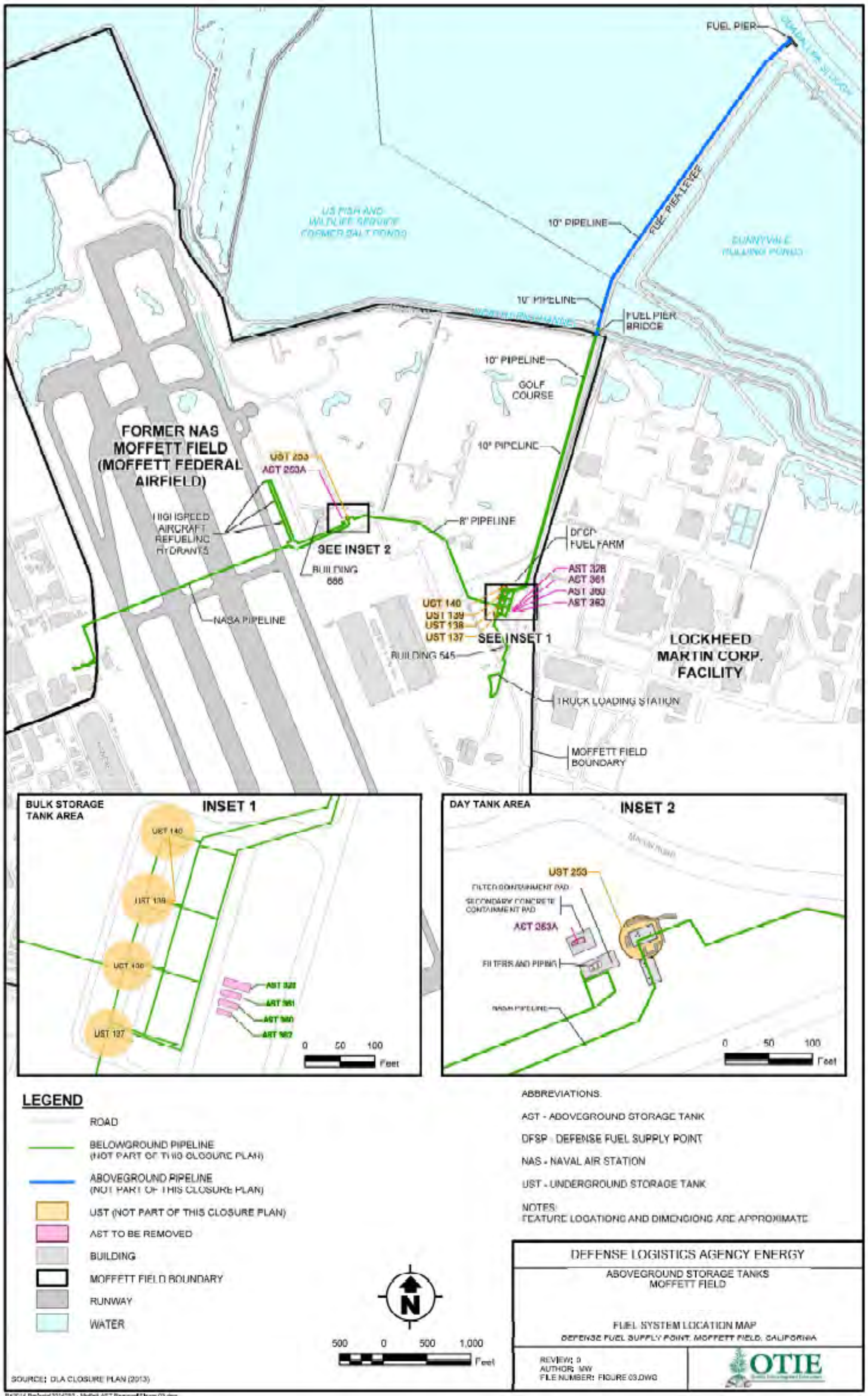


**FIGURE 2: AST REMOVAL AREAS**

## BURROWING OWLS AT MOFFETT FIELD

**Species Description:** Burrowing owls are raptors (birds of prey) which have characteristically large yellow eyes, long legs, and a brown body with white speckles (Figure 3). They do not have of ear tufts like many other owls. Full-grown males and females are no more than 10 inches in height, weigh 6 ounces or less, and have a wingspan of 20 to 24 inches.


**Figure 3. Burrowing Owl (*Athene cunicularia*)**

**Habitat:** The burrowing owl is distinguished from most other owls primarily by its habitat. Burrowing owls live on the ground in burrows dug by other animals such as gophers, ground squirrels, and prairie dogs. California supports one of the largest resident and wintering populations of burrowing owls in the United States. Based on surveys in the 1990s, there were an estimated 9,000 breeding pairs in the state. Most occur in California's agricultural lands in the Central and Imperial valleys, while declines have taken place in increasingly urbanized areas including the San Francisco Bay, Los Angeles and San Diego.

**Diet:** The burrowing owl's diet consists of insects, small mammals, amphibians, reptiles, and other birds. Like most owls, they are most active at night, but are known to hunt during the daytime. They are also known to collect mammal waste to attract dung beetles to feed on.

**Life Cycle:** Burrowing owls are migratory birds found from the Midwest to the eastern parts of the Pacific states and into Canada during the summer months, and are found in Central America and Mexico in the winter. Burrowing owls can be seen year round in California, Florida, Mexico, and parts of South America. Typically both parents will nurture their owlets until they are physically ready to fledge (leave the nest) after about 40 days (Figure 3). The average lifespan of the burrowing owl is six to eight years. The owlets are able to mimic the sounds of a rattlesnake to chase away predators such as ravens and coyotes.


**Figure 4. Burrowing Owl Young**

**Conservation Status:** Burrowing owl is listed by the Bureau of Land Management as a sensitive species. Burrowing owls are protected under the MBTA. The MBTA protects migratory bird nests from possession, sale, purchase, barter, transport, import and export, and collection. It is illegal to capture, pursue, hunt, or kill MBTA-protected species. The United States Fish and Wildlife Service administers the MBTA. While the law is not often enforced, penalties are severe, and may include up to six months in jail and a fine of up to $15,000 for impacts to individual burrowing owls and their nests. Destruction of a burrowing owl nest could result in a stop-work order and violation of the construction contract, dismissal, and possible criminal prosecution in addition to possible fines.

**Known Locations of Burrowing Owls at DFSP Moffett:** The 2001 NASA Ames Burrowing Owl Mitigation Plan contains mapped locations of burrowing owl occurring between 1998 and 2000. Figure 5 shows locations of "Former Owl Burrows" however no "Active Owl Burrows" were observed within the proposed Area of Potential Effect (APE) of the Fuel Farm in 1998 and 1999. No historic location of burrowing owl were delineated within the APE of the Day Tank area Figure 5). During preconstruction surveys conducted on August 14 and September 8 2015, no burrowing owls or sign (e.g., droppings and pellets) of burrowing owls was detected within the APE or surrounding 200 foot buffer.

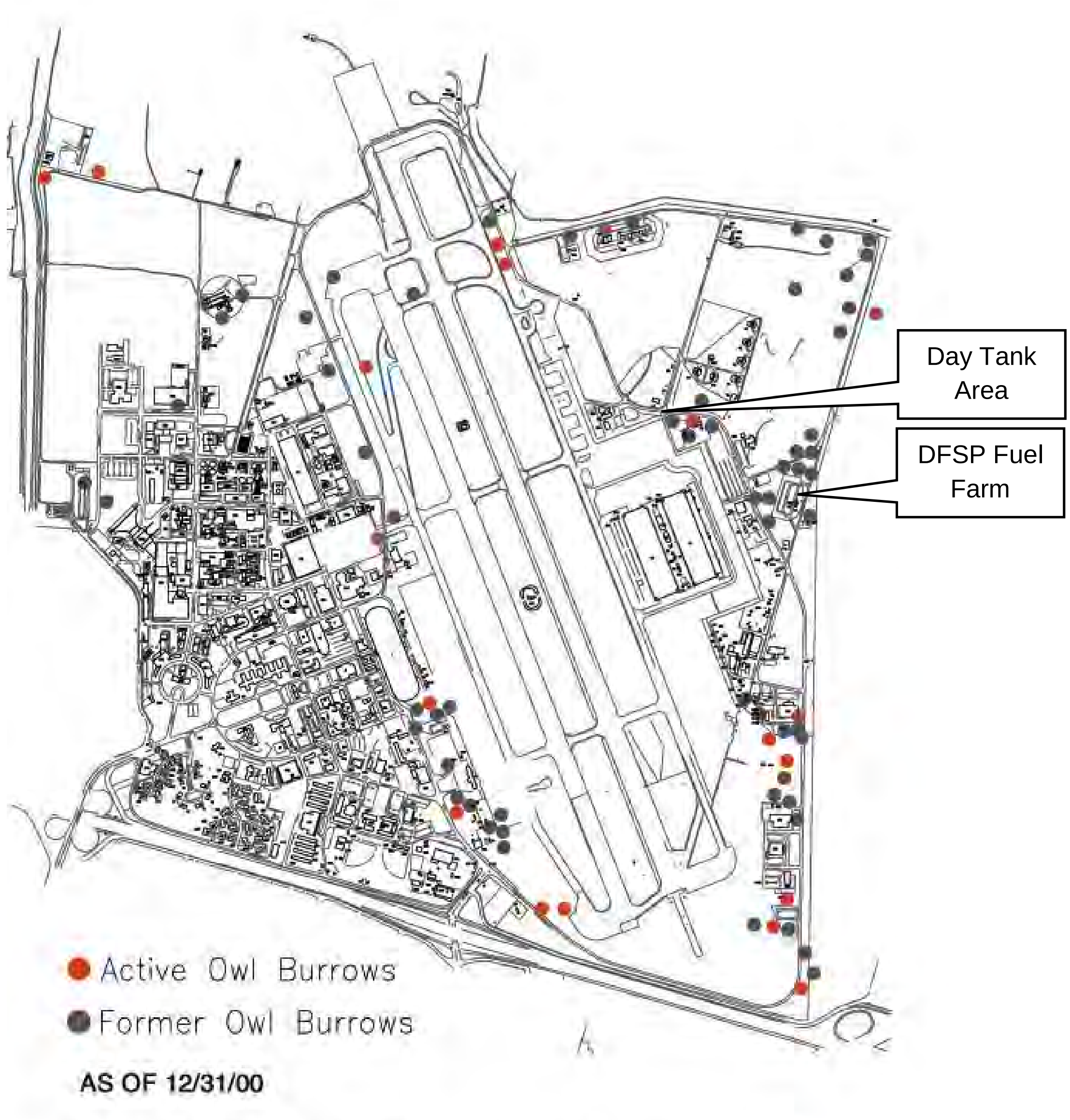


**Figure 5: Locations of Owl Burrows, 1998-2000**
**(2001 NASA Ames Burrowing Owl Mitigation Plan)**

**Potential Impacts:** Although no burrowing owls have been detected with the AST work area, there are many active ground squirrel burrows in the immediate area which could potentially attract burrowing owls before construction has been completed. Therefore, construction activities at DFSP Moffett have the potential to cause severe enough disturbance or harassment to the burrowing owl for the owl to change its behavior or potentially abandon a nest. Equipment used to remove ASTs and associated infrastructure will emit noise and potentially cause ground vibration, which could harass the species. Although no burrowing owls were detected within the APE during the 14 August and 8 September 2015 surveys, it is important to point out that these animals can easily move from one location to another. Construction at DFSP Moffett in areas of known or potential burrowing owl habitat will be minimized or avoided as discussed on pages 9.and 10. All construction staff will comply with these requirements throughout the construction process. Ground-moving activities associated with AST removal project are anticipated to be completed by 11 September 2015.

**Biological Monitoring:** Construction activities will be monitored by qualified biologists to ensure compliance with the avoidance and minimization measures listed in this document. Should any burrows be located during construction, the biological monitor will place markers to ensure that equipment and other machinery do not collapse burrows. The biological monitor will record observations of burrowing owl and other species as well as noncompliance issues. The biologist will have the authority to temporarily halt the operation if a noncompliance issue is discovered. The noncompliance issue will then be reported to the work effort foreman, to determine how to resolve the issue. Monitoring reports will be provided to DLA and NASA. The monitoring report will document all noncompliance issues observed by the biologist as well as observations of burrowing owl reactions to the disturbance (i.e., habituation, flushing, etc.).

**The Role of the Biological Monitor:** The biological monitor is on site to help the construction team avoid and minimize impacts to federally listed and sensitive species and their habitat. The biological monitor will work on site with staff to ensure that they are familiar with sensitive species that occur in and near the boundaries of the construction zone. He will also be there to help staff safely handle any wildlife issue(s) near or within the construction zone and to help the construction team identify and avoid unnecessary habitat disturbance. If personnel have any questions while on the site, they should feel free to ask the biological monitor.

If work is conducted in a sensitive resource area without a biological monitor present, the work is considered out of compliance. If a biological monitor is not present when crews are ready to begin construction, they should immediately contact their Mary Londquist, OTIE Project Scientist at (619) 507-5894, or Terry Powers, Biological Monitor at (858) 230-2167.

**Project-Specific Avoidance and Minimization Measures:** The following avoidance and minimization measures shall be complied with at all times:

- All construction workers will participate in reviewing and understanding this Environmental Education Plan to increase recognition of and commitment to burrowing owl protection. After receiving the Environmental briefing, each worker will sign the attached sign-in sheet.
- Disturbance of occupied burrows will be avoided during the nesting period (1 February through 31 August). If active burrows and/or nests are found, work should not commence until the birds have fledged or the nest(s) have been abandoned.
- All personnel shall leave all animals undisturbed. Never chase or harass any wildlife.
- Should a sighting of any federally protected animal occur within the designated construction area during operations, the biological monitor shall be notified as soon as possible. If an animal is injured, the biological monitor must be notified immediately.
- Avoid direct destruction of burrows through earth movement or clearing of vegetation. Avoid use of large mowers and/or chaining (dragging a heavy chain over an area to remove shrubs), disking, cultivation, and urban, industrial, or agricultural development.

- Grading, grubbing, or destroying habitat must always be avoided outside the designated limits of construction. Do not go outside the designated limits of the construction project as indicated by the biological monitor. Sensitive resource areas in the field will be delineated on maps and by flags or fencing.
- Staging areas are prohibited outside of identified areas within the limits of construction. To the degree feasible, staging areas will be located in already disturbed habitat.
- Vehicles must use existing access roads to the extent feasible. All access routes outside of existing roads or the construction corridor will be delineated on plans.
- The contractor must collect all of the crew's trash and dispose of it in a proper and covered location to prevent attracting scavengers.
- The contractor should avoid leaving open holes or trenches whenever possible, including trench plates lift holes. Any open holes left uncovered overnight must be inspected by the biological monitor before work can resume the following day.

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# Please Sign as an Acknowledgement of Environmental Training

## ENVIRONMENTAL EDUCATION PLAN

### Closure of Former Defense Fuel Supply Point Fuel Facility Moffett Field, Santa Clara County, California

| Name | Signature | Organization | Date |
|---|---|---|---|
| Louis J Sullivan | | PSEC | 9-9-15 |
| Greg Simonson | | PSEC | 9/9/15 |
| Suman Shun | | OTIE | ✓ |
| Diane Rosenberg | | USACE | 9/9/2015 |
| Scott Thompson | | OTIE | 9/9/15 |
| M. Londquist | | OTIE | 9/9/15 |
| Tom Mulder | | OTIE | 9-9-15 |
| Brian Eschuler | | PSEC | 9.9.15 |
| Bobby Walter | | EMC | 9/9/15 |
| Tom Jaeger | | EMC | 9/9/15 |
| Johnny Harper | | PSEC | 9/10/2015 |

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# Please Sign as Acknowledgement of Environmental Training

## ENVIRONMENTAL EDUCATION PLAN

### Closure of Former Defense Fuel Supply Point Fuel Facility
### Moffett Field, Santa Clara County, California

| Name | Signature | Organization | Date |
|---|---|---|---|
| Bryan Gartscht | [signature] | ACR | 9/10/15 |
| Nic Belletto | [signature] | ACR | 9-10-15 |
| Dennis DeCote | [signature] | Pacific States Env. | 9-10-15 |
| Frank Enos | [signature] | P.S.E.C. | 9-10-15 |
| Andy Anderson | [signature] | Pacific States | 9-10-15 |
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**Appendix B. Biological Survey and Monitoring Data Collection Sheets**

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| Burrowing Owl Survey<br>15 August 2015 | | | |
|---|---|---|---|
| **Name of Biologist** | **Start Time** | **Finish Time** | **Total Hours** |
| Terry Powers, Sean Turner | 0639 PDT | 1335 PDT | 7 |
| **Atmospheric Conditions** | | | |
| Partly cloudy with a light breeze, 1-1.5 miles per hour north by northeast, 74-85° Fahrenheit. | | | |
| **Description of Survey Activities** | | | |
| Survey took place in all areas of potential burrowing owl habitat with 250 feet of the proposed impact area, including unpaved surfaces. Transects were conducted less than 30 feet apart. Noticed that all nonnative grass areas had been recently mowed. Tire track marks were observed in unpaved areas, in some cases over squirrel burrows. AvOps escort vehicle to airfield area through L Gate drove onto and across burrows near the airfield west of the day tank area. Observed rodenticide bait station on north side of day tank enclosure. | | | |
| **List Observations of Burrowing Owl and Locations** | | | |
| None observed. | | | |
| **List Incidental Species Observations** | | | |
| Ground squirrels, mourning doves, starlings, red-winged blackbirds, egrets, cormorants, great blue heron. | | | |
| **List Special Status Species Observations** | | | |
| None observed. | | | |

**Survey near Airfield East of Hanger 1**

| Burrowing Owl Survey<br>8 September 2015 | | | |
|---|---|---|---|
| **Name of Biologist** | **Start Time** | **Finish Time** | **Total Hours** |
| Terry Powers | 0535 PDT | 1037 PDT | 5 |
| **Atmospheric Conditions** | | | |
| Cool morning, gradual heating, 70-82° Fahrenheit, 0-4.3 mile-per-hour winds | | | |
| **Description of Survey Activities** | | | |
| Surveyed the entire work area sites for the aboveground storage tanks in the fuel farm and day tank enclosures. No owls or owl sign observed. Walked transacts throughout the entire underground storage tank work area and buffer including airfield. No owls or sign observed. All unpacked areas are mowed regularly. Vehicle tire tracks observed over unpaved areas. Traffic is minimal in work areas. Ambient noise levels low. | | | |
| **List Observations of Burrowing Owl and Locations** | | | |
| None observed. | | | |
| **List Incidental Species Observations** | | | |
| Ground squirrels, mourning doves, black phoebes, starlings, swallows. Cormorants, terns, and egrets near salt ponds. | | | |
| **List Special Status Species Observations** | | | |
| None observed. | | | |

| Burrowing Owl Biomonitoring 9 September 2015 | | | |
|---|---|---|---|
| **Name of Biologist** | **Start Time** | **Finish Time** | **Total Hours** |
| Terry Powers | 0638 PDT | 1456 PDT | 8.25 |
| **Atmospherics Conditions** | | | |
| Clear and hot, 70° to 94° Fahrenheit, light winds to 6 miles per hour. | | | |
| **Description of Construction Activities** | | | |
| Crews removed most plumbing and catwalks from aboveground storage tanks in fuel farm and day tank. Abrasive saws were used. Site was left clean of trash. | | | |
| **List Noncompliance Issues** | | | |
| None observed. No earthwork or disturbances to squirrel burrows. | | | |
| **Description of Monitoring Activities** | | | |
| Conducted preconstruction survey within all work areas including the fuel farm in day tank enclosures. No burrowing owls observed. No sign. Conducted environmental education training at safety tailgate meeting. All construction workers signed the Environmental Education Plan. There were no incidents of noncompliance issues. No owls or any other incidental species observed within the project area while work was conducted. | | | |
| **List Observations of Burrowing Owl and Locations** | | | |
| None observed. | | | |
| **List Incidental Species Observations** | | | |
| Squirrels, pair of red-tailed hawks, starlings, mourning doves. | | | |
| **List Special Status Species Observations** | | | |
| None observed. | | | |

**Crews Cutting Plumbing and Catwalks from Aboveground Storage Tanks**

| Burrowing Owl Biomonitoring<br>10 September 2015 | | | |
|---|---|---|---|
| **Name of Biologist** | **Start Time** | **Finish Time** | **Total Hours** |
| Terry Powers | 0628 PDT | 1626 PDT | 10 |
| **Atmospherics Conditions** | | | |
| Clear and warm to hot, 72° to 88° Fahrenheit, light breeze up to 6 miles per hour. | | | |
| **Description of Construction Activities** | | | |
| Primary construction activity: Crane lifted the day tank and aboveground storage tanks (ASTs) onto flatbed trucks to be hauled away. | | | |
| **List Noncompliance Issues** | | | |
| None observed. | | | |
| **Description of Monitoring Activities** | | | |
| Conducted preconstruction survey within the fuel farm and day tank enclosures. No burrowing owl individuals or sign. Gave Environmental Education Plan and instruction to new workers at the site. No incidents of noncompliance. ASTs completely removed from site. | | | |
| **List Observations of Burrowing Owl and Locations** | | | |
| None observed. | | | |
| **List Incidental Species Observations** | | | |
| Pair of red-tailed Hawks, black phoebe, ground squirrels. | | | |

**Crane Hoisting Aboveground Storage Tanks onto Flatbed Trucks**

| Burrowing Owl Biomonitoring<br>11 September 2015 | | | |
|---|---|---|---|
| **Name of Biologist** | **Start Time** | **Finish Time** | **Total Hours** |
| Terry Powers | 0700 PDT | 1110 PDT | 4 |
| **Atmospherics Conditions** | | | |
| Warm and sunny, 70° to 78° Fahrenheit, light breeze. | | | |
| **Description of Construction Activities** | | | |
| Primarily cleanup activities. All aboveground storage tanks removed the previous day. | | | |
| **List Non-Compliance Issues** | | | |
| None observed. | | | |
| **Description of Monitoring Activities** | | | |
| Conducted preconstruction survey within the fuel farm and day tank enclosures. No burrowing owl individuals or sign. | | | |
| **List Observations of Burrowing Owl and Locations** | | | |
| None observed. | | | |
| **List Incidental Species Observations** | | | |
| Squirrels, mourning doves, swallows, starlings. | | | |

**Fuel Farm after Removal of Aboveground Storage Tanks**

FORMAT PAGE

# Appendix H. Wetland Delineation Report

FORMAT PAGE

# Delineation of Waters of the United States

## FORMER DEFENSE FUEL SUPPORT POINT MOFFETT FIELD, NASA AMES RESEARCH CENTER, SANTA CLARA COUNTY, CALIFORNIA

**Prepared For:**

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**Date:**

March 2016

WRA Project No: 25309

ENVIRONMENTAL CONSULTANTS

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# 1.0 INTRODUCTION

## 1.1 Study Background

WRA, Inc. (WRA) performed a jurisdictional delineation at the former Defense Fuel Support Point (DFSP) Moffett Field at the NASA Ames Research Center (former Naval Air Station Moffett Field), in unincorporated Santa Clara County, California (Figure 1). The Study Area encompasses areas planned for closure and decommissioning of the former DFSP Moffett Field fuel facility. The proposed project will close fuel system elements (underground storage tanks, pipelines, and dispensers) by excavation and removal/demolition, with certain elements to be abandoned in place.

On February 29, 2016, WRA conducted a routine wetland delineation in the Study Area (Figure 1) to determine the presence and extent of potential wetlands and non-wetland waters subject to federal jurisdiction under Section 404 of the Clean Water Act. This report presents the methods and results of the delineation. The U.S. Army Corps of Engineers (Corps) previously issued a jurisdictional determination for a portion of the Study Area in October of 2009 (Corps File Number 2001-25926S). The 2009 jurisdictional determination has since expired.

## 1.2 Regulatory Background

<u>Section 404 of the Clean Water Act</u>

Section 404 of the Clean Water Act gives the U.S. Environmental Protection Agency (EPA) and the Corps regulatory and permitting authority regarding discharge of dredged or fill material into "navigable waters of the United States." Section 502(7) of the Clean Water Act defines navigable waters as "waters of the United States, including territorial seas." Section 328 of Chapter 33 in the Code of Federal Regulations (CFR) defines the term "waters of the United States" as it applies to the jurisdictional limits of the authority of the Corps under the Clean Water Act. A summary of this definition of "waters of the U.S." in 33 CFR 328.3 includes (1) waters used for commerce; (2) interstate waters and wetlands; (3) "non-wetland waters" such as intrastate lakes, rivers, streams, and wetlands; (4) impoundments of waters; (5) tributaries to the above waters; (6) territorial seas; and (7) wetlands adjacent to waters. Therefore, for purposes of the determining Corps jurisdiction under the Clean Water Act, "navigable waters" as defined in the Clean Water Act are the same as "waters of the U.S." defined in the CFR above.

The limits of Corps jurisdiction under Section 404 as given in 33 CFR Section 328.4 are as follows: (a) *Territorial seas:* three nautical miles in a seaward direction from the baseline; (b) *Tidal waters of the U.S.:* high tide line [HTL] or to the limit of adjacent non-tidal waters; (c) *Non-tidal waters of the U.S.:* ordinary high water mark or to the limit of adjacent wetlands; (d) *Wetlands:* to the limit of the wetland.

<u>Section 10 of the Rivers and Harbors Act</u>

The Rivers and Harbors Appropriation Act (RHA) of 1899 regulates the placement of fill in navigable waterways. Under Section 10 of the RHA, Corps jurisdiction extends up to the mean high water (MHW) of navigable waterways including all tidal waters.

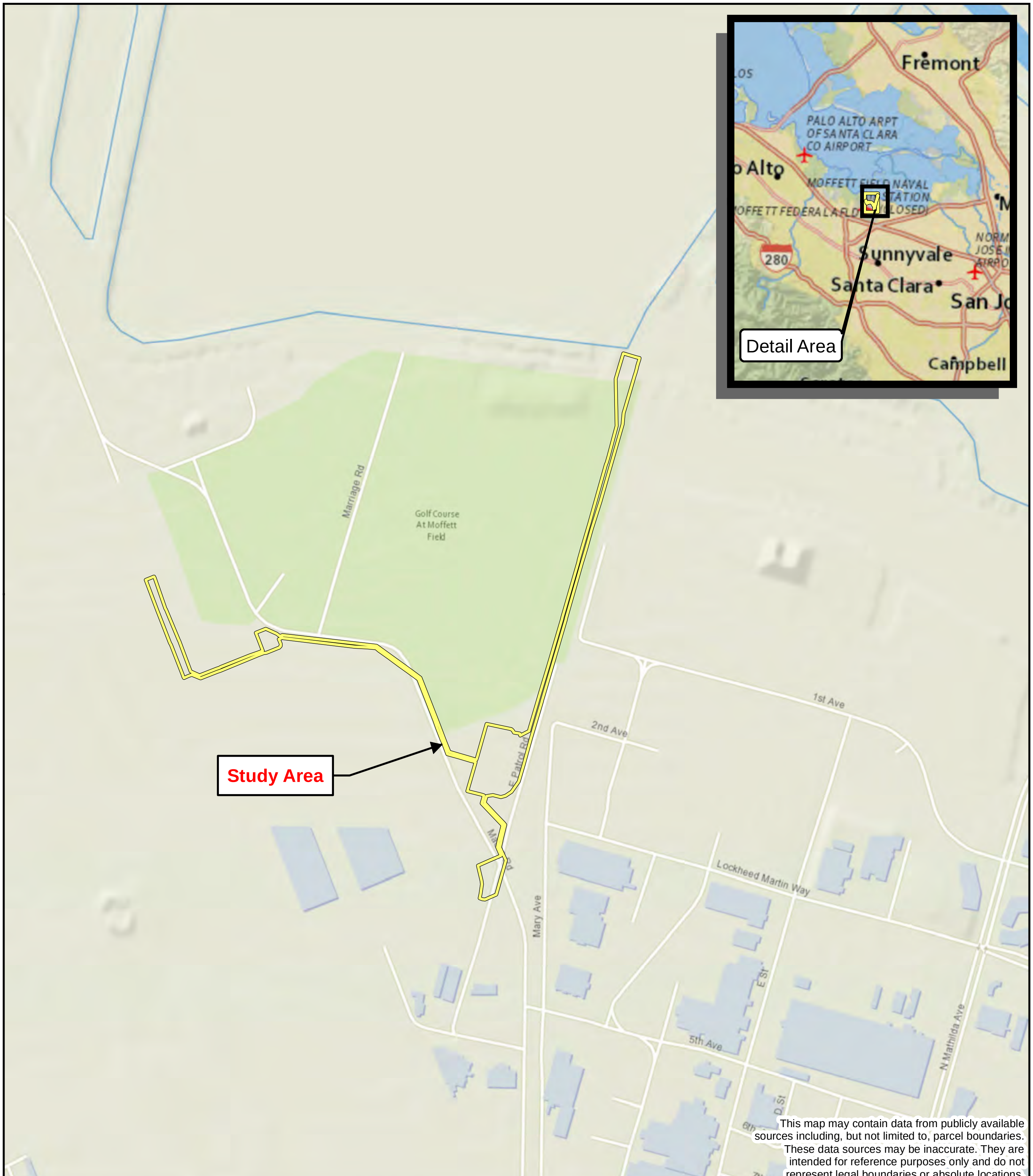


Figure 1. Study Area Location Map

N W E S

ENVIRONMENTAL CONSULTANTS

Former Defense Fuel Support Point Moffett Field
Santa Clara County, California

0 500 1,000 Feet

Map Prepared Date: 3/9/2016
Map Prepared By: Fhourigan
Base Source: Esri Streaming - National Geographic
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25309\GIS\ArcMap\FigX_LocationMap.mxd

# 2.0 METHODS

Prior to conducting field surveys, reference materials were reviewed, including online soil data (USDA 2016a, USDA 2016b), National Wetland Inventory (NWI) data (USFWS 2016), and aerial photographs of the site (Google Earth 2016).

A focused evaluation of indicators of wetlands and non-wetland waters was performed in the Study Area on February 29, 2016. The methods used in this study to delineate jurisdictional wetlands and waters are based on the *U.S. Army Corps of Engineers Wetlands Delineation Manual* ("Corps Manual"; Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* ("Arid West Supplement"; Corps 2008). The routine method for wetland delineation described in the Corps Manual was used to identify areas potentially subject to Corps Section 404 jurisdiction within the Study Area. A general description of the Study Area, including plant communities present, topography, and land use was also generated during the delineation visit. The methods for evaluating the presence of wetlands and non-wetland waters employed during the site visit are described in detail below.

## 2.1 Potential Section 404 Waters of the U.S.

### *2.1.1 Wetlands*

The Study Area was evaluated for the presence or absence of indicators of the three wetland parameters described in the Corps Manual (Environmental Laboratory 1987) and Arid West Supplement (Corps 2008) which are intended to identify the extent of wetlands potentially subject to Corps jurisdiction under Section 404 of the CWA.

The Code of Federal Regulations (33 CFR 328.3 (b)) defines wetlands as:

> *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*

The three parameters used to delineate wetlands are the presence of (1) hydrophytic vegetation, (2) wetland hydrology, and (3) hydric soils. According to the Corps Manual, for areas not considered "problem areas" or "atypical situations":

> *....evidence of a minimum of one positive wetland indicator from each parameter (hydrology, soil, and vegetation) must be found in order to make a positive wetland determination.*

Data on vegetation, hydrology, and soils collected at sample points during the delineation site visit were reported on Arid West Supplement data forms. Once an area was determined to be a potential jurisdictional wetland, its boundaries were delineated using handheld GPS equipment with sub-meter accuracy. The areas of potential jurisdictional wetlands were measured digitally using ArcGIS software. Indicators described in the Arid West Supplement were used to make wetland determinations at each sample point in the Study Area and are summarized below.

Vegetation

Plant species observed in the Study Area were identified using the Jepson Manual, Second Edition (Baldwin et al. 2012) and/or the Jepson eFlora (Jepson Flora Project 2016). Plants were assigned a wetland indicator status according to the National Wetland Plant List (NWPL; Lichvar et al. 2014). Where differences in nomenclature occur between the Jepson Manual or the Jepson eFlora and the NWPL, the species name as it occurred in the NWPL is listed in brackets. Other relevant synonyms may also be provided in brackets.

Wetland indicator statuses listed in the NWPL are based on the expected frequency of occurrence in wetlands as follows:

| **Classification (Abbreviation)** | **Definition*** | **Hydrophytic Species?** |
|---|---|---|
| Obligate (OBL) | Almost always is a hydrophyte, rarely in uplands | Y |
| Facultative Wetland (FACW) | Usually is a hydrophyte but occasionally found in uplands | Y |
| Facultative (FAC) | Commonly occurs as either a hydrophyte or non-hydrophyte | Y |
| Facultative Upland (FACU) | Occasionally is a hydrophyte but usually occurs in uplands | N |
| Upland/Not Listed (UPL/NL) | Rarely is a hydrophyte, almost always in uplands | N |

*See Lichvar et al. (2014).

The presence of hydrophytic vegetation was then determined based on indicator tests described in the Arid West Supplement. The Arid West Supplement requires that a three-step process be conducted to determine if hydrophytic vegetation is present. The procedure first requires the delineator to apply the “50/20 rule” (Indicator 1; Dominance Test) described in the manual. To apply the “50/20 rule”, dominant species are chosen independently from each stratum of the community. Dominant species are determined for each vegetation stratum from a sampling plot of an appropriate size surrounding the sample point. Dominants are the most abundant species that individually or collectively account for more than 50 percent of the total vegetative cover in the stratum, plus any other species that, by itself, accounts for at least 20 percent of the total vegetative cover. If greater than 50 percent of the dominant species has an OBL, FACW, or FAC status, ignoring + and - qualifiers, the sample point meets the hydrophytic vegetation criterion.

If the sample point fails Indicator 1 and both hydric soils and wetland hydrology are not present, then the sample point does not meet the hydrophytic vegetation criterion, unless the site is a problematic wetland situation. However, if the sample point fails Indicator 1 but hydric soils and wetland hydrology are both present, the delineator must apply Indicator 2.

Indicator 2 is known as the Prevalence Index. The prevalence index is a weighted average of the wetland indicator status for all plant species within the sampling plot. Each indicator status is given a numeric code (OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5). Indicator 2 requires the delineator to estimate the percent cover of each species in every stratum of the community and sum the cover estimates for any species that is present in more than one stratum. The delineator must then organize all species into groups according to their wetland indicator status and calculate the Prevalence Index using the following formula, where A equals total percent cover:

$$PI = \frac{A_{OBL} + 2A_{FACW} + 3A_{FAC} + 4A_{FACU} + 5A_{UPL}}{A_{OBL} + A_{FACW} + A_{FAC} + A_{FACU} + A_{UPL}}$$

The Prevalence Index will yield a number between 1 and 5. If the Prevalence Index is equal to or less than 3, the sample point meets the hydrophytic vegetation criterion. However, if the community fails Indicator 2, the delineator must proceed to Indicator 3.

Indicator 3 is known as Morphological Adaptations. If more than 50 percent of the individuals of a FACU species have morphological adaptations for life in wetlands, that species is considered to be a hydrophyte and its indicator status should be reassigned to FAC. If such observations are made, the delineator must recalculate Indicators 1 and 2 using a FAC indicator status for this species. The sample point meets the hydrophytic vegetation criterion if either test is satisfied.

Hydrology

The Corps jurisdictional wetland hydrology criterion is satisfied if an area is inundated or saturated for a period sufficient to create anoxic soil conditions during the growing season (a minimum of 14 consecutive days in the Arid West region). Evidence of wetland hydrology can include primary indicators, such as visible inundation or saturation, drift deposits, oxidized root channels, and salt crusts, or secondary indicators such as the FAC-neutral test, presence of a shallow aquitard, or crayfish burrows. The Arid West Supplement contains 16 primary hydrology indicators and 10 secondary hydrology indicators. Only one primary indicator is required to meet the wetland hydrology criterion; however, if secondary indicators are used, at least two secondary indicators must be present to conclude that an area has wetland hydrology.

The presence or absence of the primary or secondary indicators described in the Arid West Supplement was utilized to determine if sample points within the Study Area met the wetland hydrology criterion.

Soils

The Natural Resource Conservation Service (NRCS) defines a hydric soil as follows:

> *A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.*
>
> Federal Register July 13, 1994,
> U.S. Department of Agriculture, NRCS

Soils formed over long periods of time under wetland (anaerobic) conditions often possess characteristics that indicate they meet the definition of hydric soils. Hydric soils can have a hydrogen sulfide (*i.e.*, rotten egg) odor; low chroma matrix color, generally designated 0, 1, or 2; presence of redox concentrations; gleyed or depleted matrix; or high organic matter content.

Specific indicators that can be used to determine whether a soil is hydric for the purposes of wetland delineation are provided in the NRCS *Field Indicators of Hydric Soils in the U.S.* (USDA 2010). The Arid West Supplement provides a list of 23 of these hydric soil indicators which are known to occur in the Arid West Region. Soil samples were collected and described according to the methodology provided in the Arid West Supplement. Soil chroma and values were determined by utilizing a standard Munsell soil color chart (Munsell Color 2012).

Hydric soils were determined to be present if any of the soil samples met one or more of the 23 hydric soil indicators described in the Arid West Supplement.

### *2.1.2 Non-Wetland Waters*

This study also evaluated the presence of non-wetland waters potentially subject to Corps jurisdiction under Section 404 of the CWA. Other areas, besides wetlands, subject to Corps jurisdiction include lakes, rivers, and streams (including intermittent streams) in addition to all areas below the HTL in areas subject to tidal influence.

Jurisdiction in non-tidal areas extends to the ordinary high water mark (OHWM) defined as:

> *...that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impresses on the bank, shelving, changes in the characteristics of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*
>
> Federal Register Vol. 51, No. 219,
> Part 328.3 (e). November 13, 1986

Identification of the OHWM followed the Corps Regulatory Guidance Letter No. 05-05, *Ordinary High Water Mark Identification* (Corps 2005).

## 3.0 STUDY AREA DESCRIPTION

The Study Area encompasses areas planned for closure and decommissioning of the former DFSP Moffett Field fuel facility, at NASA Ames Research Center, in unincorporated Santa Clara County, along the southwest shoreline of the San Francisco Bay (Figure 1). The Study Area is bordered to the north by former salt ponds that are part of the Alviso complex. The City of Mountain View borders the Study Area to the west and the City of Sunnyvale borders the Study Area to the east. The northeast portion of the Study Area aligns with East Patrol Road and borders the east side of the Golf Club at Moffett Field. The western and southern regions of the Study Area pass through ruderal uplands and developed areas. Elevations within the Study Area range from approximately 0 to 15 feet above sea level.

<u>Vegetation</u>

Dominant vegetation in areas determined to be wetlands include: salt grass (*Distichlis spicata*, FAC), pickleweed (*Salicornia pacifica*, OBL), and common rush (*Juncus patens*, FACW). Dominant vegetation in areas determined to be uplands include: ripgut brome (*Bromus diandrus*, NL), foxtail brome (*Bromus madritensis*, UPL), italian rye grass (*Festuca perennis*, FAC), cut leaved geranium (*Geranium dissectum*, NL), redstem stork's bill (*Erodium cicutarium*, NL), and bur clover (*Medicago polymorpha*, FACU), among other species.

Hydrology

Hydrological sources for the Study Area include precipitation and surface run-off from adjacent lands. A former salt pond, a storm water channel and ditch are located in the north region of the Study Area.

Soils

The Study Area is underlain by three soil types: (1) urban land-hangerone complex, 0 to 2 percent slopes, drained; (2) embarcadero silty clay loam, drained, 0 to 2 percent slopes; and (3) Novato silty clay loam, excessive salinity, 0 to 1 percent slopes, protected (Figure 2). Soil samples analyzed during the site visit showed that sampled areas were consistently clay loam throughout the profile with evidence of disturbance and fill material in some soil samples.


Figure 2. Soils Map

Former Defense Fuel Support Point Moffett Field
Santa Clara County, California

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Map Prepared Date: 3/9/2016
Map Prepared By: Fhourigan
Base Source: Esri Streaming - National Geographic
Data Source(s): WRA, SSURGO

Path: L:\Acad 2000 Files\25000\25309\GIS\ArcMap\FigX_SoilsMap.mxd

## 4.0 RESULTS

Potential Section 404 jurisdictional areas are described in the following sections and depicted in Appendix A. A summary of these features is provided in Table 1. Vegetation, soils, and hydrology data collected during delineation site visits are reported on standard Corps Arid West Region data forms in Appendix B. Photographs of representative portions of the Study Area are provided in Appendix C.

Table 1. Summary of Potential Section 404 Jurisdictional Areas within the Study Area

| Waters of the U.S. | Area (acres) |
|---|---|
| Wetlands | 0.29 acre |
| WL1 | 0.06 acre |
| WL2 | 0.21 acre |
| WL3 | 0.02 acre |
| Non-wetland Waters | 0.18 acre |
| W1 | 0.03 acre |
| W2 | 0.11 acre |
| W3 | 0.04 acre |
| **Total:** | 0.47 acre |

Waters of the U.S. observed within the Study Area are not subject to Section 10 jurisdiction under the RHA as the Study Area is not subject to tidal influence.

### 4.1 Potential Section 404 Waters of the U.S.

#### *4.1.1 Wetlands*

Approximately 0.29 acre of potentially jurisdictional wetlands are located in the Study Area. An approximately 0.06-acre wetland (WL1) is located in the northernmost part of the Study Area along the fringe of a former salt pond. This wetland was mapped based on aerial imagery as access to this area was restricted at the time of the site visit. No sample points were taken at this location; however it was noted that wetland was dominated by pickleweed.

An approximately 0.21-acre wetland (WL2) and an approximately 0.02-acre wetland (WL3) are located in a topographic depression south of North Patrol Road and west of East Patrol Road, bordering the golf course. WL2 is connected via a culvert beneath North Patrol Road to the ditch on the north side of the road. Sample points SP1 and SP3 were taken within WL2 and WL3, respectively. WL2 is dominated by hydrophytic plant species, including pickleweed (OBL) and salt grass (FAC). WL3 is dominated by common rush (FACW). Indicators of wetland hydrology observed in WL2 and WL3 included partial inundation, sediment deposits, and a high water table. Soils were moist in both soil samples. Redoximorphic depletions were observed in both soil samples, meeting the indicator for hydric soils with a depleted dark surface (F7). The boundary between wetland and upland areas was demarcated by a transition to dominance of upland species and subtle changes in topography.

A total of 9 sample points were taken in upland areas to document upland conditions throughout the Study Area (SP2 and SP4-SP11). The majority of the upland sample points did not meet any of the three wetland criteria (vegetation, soils, or hydrology). Two of the upland sample points (SP9 and SP11) met wetland criteria for hydrology and vegetation, but did not exhibit any indicators of hydric soils. Sample Points SP9 and SP11 are located in topographic depressions that convey storm water. These areas contained cracked surface soils with sediment deposits and contained a sparse cover by hyssop loosestrife (*Lythrum hyssopifolia*), but did not contain hydric soil indicators. Soils in these areas have a color and chroma that would be expected to easily show hydric soil indicators, and the features have existed for a long enough time to form hydric soil indicators if anaerobic soil conditions were present. No evidence of ponding or saturation is evident in these areas on a review of historical aerial photographs taken during the rainy season. It appears that water flows through, or a brief thin layer of ponding is present in these features, but water is not present for a sufficient duration to form wetland conditions, and thus these features were not mapped as wetlands.

#### *4.1.2 Non-Wetland Waters*

Approximately 0.18 acre of non-wetland waters are located within the Study Area in the ditch (W3) and channel (W2) north of North Patrol Road and in the former salt pond (W1). Non-wetland waters in the Study Area are non-tidal, and thus were mapped based on the elevation of the OHWM as observed at the site and based on aerial imagery. All non-wetland waters in the Study Area are un-vegetated.

## 5.0 CONCLUSION

The Study Area contains approximately 0.29 acre of wetlands and approximately 0.18 acre of non-wetland waters. These areas may be considered as jurisdictional under Section 404 of the CWA. Wetlands were dominated by hydrophytic vegetation with FAC, FACW, and OBL classified plants and contained wetland soil and hydrology indicators. These areas are adjacent to “navigable waters of the U.S.” and therefore meet the definition of jurisdictional wetlands and non-wetland waters in Section 404 of the CWA. Waters of the U.S. observed within the Study Area are not subject to Section 10 jurisdiction under the RHA as the Study Area is not subject to tidal influence.

The conclusion of this delineation is based on conditions observed at the time of the field survey conducted on February 29, 2016.

## 6.0 REFERENCES


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# APPENDIX A

## Preliminary Delineation Map

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Appendix A. Delineation Overview Map

( Page 1 of 3 )

N W E S

1 inch = 250 feet

0 75 150 300 Feet

Former Defense Fuel Support Point Moffett Field
Santa Clara County, California

wra
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Map Prepared Date: 3/9/2016
Map Prepared By: Fhourigan
Base Source: Esri Streaming - NAIP 2014
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25309\GIS\ArcMap\DelineationMap.mxd


Appendix A. Delineation Overview Map



N W E S

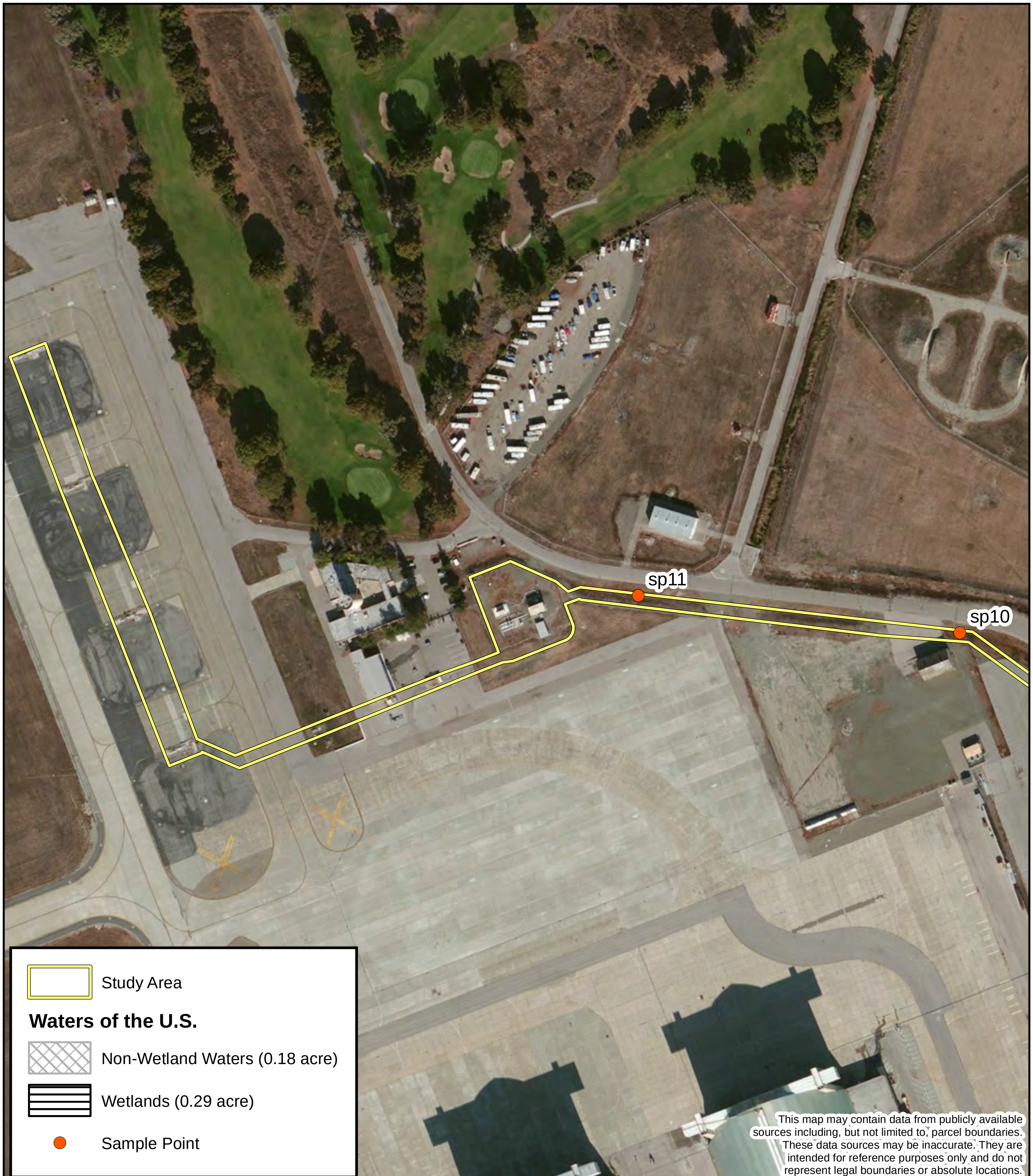
Former Defense Fuel Support Point Moffett Field
Santa Clara County, California

1 inch = 250 feet
0 75 150 300 Feet

wra ENVIRONMENTAL CONSULTANTS

Map Prepared Date: 3/9/2016
Map Prepared By: Fhourigan
Base Source: Esri Streaming - NAIP 2014
Data Source(s): WRA

Path: L:\Acad 2000 Files\25000\25309\GIS\ArcMap\DelineationMap.mxd




Appendix A. Delineation Overview Map

( Page 3 of 3 )

N
W E
S

1 inch = 250 feet

0 75 150 300 Feet

Former Defense Fuel Support Point Moffett Field
Santa Clara County, California

wra
ENVIRONMENTAL CONSULTANTS

Map Prepared Date: 3/9/2016
Map Prepared By: Fhourigan
Base Source: Esri Streaming - NAIP 2014
Data Source(s): WRA

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# APPENDIX B

## Arid West Regional Supplement Data Forms

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# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field City Unincorporated County Santa Clara Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division State CA Sampling Point **SP1**

Investigator(s) Justin Semion, Ellie Knecht Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) depression Local Relief (concave, convex, none) concave Slope(%) 1-3%

Subregion(LRR) LRR C (Medit. CA) Lat: 37°25'34.13"N Long: 122° 2'6.42"W Datum: WGS 84

Soil Map Unit Name Embarcadero silty clay loam, drained, 0 to 2 percent slopes NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☒ Yes ☐ No | **Is the Sampled Area within a Wetland?** ☒ **Yes** ☐ **No** |
| Hydric Soil Present? | ☒ Yes ☐ No | |
| Wetland Hydrology Present? | ☒ Yes ☐ No | |

**Remarks:** SP1 is located within a wetland and meets wetland criteria for vegetation, soils, and hydrology. SP1 is located within a topographic depression between the roadway and the golf course.

## VEGETATION (use scientific names)

| | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| TREE STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| SAPLING/SHRUB STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| HERB STRATUM **Plot Size:** 5' x 5' | | | |
| 1. *Salicornia pacifica* | 90 | Yes | OBL |
| 2. *Distichlis spicata* | 7 | No | FAC |
| 3. *Rumex crispus* | 3 | No | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 100 | | |
| WOODY VINE STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 0 % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 1 | (A) |
| Total number of dominant species across all strata? | 1 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 100 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: |
|---|---|---|---|
| OBL species | 90 | x1 | 90 |
| FACW species | 7 | x2 | 14 |
| FAC species | 3 | x3 | 9 |
| FACU species | 0 | x4 | 0 |
| UPL species | 0 | x5 | 0 |
| Column Totals | 100 (A) | | 113 (B) |

Prevalence Index = B/A = 1.1

**Hydrophytic Vegetation Indicators**

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☒ Yes ☐ No

**Remarks:** SP1 is dominated by Salicornia pacifica (OBL) and meets wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP1

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-4" | 10 YR 3/2 | 100% | | | | | Clay Loam | |
| 4-8" | 10 YR 3/1 | 95% | 10 YR 2/1 | 5% | D | M | Clay Loam | |
| 8-12" | 10 YR 2/1 | 90% | 10 YR 5/1 | 10% | D | M | Clay Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☒ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☒ **Yes** ☐ **No**

**Remarks:** SP1 meets wetland criteria for hydric soils. Redox depletions and concentrations visible.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☒ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface water present? | ☒ Yes ☐ No | Depth (inches): | spotty, 1 inch |
| Water table present? | ☐ Yes ☒ No | Depth (inches): | |
| Saturation Present? (includes capillary fringe) | ☐ Yes ☒ No | Depth (inches): | |

**Wetland Hydrology Present ?** ☒ **Yes** ☐ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP1 meets criteria for wetland hydrology. Spotty inundation observed and soils moist in sample pit.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field City Unincorporated County Santa Clara Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division State CA Sampling Point **SP2**

Investigator(s) Justin Semion, Ellie Knecht Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) hillslope Local Relief (concave, convex, none) concave Slope(%) 1-3%

Subregion(LRR) LRR C (Medit. CA) Lat: 37°25'34.13"N Long: 122° 2'6.42"W Datum: WGS 84

Soil Map Unit Name Embarcadero silty clay loam, drained, 0 to 2 percent slopes NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☐ Yes ☒ No | **Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No** |
| Hydric Soil Present? | ☐ Yes ☒ No | |
| Wetland Hydrology Present? | ☐ Yes ☒ No | |

**Remarks:** SP2 is not located within a wetland. SP2 is the upland sample point paired with SP1. SP2 is located on a hillslope between the roadway and the golf course.

## VEGETATION (use scientific names)

| TREE STRATUM Plot Size: N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| **SAPLING/SHRUB STRATUM Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| **HERB STRATUM Plot Size:** 5' x 5' | | | |
| 1. *Bromus diandrus* | 70 | Yes | NL |
| 2. *Distichlis spicata* | 15 | No | FAC |
| 3. *Geranium molle* | 15 | No | NL |
| 4. *Geranium dissectum* | 5 | No | NL |
| 5. *Salicornia pacifica* | 5 | No | OBL |
| 6. *Carduus pycnocephalus* | 2 | No | NL |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 112 | | |
| **WOODY VINE STRATUM Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 0 % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 0 | (A) |
| Total number of dominant species across all strata? | 1 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 0 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: |
|---|---|---|---|
| OBL species | 5 | x1 | 5 |
| FACW species | 0 | x2 | 0 |
| FAC species | 15 | x3 | 30 |
| FACU species | 0 | x4 | 0 |
| UPL species | 92 | x5 | 460 |
| Column Totals | 112 (A) | | 495 (B) |

Prevalence Index = B/A = 4.4

**Hydrophytic Vegetation Indicators**

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☐ Yes ☒ No

**Remarks:** SP2 does not meet the wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP2

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 2/1 | 90% | 10 YR 4/1 | 10 | D | M | Clay Loam | Relict indicators |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP2 does not meet wetland criteria for hydric soils. Redoximorphic features present are characteristic of former marsh soils in a current upland area.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface water present? ☐ Yes ☒ No Depth (inches):

Water table present? ☐ Yes ☒ No Depth (inches):

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches):

**Wetland Hydrology Present ?** ☐ **Yes** ☒ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP2 does not meet wetland criteria for hydrology. No wetland hydrology indicators observed.

# Wetland Determination Data Form - Arid West Region

Project/Site: DFSP, Moffett Field | City: Unincorporated | County: Santa Clara | Sampling Date: 2/29/2016

Applicant/Owner: Defense Logistics Agency Energy Division | State: CA | Sampling Point: **SP3**

Investigator(s): Justin Semion, Ellie Knecht | Section,Township,Range: Sec12, T6S, R2W

Landform (hillslope, terrace, etc.): depression | Local Relief (concave, convex, none): concave | Slope(%): 1%

Subregion(LRR): LRR C (Medit. CA) | Lat: 37°25'34.13"N | Long: 122° 2'6.42"W | Datum: WGS 84

Soil Map Unit Name: Embarcadero silty clay loam, drained, 0 to 2 percent slopes | NWI classification: None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology | Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☒ Yes ☐ No | **Is the Sampled Area within a Wetland?** ☒ **Yes** ☐ **No** |
| Hydric Soil Present? | ☒ Yes ☐ No | |
| Wetland Hydrology Present? | ☒ Yes ☐ No | |

**Remarks:** SP3 is located within a wetland ditch and meets wetland criteria for vegetation, soils, and hydrology. SP3 is located within a ditch between the roadway and the golf course.

## VEGETATION (use scientific names)

| | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| TREE STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| SAPLING/SHRUB STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| HERB STRATUM **Plot Size:** 5' x 5' | | | |
| 1. *Juncus tenuis* | 80 | Yes | FACW |
| 2. *Festuca perennis* | 10 | No | FAC |
| 3. *Rumex crispus* | 5 | No | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 95 | | |
| WOODY VINE STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 5 | % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 1 | (A) |
| Total number of dominant species across all strata? | 1 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 100 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x1 | 0 |
| FACW species | 80 | x2 | 160 |
| FAC species | 15 | x3 | 45 |
| FACU species | 0 | x4 | 0 |
| UPL species | 0 | x5 | 0 |
| Column Totals | 95 (A) | | 205 (B) |

Prevalence Index = B/A = 2.2

**Hydrophytic Vegetation Indicators**

☒ Dominance Test is >50%

☒ Prevalence Index is </= 3.0[1]

☐ Morphological adaptations (provide supporting data in remarks)

☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☒ Yes ☐ No

**Remarks:** SP3 is dominated by juncus patens (FACW) and meets wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP3

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 3/1 | 90% | 10 YR 5/1 | 10% | D | M | Clay Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☒ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☒ **Yes** ☐ **No**

**Remarks:** SP3 meets wetland criteria for hydric soils. Redox depletions visible.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface water present? | ☐ Yes | ☒ No | Depth (inches): |
| Water table present? | ☒ Yes | ☐ No | Depth (inches): 8" below surface |
| Saturation Present? (includes capillary fringe) | ☐ Yes | ☒ No | Depth (inches): |

**Wetland Hydrology Present ?** ☒ **Yes** ☐ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP3 meets wetland criteria for hydrology. Water table observed at approximately 8 inches below the ground surface. Soils moist in sample pit.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field | City Unincorporated | County Santa Clara | Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division | State CA | Sampling Point **SP4**

Investigator(s) Justin Semion, Ellie Knecht | Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) depression | Local Relief (concave, convex, none) concave | Slope(%) 1%

Subregion(LRR) LRR C (Medit. CA) | Lat: 37°25'34.13"N | Long: 122° 2'6.42"W | Datum: WGS 84

Soil Map Unit Name Embarcadero silty clay loam, drained, 0 to 2 percent slopes | NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology | Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☐ Yes ☒ No | **Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No** |
| Hydric Soil Present? | ☐ Yes ☒ No | |
| Wetland Hydrology Present? | ☐ Yes ☒ No | |

**Remarks:** SP4 is not located within a wetland. SP4 is the upland sample point paired with SP3. SP4 is located in a ditch between the roadway and the golf course.

## VEGETATION (use scientific names)

| TREE STRATUM Plot Size: N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| **SAPLING/SHRUB STRATUM Plot Size: N/A** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| **HERB STRATUM Plot Size: 5' x 5'** | | | |
| 1. *Festuca perennis* | 70 | Yes | FAC |
| 2. *Digitaria sanguinalis* | 20 | Yes | FACU |
| 3. *Cynodon dactylon* | 10 | No | FACU |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 100 | | |
| **WOODY VINE STRATUM Plot Size: N/A** | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 0 | % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 1 | (A) |
| Total number of dominant species across all strata? | 2 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 50 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: | |
|---|---|---|---|---|
| OBL species | 0 | x1 | 0 | |
| FACW species | 0 | x2 | 0 | |
| FAC species | 70 | x3 | 210 | |
| FACU species | 30 | x4 | 120 | |
| UPL species | 0 | x5 | 0 | |
| Column Totals | 100 | (A) | 330 | (B) |

Prevalence Index = B/A = 3.3

**Hydrophytic Vegetation Indicators**

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☐ Yes ☒ No

**Remarks:** SP4 does not meet the wetland criteria for hydrophytic vegetation. Planted golf course vegetation is prevalent.

## SOIL

**Sampling Point** SP4

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 2/1 | 100 | | | | | Clay Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP4 does not meet wetland criteria for hydric soils. No redox concentrations or depeletions visible.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface water present? | ☐ Yes | ☒ No | Depth (inches): |
| Water table present? | ☐ Yes | ☒ No | Depth (inches): |
| Saturation Present? (includes capillary fringe) | ☐ Yes | ☒ No | Depth (inches): |

**Wetland Hydrology Present ?** ☐ **Yes** ☒ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP4 does not meet wetland criteria for hydrology. Soils were dry.

# Wetland Determination Data Form - Arid West Region

Project/Site: DFSP, Moffett Field  City: Unincorporated  County: Santa Clara  Sampling Date: 2/29/2016

Applicant/Owner: Defense Logistics Agency Energy Division  State: CA  Sampling Point: **SP5**

Investigator(s): Justin Semion, Ellie Knecht  Section,Township,Range: Sec12, T6S, R2W

Landform (hillslope, terrace, etc.): depression  Local Relief (concave, convex, none): concave  Slope(%): 1-3%

Subregion(LRR): LRR C (Medit. CA)  Lat: 37°25'34.13"N  Long: 122° 2'6.42"W  Datum: WGS 84

Soil Map Unit Name: Urban Land Hangerone complex, 0 to 2 percent slopes, drained  NWI classification: None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology  Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology  (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☐ Yes | ☒ No |
| Hydric Soil Present? | ☐ Yes | ☒ No |
| Wetland Hydrology Present? | ☐ Yes | ☒ No |

**Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No**

**Remarks:** SP5 is not located within a wetland. SP5 is located in a depression between the roadway and the golf course.

## VEGETATION (use scientific names)

| TREE STRATUM Plot Size: N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| **SAPLING/SHRUB STRATUM Plot Size: N/A** | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| **HERB STRATUM Plot Size: 5' x 5'** | | | |
| 1. *Festuca perennis* | 40 | Yes | FAC |
| 2. *Digitaria sanguinalis* | 30 | Yes | FACU |
| 3. *Geranium dissectum* | 20 | Yes | NL |
| 4. *Plantago lanceolata* | 5 | No | FAC |
| 5. *Convolvulus arvensis* | 5 | No | NL |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 100 | | |
| **WOODY VINE STRATUM Plot Size: N/A** | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum: 0  % cover of biotic crust: 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 1 | (A) |
| Total number of dominant species across all strata? | 3 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 33% | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x1 | 0 |
| FACW species | 0 | x2 | 0 |
| FAC species | 45 | x3 | 135 |
| FACU species | 30 | x4 | 120 |
| UPL species | 25 | x5 | 125 |
| Column Totals | 100 (A) | | 380 (B) |

Prevalence Index = B/A = 3.8

**Hydrophytic Vegetation Indicators**

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☐ Yes ☒ No

**Remarks:** SP5 does not meet the wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP5

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 2/1 | 100% | | | | | Clay Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP5 does not meet wetland criteria for hydric soils. No redox concentrations or depeletions visible.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface water present? ☐ Yes ☒ No Depth (inches):

Water table present? ☐ Yes ☒ No Depth (inches):

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches):

**Wetland Hydrology Present ?** ☐ **Yes** ☒ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP5 does not meet wetland criteria for hydrology. Soils were dry.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field | City Unincorporated | County Santa Clara | Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division | State CA | Sampling Point **SP6**

Investigator(s) Justin Semion, Ellie Knecht | Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) flat | Local Relief (concave, convex, none) none | Slope(%) 0

Subregion(LRR) LRR C (Medit. CA) | Lat: 37°25'34.13"N | Long: 122° 2'6.42"W | Datum: WGS 84

Soil Map Unit Name Urban Land Hangerone complex, 0 to 2 percent slopes, drained | NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology | Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☐ Yes | ☒ No |
| Hydric Soil Present? | ☐ Yes | ☒ No |
| Wetland Hydrology Present? | ☐ Yes | ☒ No |

**Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No**

**Remarks:** SP6 is not located within a wetland. SP6 is located in a low-lying, flat upland area.

## VEGETATION (use scientific names)

| TREE STRATUM **Plot Size:** N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| SAPLING/SHRUB STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| HERB STRATUM **Plot Size:** 5' x 5' | | | |
| 1. *Bromus madritensis* | 70 | Yes | UPL |
| 2. *Erodium cicutarium* | 30 | Yes | NL |
| 3. *Medicago polymorpha* | 5 | No | FACU |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 105 | | |
| WOODY VINE STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 0 | % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 0 | (A) |
| Total number of dominant species across all strata? | 2 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 0 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: | |
|---|---|---|---|---|
| OBL species | 0 | x1 | 0 | |
| FACW species | 0 | x2 | 0 | |
| FAC species | 0 | x3 | 0 | |
| FACU species | 5 | x4 | 20 | |
| UPL species | 100 | x5 | 500 | |
| Column Totals | 105 | (A) | 520 | (B) |

Prevalence Index = B/A = 4.9

**Hydrophytic Vegetation Indicators**

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☐ Yes ☒ No

**Remarks:** SP6 does not meet the wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP6

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-3" | 10 YR 2/1 | 100% | | | | | Clay Loam | |
| 3-12" | 2.5 Y 5/6 | 50% | | | | | Clay Loam | Disturbed soil with fill deposit |
| | 10 YR 2/1 | 50% | | | | | Clay Loam | Disturbed soil with fill deposit |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP6 does not meet wetland criteria for hydric soils. No redox concentrations or depeletions visible. Soil is disturbed and contains fill material.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface water present? ☐ Yes ☒ No Depth (inches): ______

Water table present? ☐ Yes ☒ No Depth (inches): ______

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): ______

**Wetland Hydrology Present ?** ☐ **Yes** ☒ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP6 does not meet wetland criteria for hydrology. Soils were dry.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field City Unincorporated County Santa Clara Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division State CA Sampling Point **SP7**

Investigator(s) Justin Semion, Ellie Knecht Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) flat Local Relief (concave, convex, none) none Slope(%) 0

Subregion(LRR) LRR C (Medit. CA) Lat: 37°25'34.13"N Long: 122° 2'6.42"W Datum: WGS 84

Soil Map Unit Name Urban Land Hangerone complex, 0 to 2 percent slopes, drained NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☐ Yes ☒ No | **Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No** |
| Hydric Soil Present? | ☐ Yes ☒ No | |
| Wetland Hydrology Present? | ☐ Yes ☒ No | |

**Remarks:** SP7 is not located within a wetland. SP7 is located in a flat upland area.

## VEGETATION (use scientific names)

| TREE STRATUM Plot Size: N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| SAPLING/SHRUB STRATUM Plot Size: N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| HERB STRATUM Plot Size: 5' x 5' | | | |
| 1. *Festuca myuros* | 25 | Yes | FACU |
| 2. *Avena sp.* | 20 | Yes | NL |
| 3. *Hordeum murinum* | 20 | Yes | FACU |
| 4. *Erodium cicutarium* | 20 | Yes | NL |
| 5. *Bromus diandrus* | 15 | No | NL |
| 6. *Bromus hordeaceus* | 10 | No | FACU |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 110 | | |
| WOODY VINE STRATUM Plot Size: N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 0 % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 0 | (A) |
| Total number of dominant species across all strata? | 4 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 0 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: |
|---|---|---|---|
| OBL species | 0 | x1 | 0 |
| FACW species | 0 | x2 | 0 |
| FAC species | 0 | x3 | 0 |
| FACU species | 55 | x4 | 220 |
| UPL species | 55 | x5 | 275 |
| Column Totals | 110 (A) | | 495 (B) |

Prevalence Index = B/A = 4.5

**Hydrophytic Vegetation Indicators**

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☐ Yes ☒ No

**Remarks:** SP7 does not meet the wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP7

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 2/1 | 100% | | | | | Clay Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP7 does not meet wetland criteria for hydric soils. No redox concentrations or depeletions visible.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface water present? | ☐ Yes | ☒ No | Depth (inches): |
| Water table present? | ☐ Yes | ☒ No | Depth (inches): |
| Saturation Present? (includes capillary fringe) | ☐ Yes | ☒ No | Depth (inches): |

**Wetland Hydrology Present ?** ☐ **Yes** ☒ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP7 does not meet wetland criteria for hydrology. Soils were dry.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field City Unincorporated County Santa Clara Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division State CA Sampling Point **SP8**

Investigator(s) Justin Semion, Ellie Knecht Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) ditch Local Relief (concave, convex, none) concave Slope(%) 0-3%

Subregion(LRR) LRR C (Medit. CA) Lat: 37°25'34.13"N Long: 122° 2'6.42"W Datum: WGS 84

Soil Map Unit Name Urban Land Hangerone complex, 0 to 2 percent slopes, drained NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☐ Yes ☒ No | **Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No** |
| Hydric Soil Present? | ☐ Yes ☒ No | |
| Wetland Hydrology Present? | ☐ Yes ☒ No | |

**Remarks:** SP8 is not located within a wetland. SP8 is located in a ditch adjacent to the roadway.

## VEGETATION (use scientific names)

| TREE STRATUM **Plot Size:** N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| SAPLING/SHRUB STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| HERB STRATUM **Plot Size:** 5' x 5' | | | |
| 1. *Festuca perennis* | 65 | Yes | FAC |
| 2. *Bromus madritensis* | 20 | Yes | UPL |
| 3. *Erodium cicutarium* | 15 | No | NL |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 100 | | |
| WOODY VINE STRATUM **Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 0 % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 1 | (A) |
| Total number of dominant species across all strata? | 2 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 50 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: |
|---|---|---|---|
| OBL species | 0 | x1 | 0 |
| FACW species | 0 | x2 | 0 |
| FAC species | 65 | x3 | 195 |
| FACU species | 0 | x4 | 0 |
| UPL species | 35 | x5 | 175 |
| Column Totals | 100 (A) | | 370 (B) |

Prevalence Index = B/A = 3.7

**Hydrophytic Vegetation Indicators**

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☐ Yes ☒ No

**Remarks:** SP8 does not meet the wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP8

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 2/1 | 100% | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP8 does not meet wetland criteria for hydric soils. No redox concentrations or depeletions visible.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface water present? ☐ Yes ☒ No Depth (inches): ______

Water table present? ☐ Yes ☒ No Depth (inches): ______

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): ______

**Wetland Hydrology Present ?** ☐ **Yes** ☒ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP8 does not meet wetland criteria for hydrology. Soils were dry. No hydrology indicators are present.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field City Unincorporated County Santa Clara Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division State CA Sampling Point **SP9**

Investigator(s) Justin Semion, Ellie Knecht Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) depression Local Relief (concave, convex, none) none Slope(%) 0

Subregion(LRR) LRR C (Medit. CA) Lat: 37°25'34.13"N Long: 122° 2'6.42"W Datum: WGS 84

Soil Map Unit Name Urban Land Hangerone complex, 0 to 2 percent slopes, drained NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☒ Yes ☐ No | **Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No** |
| Hydric Soil Present? | ☐ Yes ☒ No | |
| Wetland Hydrology Present? | ☒ Yes ☐ No | |

**Remarks:** SP9 is not located in a wetland. SP9 contains indicators of hydrophytic vegetation and hydrology; however, SP9 does not meet criteria for hydric soils. SP9 is located in a stormwater ditch that conveys water. Feature does not appear to retain water long enough to meet wetland criteria. No ponding or saturation is visible on historic aerial photographs during the rainy season.

## VEGETATION (use scientific names)

| TREE STRATUM Plot Size: N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| SAPLING/SHRUB STRATUM Plot Size: N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| HERB STRATUM Plot Size: 5' x 5' | | | |
| 1. *Lythrum hyssopifolia* | 30 | Yes | OBL |
| 2. *Plantago lanceolata* | 5 | No | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 35 | | |
| WOODY VINE STRATUM Plot Size: N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 65 % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 1 | (A) |
| Total number of dominant species across all strata? | 1 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 100 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: |
|---|---|---|---|
| OBL species | 30 | x1 | 30 |
| FACW species | 0 | x2 | 0 |
| FAC species | 5 | x3 | 15 |
| FACU species | 0 | x4 | 0 |
| UPL species | 0 | x5 | 0 |
| Column Totals | 35 | (A) | (B) |

Prevalence Index = B/A = 1.3

**Hydrophytic Vegetation Indicators**

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☒ Yes ☐ No

**Remarks:** SP9 is dominated by Lythrum hyssopifolia (OBL) and meets wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP9

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 4/2 | 100% | | | | | Clay Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP9 does not meet wetland criteria for hydric soils. No redox concentrations or depletions observed.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface water present? | ☐ Yes | ☒ No | Depth (inches): |
| Water table present? | ☐ Yes | ☒ No | Depth (inches): |
| Saturation Present? (includes capillary fringe) | ☐ Yes | ☒ No | Depth (inches): |

**Wetland Hydrology Present ?** ☒ **Yes** ☐ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP9 meets wetland criteria for hydrology. Soil cracks and sediment deposits observed. Soil moisture was the same as in nearby upland points. No evidence of ponding or saturation visible on historic aerial photographs. Area appears to hold or carry water for only a brief period of time.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field City Unincorporated County Santa Clara Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division State CA Sampling Point **SP10**

Investigator(s) Justin Semion, Ellie Knecht Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) depression Local Relief (concave, convex, none) concave Slope(%) 1-3

Subregion(LRR) LRR C (Medit. CA) Lat: 37°25'34.13"N Long: 122° 2'6.42"W Datum: WGS 84

Soil Map Unit Name Urban Land Hangerone complex, 0 to 2 percent slopes, drained NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☐ Yes ☒ No | **Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No** |
| Hydric Soil Present? | ☐ Yes ☒ No | |
| Wetland Hydrology Present? | ☐ Yes ☒ No | |

**Remarks:** SP10 is not located within a wetland. SP10 is located in a ditch adjacent to the roadway.

## VEGETATION (use scientific names)

| TREE STRATUM Plot Size: N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| **SAPLING/SHRUB STRATUM Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| **HERB STRATUM Plot Size:** 5' x 5' | | | |
| 1. *Medicago polymorpha* | 80 | Yes | FACU |
| 2. *Bromus madritensis* | 15 | No | UPL |
| 3. *Erodium cicutarium* | 5 | No | NL |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 100 | | |
| **WOODY VINE STRATUM Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 0 % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 0 | (A) |
| Total number of dominant species across all strata? | 1 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 0 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | 0 | x1 | 0 |
| FACW species | 0 | x2 | 0 |
| FAC species | 0 | x3 | 0 |
| FACU species | 80 | x4 | 320 |
| UPL species | 20 | x5 | 100 |
| Column Totals | 100 (A) | | 420 (B) |

Prevalence Index = B/A = 4.2

**Hydrophytic Vegetation Indicators**

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☐ Yes ☒ No

**Remarks:** SP10 does not meet the wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP10

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12" | 10 YR 2/1 | 100 | | | | | Clay Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** N/A

**Depth (inches):** N/A

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP10 does not meet wetland criteria for hydric soils. No redox concentrations or depeletions visible.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface water present? | ☐ Yes | ☒ No | Depth (inches): |
| Water table present? | ☐ Yes | ☒ No | Depth (inches): |
| Saturation Present? (includes capillary fringe) | ☐ Yes | ☒ No | Depth (inches): |

**Wetland Hydrology Present ?** ☐ **Yes** ☒ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP10 does not meet wetland criteria for hydrology. Soils were dry.

# Wetland Determination Data Form - Arid West Region

Project/Site DFSP, Moffett Field  City Unincorporated  County Santa Clara  Sampling Date 2/29/2016

Applicant/Owner Defense Logistics Agency Energy Division  State CA  Sampling Point **SP11**

Investigator(s) Justin Semion, Ellie Knecht  Section,Township,Range Sec12, T6S, R2W

Landform (hillslope, terrace, etc.) depression  Local Relief (concave, convex, none) flat  Slope(%) 0-1

Subregion(LRR) LRR C (Medit. CA)  Lat: 37°25'34.13"N  Long: 122° 2'6.42"W  Datum: WGS 84

Soil Map Unit Name Urban Land Hangerone complex, 0 to 2 percent slopes, drained  NWI classification None

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology  Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

**SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.**

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | ☒ Yes ☐ No | **Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No** |
| Hydric Soil Present? | ☐ Yes ☒ No | |
| Wetland Hydrology Present? | ☒ Yes ☐ No | |

**Remarks:** SP11 is not located in a wetland. SP11 contains indicators of hydrophytic vegetation and hydrology; however, SP11 does not meet criteria for hydric soils. SP11 is located in a stormwater ditch that conveys water. Feature does not appear to retain water long enough to form hydric soils. No clear evidence of ponding or saturation on historical aerial photographs taken during the rainy season. Gravel in soil profile may serve to drain the area.

## VEGETATION (use scientific names)

| TREE STRATUM Plot Size: N/A | Absolute % cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Tree Stratum Total Cover:** | | | |
| **SAPLING/SHRUB STRATUM Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| **Sapling/Shrub Stratum Total Cover:** | | | |
| **HERB STRATUM Plot Size:** 5' x 5' | | | |
| 1. *Lythrum hyssopifolia* | 20 | Yes | OBL |
| 2. *Bromus madritensis* | 10 | Yes | UPL |
| 3. *Plantago lanceolata* | 10 | Yes | FAC |
| 4. *Festuca myuros* | 5 | No | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| **Herb Stratum Total Cover:** | 45 | | |
| **WOODY VINE STRATUM Plot Size:** N/A | | | |
| 1. | | | |
| 2. | | | |
| **Woody Vines Total Cover:** | | | |

% Bare ground in herb stratum 55  % cover of biotic crust 0

**Dominance Test Worksheet**

| | | |
|---|---|---|
| Number of Dominant Species that are OBL, FACW, or FAC? | 2 | (A) |
| Total number of dominant species across all strata? | 3 | (B) |
| % of dominant species that are OBL, FACW, or FAC? | 66 | (A/B) |

**Prevalence Index Worksheet**

| Total % cover of: | | | Multiply by: |
|---|---|---|---|
| OBL species | 20 | x1 | 20 |
| FACW species | 0 | x2 | 0 |
| FAC species | 10 | x3 | 30 |
| FACU species | 5 | x4 | 20 |
| UPL species | 10 | x5 | 50 |
| Column Totals | 45 | (A) | 120 (B) |

Prevalence Index = B/A = 2.6

**Hydrophytic Vegetation Indicators**

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present ?** ☒ Yes ☐ No

**Remarks:** SP11 meets wetland criteria for hydrophytic vegetation.

## SOIL

**Sampling Point** SP11

**Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[1] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-4" | 10 YR 2/1 | 50% | | | | | Clay Loam | met restriction at 4", gravel below 4" |
| | 2.5 Y 5/6 | 50% | | | | | Clay Loam | met restriction at 4", gravel below 4" |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

**Restrictive Layer (if present):**

**Type:** __________

**Depth (inches):** __________

**Hydric Soil Present ?** ☐ **Yes** ☒ **No**

**Remarks:** SP11 does not meet wetland criteria for hydric soils. No redox concentrations or depeletions visible. Met restriction at 4 inches and gravel below 4". Gravel fill may serve to drain the area.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☒ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

| | | | |
|---|---|---|---|
| Surface water present? | ☐ Yes | ☒ No | Depth (inches): |
| Water table present? | ☐ Yes | ☒ No | Depth (inches): |
| Saturation Present? (includes capillary fringe) | ☐ Yes | ☒ No | Depth (inches): |

**Wetland Hydrology Present ?** ☒ **Yes** ☐ **No**

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: SP11 meets wetland criteria for hydrology. Soil cracks and sediment deposits observed. Soil moisture was the same as in nearby locations that are clearly upland. No ponding or saturation clearly evident on historical aerial photographs taken during the rainy season. Gravel in the soil profile may serve to drain the area, preventing formation of wetland conditions.

# APPENDIX C

## Representative Photographs of the Study Area

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Facing north from the west side of East Patrol Road in the vicinity of SP1 and SP2. SP1 is located in a wetland. SP2 is not located in a wetland.
Photograph taken 2/29/16.

Facing south from the west side of East Patrol Road in the vicinity of SP1 and SP2. SP1 is located in a wetland. SP2 is not located in a wetland.
Photograph taken 2/29/16.

Facing north from the west side of East Patrol Road in the vicinity of SP3. SP3 is located in a wetland. Photograph taken 2/29/16.

Facing north from the west side of East Patrol Road in the vicinity of SP4. SP4 is not located in a wetland.
Photograph taken 2/29/16.

Facing south from the west side of East Patrol Road in the vicinity of SP5. SP5 is not located in a wetland.
Photograph taken 2/29/16.

Facing east in the vicinity of SP6.  SP6 is not located in a wetland.
Photograph taken 2/29/16.

Facing south from the vicinity of SP7. SP7 is not located in a wetland.
Photograph taken 2/29/16.

Facing northeast from the vicinity of SP8. SP8 is not located in a wetland.
Photograph taken 2/29/16.

Facing south from the vicinity of SP9. SP9 is located in a storm drainage feature that conveys water. This feature does not retain water long enough to form hydric soils. SP9 is not located in a wetland. Photograph taken 2/29/16.

Facing west from the vicinity of SP11. SP11 is located in a storm drainage feature that conveys water. This feature does not retain water long enough to form hydric soils. SP11 is not located in a wetland. Photograph taken 2/29/16.

# Appendix I. Additional Projects Planned in the Project Vicinity
## (Moffett Federal Airfield, and the Cities of Mountain View and Sunnyvale)

FORMAT PAGE

**Table I-1. Projects within the NASA Property**

| No. on Map | Projects | | |
|---|---|---|---|
| **Projects inside NASA Property in the County of Santa Clara** | | | |
| 2 | Vehicle Maintenance Facility (Supply Warehouse Building 681) | Vehicle Maintenance Facility is approved and currently in the design phase. New facility to add 8,800 square foot maintenance building. | Approved. The building plans are currently in the design phase. |
| 1 | CANG Project 1: QMSN 099051 | Construction of security fence with barbed wire around cantonment area, create new entrance at northern end of cantonment area. | Project Complete |
| 2 | CANG Project 2: QMSN 092802 | Construction of new 4,073 SF facilities that support CATS/CATM functions. | No construction date provided |
| 3 | CANG Project 3: QMSN 019029 | Construction of new 54,780 SF facilitate in order consolidate location of airborne pararescue mission. | Construction began on January 11, 2016 and is anticipated to be complete on March 6, 2018 |
| 4 | CANG Project 4: QMSN 092803 | Construction of new communications tower. | No construction date provided |
| 5 | CANG Project 5: QMSN 099104 | Construction of new 28,100 SF facility and 7,800 sf storage shed in order to consolidate the vehicle maintenance facilities. | No construction date provided |
| 6 | CANG Project 6: QMSN 099105 | Construction of 7,000 SF addition to Building 662 in order to consolidate the jet engine inspection and maintenance shop into one location. | Construction is anticipated to begin on May 12, 2017 and complete on July 5, 2018. |
| 7 | CANG Project 7: QMSN 099106 | Construction of new 14,600 SF facility to consolidate Aerospace Support Equipment facilities into one location. | Construction is anticipated to begin on May 12, 2017 and complete on July 5, 2018. |
| 8 | CANG Project 8: QMSN 099107 | Construction of new 5,500 SF facility in order to facilitate consolidation of munitions storage | Construction is anticipated to begin on April 21, 2017 and complete on August 10, 2018. |
| 9 | CANG Project 9: QMSN 099108 | Construction of a new 36,700 SF building in order to consolidate squadron operations. | Construction is anticipated to begin on February 21, 2017 and complete on February 19, 2018. |
| 10 | CANG Project 10: QMSN 099109 | Construction of new 56,650 SF building in order to consolidate Reserve Force Operations and Training into one space. | No construction date provided |
| 11 | CANG Project 11: QMSN 099110 and 092804 | Construction of new facilities for fitness center, dining, deployment processing and general training. Fitness center to be new 2,780 SF addition to Building 653, all other facilities fall within complex constructed under Project 10 | No construction date provided |

| No. on Map | Projects | | |
|---|---|---|---|
| 12 | CANG Project 12: QMSN 099111 | Construction of new 41,200 SF hangar to house corrosion control and fuel cell maintenance hangar. | Construction is anticipated to begin on March 26, 2017 and complete on August 9, 2018. |
| 13 | CANG Project 13: QMSN 099112 and 099115 | Three new parking areas would be constructed totaling 607,200 SF. | Construction is anticipated to begin on January 1, 2017 and complete on September 5, 2018. |
| 14 | CANG Project 14: Photovoltaic Generation System | Project is comprised of installing photovoltaic generator systems on the roofs of covered parking. | Construction date not specified. |
| FC78 | NASA Land: MFA Project: FC78 | Hangar 1 Reskin and Remediation | Renovation anticipated May 1, 2016 through November 1, 2020 |
| FC79 | NASA Land: MFA Project: FC79 | Hangar 2&3 Remediation and Structural Renovation | Renovation underway with an anticipated completion date of April 1, 2018 |
| FC80 | NASA Land: MFA: FC80 | Building 158 and Tower Renovations | Renovation underway with an anticipated completion date of April 1, 2018 |
| FC81 | US-MFT-XXX: NASA Land: Other: FC81 | Golf Course Renovations | Renovation underway with an anticipated completion date of April 1, 2018 |
| FC82 | US-MFT-XXX: NASA Land: FC82 | New Education/Museum/Incubator Building | Construction date not specified. |
| FF69 | US-MFT-XXX: Moffett Field: Other: FF69 | Utility Renovations - Metering and Infrastructure Upgrades | Anticipated renovations from May 1 2016 through May 1, 2019 |
| FF66 | US-MFT-XXX: Moffett Field: Other: FF66 | Airfield Renovations - Repairs, Maintenance, etc. | Renovation underway with an anticipated completion date of December 1, 2019 |
| FF65 | US-MFT-XXX: Moffett Field: Other: FF65 | Security Renovations<br>Security Forces Building (Building 653, East patrol Road). Construction to add an additional 3,285 square foot to the Security Forces building (east side of Building 653) for Combat Arms Training (CAT). | Anticipated renovations from April 1, 2016 through April 1, 2019 |
| Bus | US-MFT-XXX | Bus Parking Operations and Improvements | Anticipated May 1, 2016 through April 1, 2019 |
| 681 | Vehicle Maintenance Facility (Supply Warehouse Building 681) | Vehicle Maintenance Facility is approved and currently in the design phase. New facility to add 8,800 square foot maintenance building. | Approved. The building plans are currently in the design phase. |

| No. on Map | Projects | | |
|---|---|---|---|
| **Projects in Mountain View within 2 Miles of Work Site** | | | |
| 3 | National Avenue Partners (600 National Ave.) | New 4-story, 140,654 sq. ft. office building (0.67 FAR) a one-story parking structure and the removal of 11 Heritage trees to replace four industrial buildings. | Approved. Project is under construction. |
| 5 | Renault & Handley (580 – 620 Clyde Avenue) | New 178,477 square foot, 5-story office building and a three-story parking garage on a 5.15 acre site. Removal of up to 39 Heritage trees. The project would replace two one-story light industrial buildings totaling approximately 75,000 square feet. | Under review. A City Council Study Session is tentatively scheduled for October 27, 2015. |
| **Projects in Mountain View between 2 and 5 Miles of Work Site** | | | |
| 4 | The Quad / Lovewell (369 N. Whisman Rd.) east side of N. Whisman, north of E. Middlefield Road. | Three-story 70,846 sq. ft. office building, a four-story 109,927 sq. ft. office building and two four-story parking structures on a 29.3-acre site (0.49 FAR) with seven existing office buildings and the removal of 22 heritage trees. Reduction of 143 parking spaces or 6.9 percent of the required parking, a Tentative Map to create 13 parcels, and a 10-year development agreement. | Approved, but inactive at this time. Entitlements are vested through September 2021. |
| 6 | Symantec (575 E. Middlefield Rd.) south side of East Middlefield Road between Ellis Street. | 102,419 sq. ft., four-story office building on a 10.7-acre site (0.5 FAR) with three existing office buildings and removal of 21 heritage trees. The approval includes upgrades to the existing parking lot and landscaping, a parking reduction of 62 spaces or 7.9 percent of the total required parking, a parcel map to create condominium parcels for the buildings, and an 8-year development agreement. | Approved, but inactive at this time. Entitlements are vested through February 2018. |
| 7 | Google (700 E. Middlefield Road and 1100 W. Maude Avenue) | Site Plan and Architectural Review approval to modify the parking lots for existing Google office campus | Under review. |
| 8 | Prometheus (100 Moffett Blvd.) | 184-unit residential apartment. Includes three new buildings on an approximately 2.68 acre site.<br>The project includes the conversion of an existing vehicle on-ramp to a bicycle/pedestrian-only paseo connecting Stierlin Road to the corner of Central Expressway and Moffett Boulevard. | Approved. Construction is underway and expected to be completed by mid/late-2016. |

| No. on Map | Projects | | |
|---|---|---|---|
| 9 | Hampton Inn Addition (390 Moffett Blvd.) | 11,630 square foot, 21 room addition to an existing 52,707 square foot, 87 room hotel (Hampton Inn and Suites), a parking reduction of 18 spaces (93 from the required 111), and a Heritage Tree Removal Permit to remove 1 Heritage Tree on a 1.34 acre project site. | Status/Next Step(s): Approved. The Building Permit plans are under review. |
| 30 | Residence Inn Gatehouse (1854 El Camino Real W.) | 8,940 square foot hotel gatehouse and removal of 3 heritage trees on a 3.22 acre project site. | Approved. Construction is underway, expected to be completed in spring, 2016. |
| 31 | Tropicana Lodge – Prometheus (1720 El Camino Real W.) | 162-unit residential apartment building in two four-story buildings and the removal of 11 heritage trees to replace the Tropicana Lodge and Western Appliance Store on a 2.51-acre site. | Approved. Construction started in January 2014 and is expected to be completed Spring of 2016. |
| 32 | Austin's – Prometheus (1616 El Camino Real W.) | 66 unit, 4-story apartment building to replace two existing retail buildings totaling approximately 6,100 square feet, and removal of two heritage trees on a 0.99 acre project site. | Approved. Construction started in December 2014 and is expected to be completed in summer 2016. |
| 33 | 1701 W. El Camino Real | The City is evaluating a proposal for a 60 unit (all studios) affordable housing development through the City's Notice of Funding Availability (NOFA) process, on an approximately half-acre site. | Public hearing tentatively scheduled for October 20, 2015. |
| 34 | Harv's Car Wash - Regis Homes (1101 El Camino Real W.) | The proposed project includes demolishing the existing Harv's Carwash and replacing it with 52 ownership units, resulting in approximately 73,445 net new square feet of development on the site. | Approved. Building permit plans are currently under review. Construction of the underground parking has begun. |
| 35 | 23. Greystar (801 El Camino Real W.) | Request for a Zoning Map Amendment from the CRA (Commercial/Residential-Arterial) district to the Planned Community district, a Planned Community Permit to construct a new mixed-use project with 164 apartment units and 10,800 square feet of commercial space on a 2.39 acre project site, replacing 22,380 square feet of existing commercial development. | Approved. Building permit plans are currently under review. |

| No. on Map | Projects | | |
|---|---|---|---|
| **Projects in Sunnyvale Within 2 Miles of Project Site** | | | |
| 10 | 1111 Lockheed Martin Way | To develop a 47-acre parcel into five 8-story office/R&D buildings, four parking structures and an amenity building for a total floor area of 1,651,795 square feet and 80% floor area ratio. Project includes a General Plan Amendment to modify the Moffett Park Specific Plan, Rezone to MP-TOD, Special Development Permit for site and architectural review, and an Environmental Impact Report. | Under Review |
| 11 | 1235 Bordeaux DR 1 | Major Moffett Park Special Development Permit to demolish an existing 41,832 sq. ft. one-story industrial building and construct two new hotels on the same site - 8-story, 200-room AC Hotel and 8-story, 150-room Courtyard Marriott Hotel with a detached three-and-a-half level, above grade parking structure | Under Review |
| 12 | 807 Eleventh AV | Development of a new building (5th) at the Ariba Campus (80% FAR), includes modification to the existing development agreement. The new building totals 200,000 square feet. | Under Construction |
| 13 | 1100 N Mathilda AV | Expansion of the 173-room Sheraton Hotel to 342 rooms. Project involves a new 9-story building with 232 rooms; demolition of 63 rooms with a net new of 139 rooms. Project also involves construction of a 4-level parking structure with 170 parking stalls. | Approved by Planning Commission December 8, 2014 |
| 14 | 433 North Mathilda Avenue | Two new office buildings totaling 213,216 square feet with a 53% floor area ratio | Under Construction |
| 15 | 549 Baltic WY | Expansion of the Netapp campus (Site 3) utilizing the green building bonus to enable 60% FAR for a total of 483,326 square-feet. The site would be redeveloped with two 5-story buildings (15 &16). | Approved by Planning Commission October 22, 2012 |
| 17 | 1221 Crossman AV | Redevelopment of an existing industrial site with two new 7-story office buildings and one parking structure. | Under Construction |

| No. on Map | Projects | | |
|---|---|---|---|
| **Projects in Sunnyvale Between 2 and 5 Miles of Project Site** | | | |
| 19 | 645 Almanor AV | New 6-story 172,675 square-foot office building and a new 5-level, 757 stall parking structure on a site with an existing 2-story 130,882 square-foot office building used by St. Jude Medical. Project also includes rezoning of the site to 100% FAR. | Approved by City Council on March 25, 2014 |
| 20 | 767 N Mary AV | New 60-foot tall wireless telecommunications tower (to appear as a eucalyptus tree) in the parking lot of an industrial site. | Under Construction |
| 21 | 1071 Noriega AV | Rezone a residential site from R-3 (Medium Density Residential) to R-3/PD (Medium Density Residential/Planned Development) and construct a 3-story, 10-unit townhome development. Project includes demolition of the existing 11-unit apartment complex, subdivision of the existing two lots into 10 lots plus one common lot, and site improvements. | Under Construction |
| 22 | 1095 W El Camino Real | A mixed-use project involving 156 multi-family apartment units in a four-story building and a 40,544 sq. ft. three-story office building. | Under Construction |
| 23 | 479 N Pastoria AV | Redevelopment of a vacant 2.17-acre site with a 52,394 square foot four-story office/R&D building and a detached two-level parking structure, resulting in approximately 55% Floor Area Ratio (FAR). | Under Construction |
| 24 | 815 W Maude AV | Redevelopment of a 0.53-acre site with a 23,340 square foot three-story office/R&D building resulting in approximately 55% Floor Area Ratio (FAR). | Under Construction |
| 25 | 539 E Weddell DR | General Plan Amendment Initiation request to consider changing the General Plan designation from MS (Industrial and Service) to a designation that would allow a school use. | Approved by City Council August 26, 2014 |
| 26 | 520 E Weddell DR | Redevelopment of the site from industrial to residential with 465 apartment units and associated parking. Project involves a General Plan Amendment and Rezoning and an Environmental Impact Report. | Under Construction |

| No. on Map | Projects | | |
|---|---|---|---|
| 27 | 610 E Weddell DR | Redevelopment of the site from industrial to residential to build 205 apartment units. Project involves a General Plan Amendment, Rezoning of the site and an Environmental Impact Report. | Under Construction |
| 28 | 1101 N Fair Oaks AV | Multi-family residential development of 97 units. | Under Construction |
| 29 | 470 Persian DR | Redevelopment of an industrial site with 47 residential condominium units. | Under Construction |
| **Projects more than 5 Miles of Project Site** | | | |
| 36 | Medical Building (412 El Camino Real W.) | In May 2014, the Zoning Administrator approved a request for a new 8,582 square foot medical office building on a 24,484 square foot lot. An appeal was filed in June 2014, but was withdrawn in September 2014. The project involves the removal of two small, vacant commercial structures and one Heritage tree. | Approved. Construction began in February 2015. |
| 16 | 589 W Java DR | Yahoo! campus expansion to add a new, 6-story 315,000 square foot office building, 24,000 square foot special use amenities building and one parking structure (LEED Gold and 80% FAR). Permit extended to October 10, 2014 by MPP 2013-7823. | Approved by Planning Commission October 10, 2011 |
| 37 | Wonder Years Preschool (86 El Camino Real) | In June 2015, Wonder Years Preschool submitted a formal application to build a new 2-story, 4,800 square foot preschool building on a site adjacent to their current property. The project would replace an existing 1-story building that currently houses a car-stereo business. | Under review. An Administrative Zoning Hearing is tentatively scheduled for October 14, 2015. |
| 38 | Lennar Apartments (865 East El Camino Real) | In April 2013, the City Council approved a Planned Community Permit for a four story, 150-unit residential development with underground parking and a Heritage Tree Removal Permit for 15 trees on a 2.3-acre site for Summer Hill Apartment Communities. The project includes demolition of an existing billiard hall, grocery store, and restaurant. Lennar Multifamily Communities has purchased the site from Summer Hill. | Approved. Construction began in November 2013 and is expected to be completed in October 2015. |

**FAR** – Floor Area Ratio

SOURCES: Sunnyvale Planning Department: http://gis.sunnyvale.ca.gov/planning/, Mountain View Planning Department http://www.mountainview.gov/depts/comdev/planning/activeprojects/list.asp

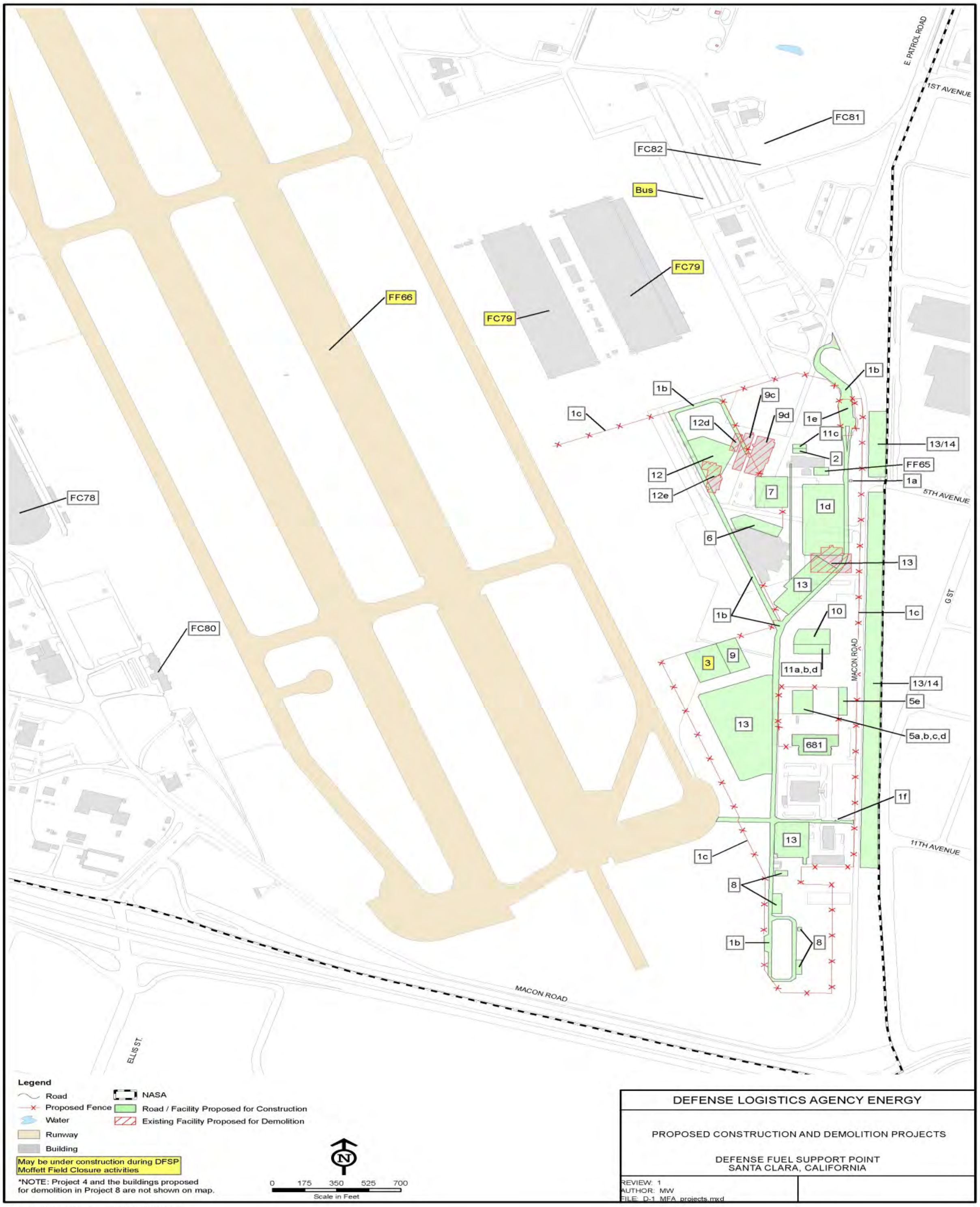


**Figure I-1: Locations of Development at Moffett Federal Airfield**

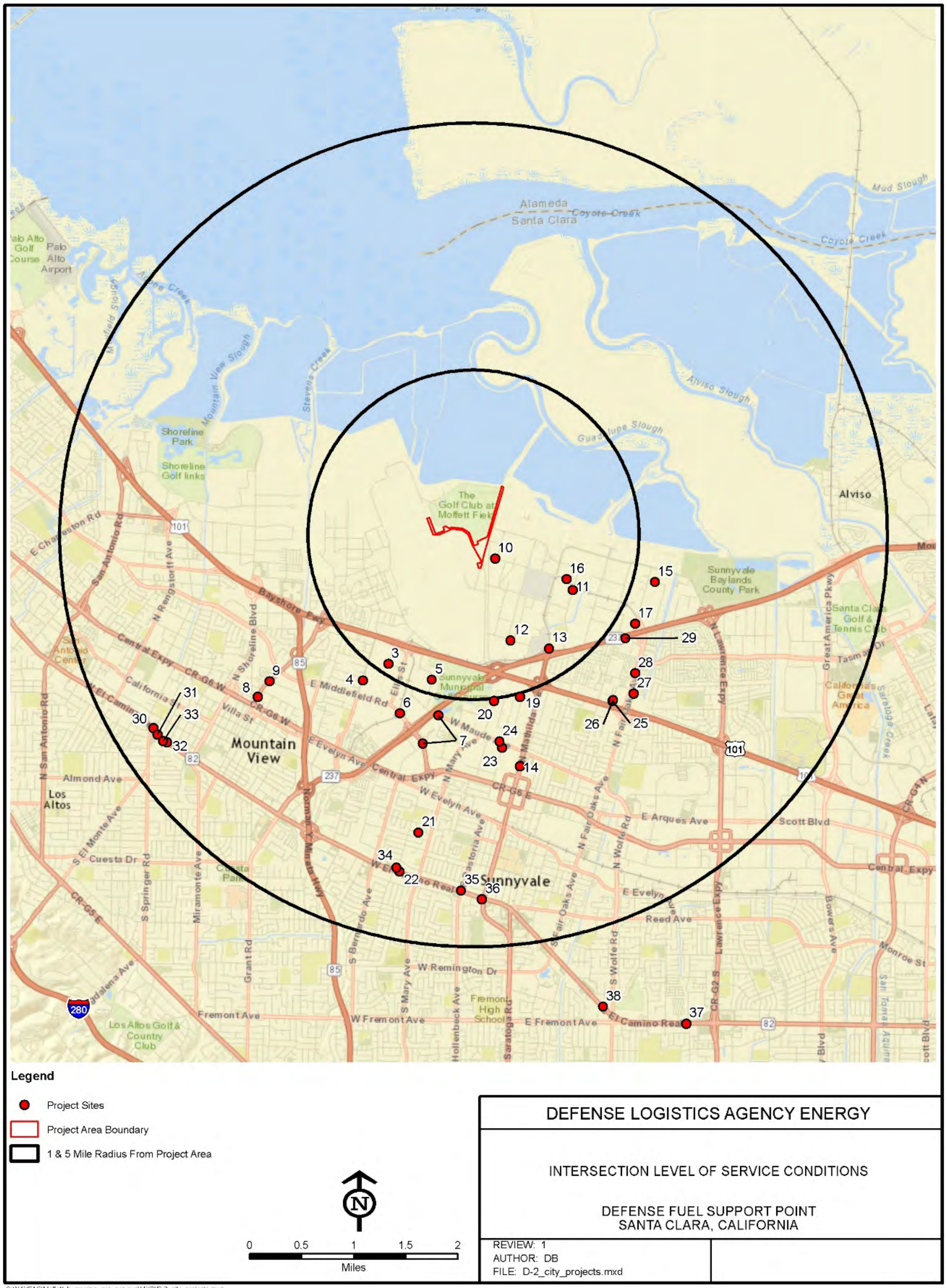


**Figure J-2: Locations of Development within 2 and 5 Five Miles of Project Site**

FORMAT PAGE

# Appendix J. NASA Section 106 Consultation

FORMAT PAGE

National Aeronautics and Space Administration

**Ames Research Center**
Moffett Field, California 94035

April 19, 2016

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

Attn: Mr. Mark Beason

Subject: NASA Section 106 Consultation: Defense Fuel Support Point Closure Project at Ames Research Center, Moffett Field, California

Dear Ms. Polanco:

As part of its responsibilities under Section 106 of the National Historic Preservation Act (NHPA), the National Aeronautics and Space Administration (NASA) is requesting consultation for the Defense Fuel Support Point (DFSP) Closure Project (project or undertaking) located at Ames Research Center (ARC) at Moffett Field, California. NASA, as the lead agency under NHPA, has determined that this project constitutes an undertaking. NASA requests review and consultation concerning the project as described in the attached *Historic Property Survey Report for the Defense Fuel Support Point Closure Project at Ames Research Center, Moffett Field, California*. NASA requests the State Historic Preservation Officer's (SHPO) concurrence on NASA's determinations of eligibility for resources identified in the report, and that NASA's finding of no adverse effect is appropriate for this project, pursuant to 36 Code of Federal Regulations (CFR) 800.5(b).

The Defense Logistics Agency (DLA) proposes to permanently close the DFSP, a fuel storage and distribution facility at Moffett Federal Airfield that is owned by NASA and has not been in use since 2003. As a result of this project, 4,443 lineal feet of pipeline corridor would be closed by excavation and removal, and 4,102 lineal feet of pipeline corridor would be closed in place. The existing fuel facility infrastructure would be physically disconnected, abandoned in place, dismantled, and/or demolished based on consultation with the County of Santa Clara's Hazardous Materials Compliance Division and pursuant to the *State of California Underground Storage Tank Requirements*, CCR Title 23, Division 3, Chapter 16, Article 7. In areas where excavation of pipelines would impact sensitive landscape features, pipelines would be closed in place, specifically those sections where removal by excavation/demolition may damage structures such as nearby underground utilities, aircraft ramps and taxiways, mature vegetation, and wetlands or U.S. waters.

NASA has delineated the Area of Potential Effects (APE) to include the project footprint and adjacent areas where historic properties may be indirectly impacted. An archaeological pedestrian survey and intensive built environment survey were conducted. No archaeological resources in the APE. The APE is located within Moffett Federal Airfield, which was determined to be contributing to the NAS Sunnyvale Historic District in 2013. Other NRHP-listed contributors to the district in the APE include Hangars 2 and 3, and Building 55. Features of the airfield are also located in the APE and were evaluated for significance.

Based on the cultural resources study, NASA has determined that the aircraft parking apron (MF1002) and aircraft taxiway (MF1016) are character-defining features of the airfield, which contributes to the NAS Sunnyvale Historic District. NASA has also determined that Building 69, Building 439, and the DFSP, including several individual DFSP components are not individually eligible, character-defining features of the airfield, or contributors to the NAS Sunnyvale Historic District. NASA is seeking the SHPO's concurrence with these determinations.

NASA, in applying the Criteria of Adverse Effect on the proposed project activities, has determined that the undertaking's impact would not constitute an adverse effect due to its minimal impact on the ability of the adjacent historic properties in the APE to convey their historical associations that make them eligible for the NRHP. In the event there is an inadvertent discovery of archaeological resources during the Undertaking, NASA will comply with best management practices as outlined in the 2014 Draft Integrated Cultural Resources Management Plan Standard Operating Procedure 8: Inadvertent Discovery of Archaeological Resources.

Pursuant to 36 CFR 800.5(c), NASA will make its finding of no adverse effect for this undertaking available to the public and any consulting parties, as specified in 36 CFR 800.11(e). Currently, there are no federally recognized Native American Tribes associated with the geographic boundaries of the APE. Under the National Environmental Policy Act (NEPA) environmental review process for this project, DLA will publish a Notice of Availability in the *San Jose Mercury News* newspaper for the Environmental Assessment for the project, including the attached cultural resources report. DLA will also make the Environmental Assessment available to the public online, in the Federal Register, and at the Mountain View Public Library.

NASA is seeking the SHPO's concurrence with NASA's finding that the proposed undertaking will have no adverse effect on historic properties. NASA requests the SHPO's concurrence within 30 days of receipt of this letter, as specified in 36 CFR 800.5(c).

Please contact me at keith.venter@nasa.gov or at (650) 604-6408 with your comments or questions.

Sincerely,

Keith Venter
Historic Preservation Officer

Ames Research Center
Ames Research Center, MS 213-8
Moffett Field, California 94035

**cc:**

HQ/EMD/Ms. Rebecca Klein, Ph.D., RPA

DLA/Mr. Patrick Brown

**Attachment**

*Historic Property Survey Report for the Ames Research Center Defense Fuel Support Point Closure Project, Moffett Field, California* (April 2016). Prepared by AECOM.

# HISTORIC PROPERTY SURVEY REPORT FOR THE DEFENSE FUEL SUPPORT POINT CLOSURE PROJECT AT AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA

***Prepared for:***

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M. K. Meiser, M.A.
Jennifer Redmond, M.A., R.P.A.

April 2016

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# EXECUTIVE SUMMARY

The Defense Logistics Agency (DLA), under the Department of Defense, proposes the Defense Fuel Support Point (DFSP) Closure Project (project or undertaking) located at Ames Research Center (ARC) at Moffett Field, California. The project is located on lands under the jurisdiction of the National Aeronautics and Space Administration (NASA), which is the lead agency for the purposes of Section 106 review under the National Historic Preservation Act (NHPA). NASA has determined that this project constitutes an undertaking under the NHPA. In support of NASA's obligations under NHPA, NASA requested AECOM to conduct a historic properties study of the project. AECOM conducted research and survey to identify historic properties that may be affected by the project, and prepared this report to document the survey findings and the potential effects on historic properties as a result of the project.

The project proposes to permanently close the DFSP, an onshore fuel storage and distribution facility, which has not been in use since 2003. Five underground storage tanks and associated pipelines, fueling hydrants, truck filling rack, and associated infrastructure and appurtenances would be closed, removed, and/or abandoned in place. In total, 4,443 lineal feet of pipeline corridor would be closed by excavation (maximum excavation depth anticipated to approximately 10 feet) and demolition, and 4,102 lineal feet of pipeline corridor would be closed in place. An area of potential effects was delineated to include the project footprint and adjacent areas that could be indirectly affected by the project.

An archaeological pedestrian survey and an intensive built environment survey were conducted on March 21, 2016. The survey identified no archaeological resources and 15 buildings and structures (Table ES-1). Of the 15 resources, three resources are listed in the National Register of Historic Places (NRHP) as contributors to the NAS Sunnyvale Historic District, eight resources are features of the DFSP fueling facility, and the remaining four resources are miscellaneous features of the airfield.

Resources were evaluated under the NRHP criteria. Two resources, MF1002, an aircraft parking apron, and MF1016, an aircraft taxiway, are recommended as character-defining features of the airfield that is an eligible contributor to the NAS Sunnyvale Historic District under NRHP Criterion A. In addition, 10 resources are recommended not eligible for the NRHP.

As a result of the assessment of effects, it appears that the project will have no adverse effect on the NAS Sunnyvale Historic District as a whole, or its contributors located in the APE, including Hangars 2 and 3, Building 55, and the airfield. The significance of these historic properties is associated with aviation missions related to several themes, including the Navy dirigible and lighter-than-air operations, the Army Air Corps's research and mission, Navy transport operations, and Navy jet aircraft operations. The project proposes the permanent closure and partial removal of the DFSP, historically the jet fueling facility, which served a supporting utilitarian function of the airfield during the period of significance from 1953 to 1961, and was closed in 2003. Due to its support function and the integrity of some of its significant

**Table ES-1. Survey and Evaluation Results in the APE**

| Building No. | Historic Name (Current Name) | Year Built | NRHP Evaluation | Effects Analysis |
|---|---|---|---|---|
| 46 | Hangar 2 | 1942 | Listed Contributor (NAS Sunnyvale HD) | No Adverse Effect |
| 47 | Hangar 3 | 1942 | Listed Contributor (NAS Sunnyvale HD) | No Adverse Effect |
| 55 | Boiler House (Hangars 2 and 3) | 1943 | Listed Contributor (NAS Sunnyvale HD) | No Adverse Effect |
| 69 | Inert Ammunition Storage | 1943 | Not Eligible | No Historic Properties Affected |
| 137 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible | No Historic Properties Affected |
| 138 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible | No Historic Properties Affected |
| 139 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible | No Historic Properties Affected |
| 140 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible | No Historic Properties Affected |
| 141 | Tank Truck Filling Rack* | 1952 | Not Eligible | No Historic Properties Affected |
| 169 | Vehicular Bridge* | 1953 | Not Eligible | No Historic Properties Affected |
| 439 | Aircraft Wash Rack | 1942 | Not Eligible | No Historic Properties Affected |
| 953 | Aircraft Ready Fuel Day Tank and Pumping Station* | 1956 | Not Eligible | No Historic Properties Affected |
| MF1002 | Aircraft Parking Apron | 1945 | Character-Defining Feature of Eligible Contributor (NAS Sunnyvale HD) | No Adverse Effect |
| MF1003 | High-Speed Aircraft Fueling Pits* | 1955 | Not Eligible | No Historic Properties Affected |
| MF1016 | Aircraft Taxiway (East Parallel) | 1945 | Character-Defining Feature of Eligible Contributor (NAS Sunnyvale HD) | No Adverse Effect |

*feature of the Jet (DFSP) Fueling Facility

components directly related to the aviation mission of the airfield, the jet fueling facility does not appear to be a character-defining feature of the airfield. In applying the Criteria of Adverse Effect and the Advisory Council on Historic Preservation's guidelines for considering the changing nature of highly technical facilities in assessing the effects of project activities, it appears that a finding of no adverse effect is appropriate.

# INTRODUCTION

The Defense Logistics Agency (DLA), under the Department of Defense, proposes the Defense Fuel Support Point (DFSP) Closure Project (project or undertaking) located at Ames Research Center (ARC) at Moffett Field, California. The project is located on lands under the jurisdiction of the National Aeronautics and Space Administration (NASA), which is the lead agency for the purposes of Section 106 review under the National Historic Preservation Act (NHPA) (36 Code of Federal Regulations (CFR) 800.5(b)). NASA has determined that this project constitutes an undertaking under the NHPA. In support of NASA's obligations under NHPA, NASA requested AECOM to conduct a historic properties study of the project. AECOM conducted research and survey to identify historic properties that may be affected by the project, and prepared this report to document the survey findings and the potential effects on historic properties as a result of the project.

## DESCRIPTION OF THE UNDERTAKING

The project proposes to permanently close the DFSP, an onshore fuel storage and distribution facility, which has not been in use since 2003. The DFSP fuel facility has eight primary components:

- Bulk storage tank area (including Buildings 137–140), also referred to as the tank farm or fuel farm;
- Day tank area (including Building 253);
- Building 141, the truck filling rack;
- Four high-speed aircraft fueling hydrants (MF1003);
- Two 10-inch-diameter underground fuel dock pipelines in a 3,010-foot-long corridor;
- One 8-inch-diameter underground day tank pipeline in a 2,100-foot-long corridor;
- Two 6-inch-diameter underground trucking filling rack pipelines in a 1,165-foot-long corridor; and
- Two underground fuel hydrant pipelines in a 2,270-foot-long corridor.

Five underground storage tanks (USTs) and associated pipelines, fueling hydrants, truck filling rack, and associated infrastructure and appurtenances would be closed.

Within the fence boundaries of the fuel farm area and day tank area, all tanks, pipelines, buildings, and associated infrastructure and appurtenances would be cleaned, abated, and/or removed by demolition/excavation. Tanks and pipelines would be cleaned to remove fuel residuals prior to removing or abandoning, in accordance with Certified Unified Program Agencies (CUPA) regulations. Hazardous building materials such as asbestos gaskets and loose (flaking) lead-containing paint would be abated prior to demolition, per federal and state regulations. Contaminated soil encountered during the removal operation would be excavated and characterized for waste disposal in accordance with the Closure Plan (OTIE 2015) to be reviewed and approved by the Health and Hazardous Materials Compliance Division (HMCD) of Santa Clara County. The reinforced concrete tank floors would be perforated and left in place. The proposed project would only handle the amount of contaminated soil necessary to accomplish the removal project. Further excavations would be no larger than necessary, and the bulk of contaminated soil, if any, would be left in place for potential cleanup during a later action. Other actions are as follows:

- The truck filling rack (Building 141) would be left in place. At the truck filling rack, the aboveground portion of the fuel system would be abated and cleaned. The below grade pipeline would be closed in place. The hardscape (e.g., pavement, pads, and curbing) would be left in place.
- Within the pipeline corridors, approximately 300 lineal feet of aboveground piping would be cleaned, abated, and demolished. 15,133 lineal feet of underground pipelines would be cleaned, abated, and demolished where practical. In areas where demolition/excavation of pipelines would impact sensitive site features, pipelines would be closed in place, specifically those sections where removal by excavation/demolition may damage structures such as nearby underground utilities, aircraft ramps and taxiways, mature vegetation that is part of the golf course recreation facility, and wetlands or waters of the U.S. Those underground pipeline segments closed in place would be cleaned and would be sealed at each end. In summary, 4,443 lineal feet of pipeline corridor would be closed by excavation/ demolition and 4,102 lineal feet of pipeline corridor would be closed in place. After pipeline removal is complete, the area would be filled using on-site soil, supplemented by imported soil as necessary, to restore the topography to match the surrounding grade. Backfilled excavations would be compacted to engineering standards, and vegetation would be restored to match surrounding vegetation.
- At the fuel hydrants, the above grade equipment would be cleaned, abated, and removed by demolition. The below grade pipeline would be closed in place. The hardscape (e.g., pavement, pads, and curbing) would be left in place.
- Utilities that serviced the fuel system would be disconnected and secured.
- A total of 6.77 acres would be disturbed by the closure/demolition activities. Approximately 24,432 cubic yards of soil would be excavated and stockpiled while infrastructure is being demolished. That soil would be used to backfill after demolition is completed. Approximately 3,717 cubic yards of soil would be imported to complete backfill.
- A Closure Plan[1] (OTIE 2015) has been be prepared to describe the work to be performed and the environmental closure commitments. The Closure Plan (OTIE 2015) would be

[1] A Closure Plan is a plan that describes the procedures for terminating the storage of hazardous materials and/or hazardous wastes in a storage facility in a manner that (1) eliminates or minimizes the need for further maintenance; (2) eliminates or minimizes any threat to public health, safety, or the environment from residual hazardous materials or hazardous wastes in the facility; and (3) demonstrates that the hazardous materials and/or hazardous wastes that

submitted to the HMCD, the lead agency overseeing tank closure under the *State of California Underground Storage Tank Requirements,* California Code of Regulations Title 23, Division 3, Chapter 16, Article 7.

- Once closure/demolition activities are complete, the disturbed areas would be graded to restore topography to match surrounding grade, compacted to engineering standards, and hydroseeded with a local native seed mix.
- Within the pipeline corridors, aboveground pipelines would be cleaned, abated, and demolished.
- Prior releases of fuel occurred at the facility; therefore, this project includes provision for sampling and disposal of approximately 3,210 tons of petroleum-contaminated soil, in the event it is encountered. Any follow-on investigation and remediation is not part of this project. The provision for 3,210 tons of petroleum-contaminated soil is based on 10 percent of the excavated soil from the day tank area and fuel farm being petroleum-contaminated (assuming 1.4 tons/bank cubic yard). It is estimated that 3,210 tons of petroleum-contaminated soil would be removed and disposed of at the Altamont Landfill in Livermore, California, 51 miles from the work site.

## Area of Potential Effects

The area of potential effects (APE) was delineated to encompass the project footprint, including all areas of excavation, demolition, and abandonment of the DFSP fueling facility (Figure 3). For archaeological resources, the APE is defined as the limits of disturbance, including areas of temporary staging and construction ground disturbance. Where the project proposes only excavation of subsurface pipeline, the APE is limited to the footprint of that activity. Excavation is proposed to the depth and width of the previously disturbed area of the pipeline, so the vertical APE extends to the approximate depth of the pipeline, which varies throughout the pipeline corridor. Excavation is anticipated to a maximum depth of approximately 10 feet, but will be determined during construction. The proposed APE boundary also includes built environment historic properties in the vicinity of the project footprint that may be indirectly affected through visual or contextual alterations. Due to the proposed removal of the day tank area (Building 953) and surficial elements of the high-speed fueling pits (MF1003) that would create a visual change near the airfield, a portion of the east side of the airfield within immediate view of these resources, including Hangars 2 and 3, was included in the APE.

## Personnel

This investigation was conducted by M.K. Meiser, M.A., and Jennifer Redmond, M.A., R.P.A. Ms. Meiser and Ms. Redmond are both qualified under the Secretary of the Interior's Standards (36 CFR Part 61) for architectural history and history, and archaeology and history, respectively. Resumes for key personnel are included in Appendix A.

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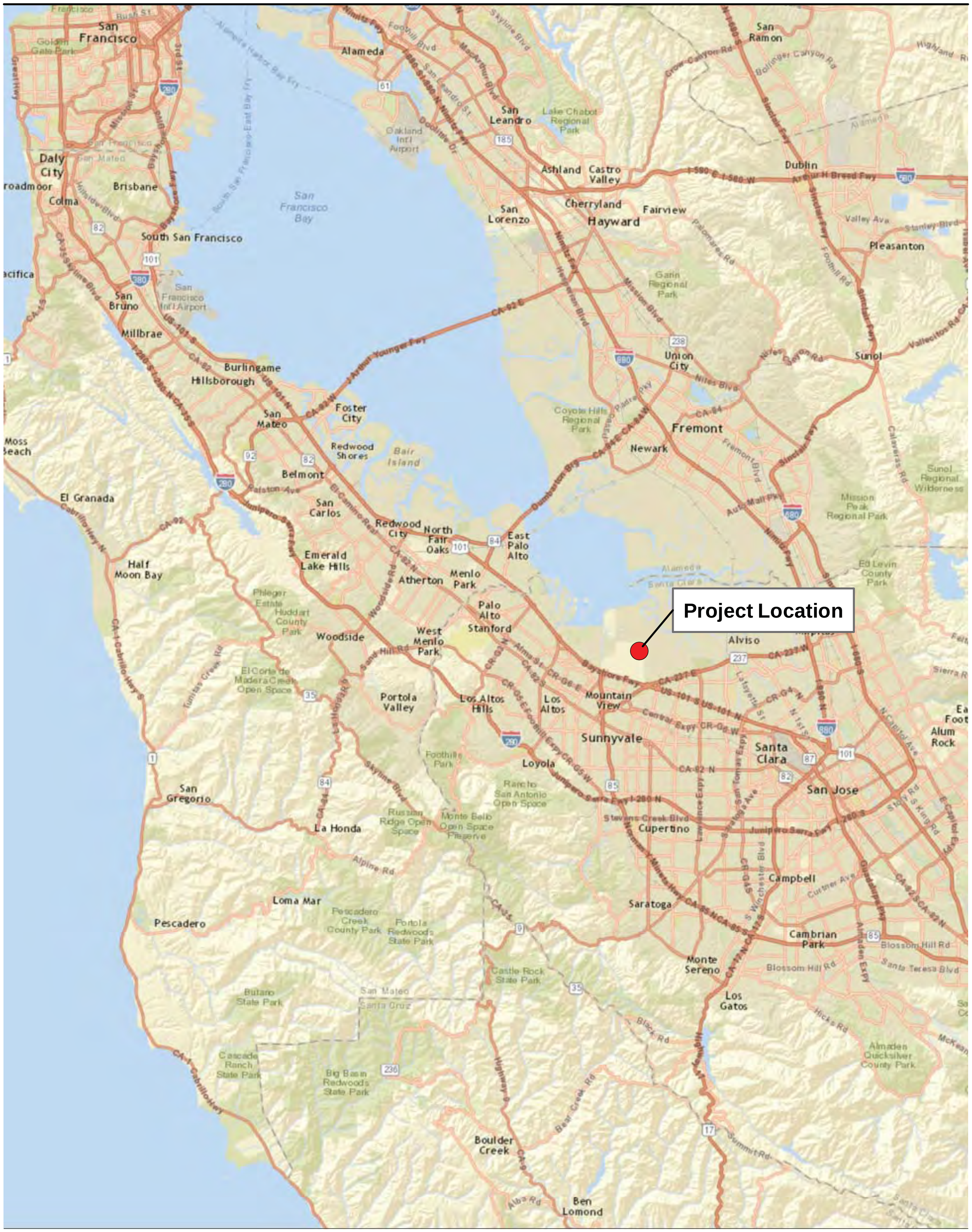
were stored in the facility would be removed, disposed of, neutralized, or reused in an appropriate manner (CUPA, Chapter 8.20).

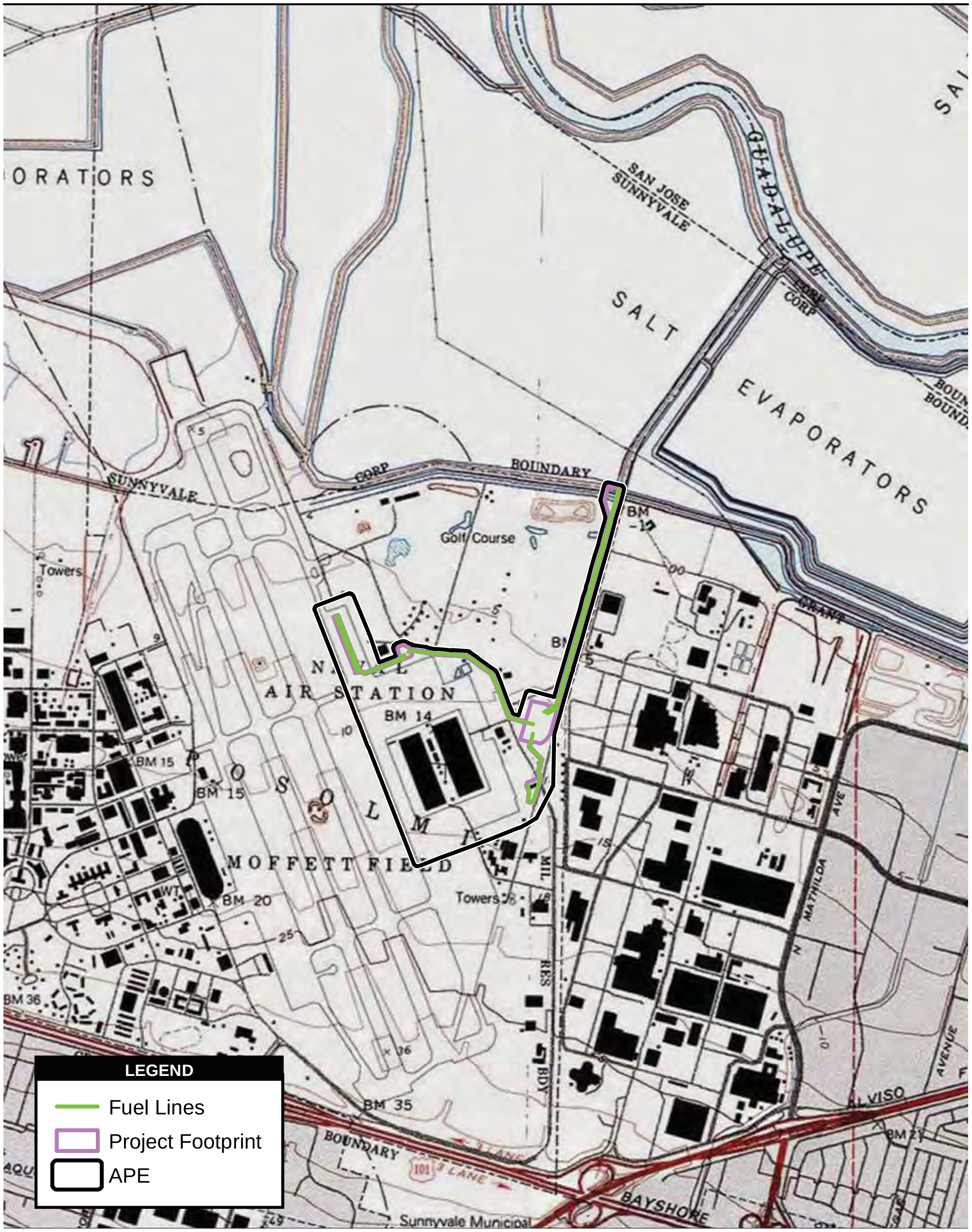



Source: ESRI 2015

6 3 0 6 Miles

Scale: 1:380,160; 1 inch = 6 miles

**Figure 1**
**Project Location**

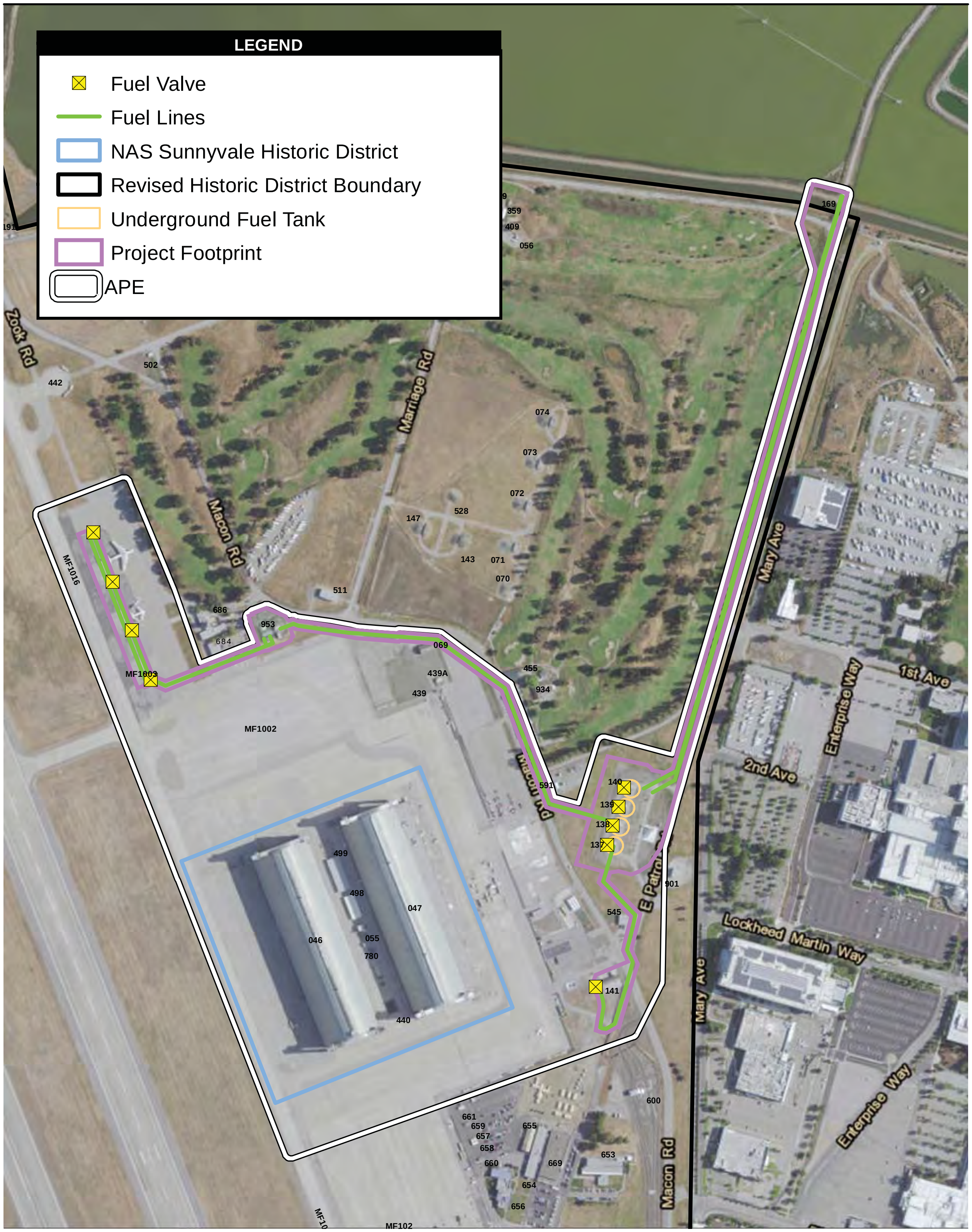



Source: MIcrosoft 2015; ESRI 2015

2,000 1,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

**Figure 2**
**Site Location**




Source: MIcrosoft 2015; ESRI 2015

750 375 0 750 Feet

Scale: 1:9,000; 1 inch = 750 feet

**Figure 3**
**Area of Potential Effects**

# PROJECT SETTING

## HISTORICAL CONTEXT

The historical context for Moffett Field has been previously established in the *Historic Property Survey Report for the Airfield at NASA Ames Research Center, Moffett Field, California*, prepared by AECOM in 2013 (AECOM 2013). The following sections regarding the general history of Moffett Field are excerpted from that report. Additional information specific to the DFSP fueling facility is also included.

### Pre-Military Period (to 1930)

The earliest well-documented entry and spread of native peoples throughout California occurred at the beginning of the Paleo-Indian Period (12,000–8000 years Before Present [B.P.]), and social units are thought to have been small and highly mobile. Known sites have been identified in the contexts of ancient pluvial lakeshores and coastlines, as evidenced by such characteristic hunting implements as fluted projectile points and flaked stone crescent forms. Prehistoric adaptations over the ensuing centuries have been identified in the archaeological record by numerous researchers working in the Bay Area since the early 1900s, as summarized by Fredrickson (1974) and Moratto ([1984] 2004).

Few archaeological sites have been found in the Bay Area that date to the Paleo-Indian Period or the subsequent Lower Archaic (8000–5000 B.P.) time period, probably because of high sedimentation rates and sea level rise. However, archaeologists have recovered a great deal of information from sites occupied during the Middle Archaic Period (5000–2500 B.P.). By this time, broad regional subsistence patterns gave way to more intensive procurement practices. Economies were more diversified, possibly including the introduction of acorn-processing technology, and populations were growing and occupying more diverse settings. Permanent villages that were occupied throughout the year were established, primarily along major waterways. The onset of status distinctions and other indicators of growing sociopolitical complexity mark the Upper Archaic Period (2500–1300 B.P.). Exchange systems became more complex and formalized, and evidence of regular sustained trade between groups was more prevalent.

Several technological and social changes characterize the Emergent Period (1300–200 B.P.). Territorial boundaries between groups became well established, and it became increasingly common for distinctions in an individual's social status to be linked to acquired wealth. In the latter portion of this period (500–200 B.P.), exchange relations became highly regularized and sophisticated. The clamshell disk bead became a monetary unit, and specialists arose to govern various aspects of production and material exchange.

The Middle Archaic, Upper Archaic, and Emergent Periods can be broken down further, according to additional cultural manifestations that are well represented in archaeological assemblages in the Bay Area:

- *Windmiller Pattern* (5000–1500 B.P.) peoples placed an increased emphasis on acorn use and on a continuation of hunting and fishing activities. Ground and polished charmstones, twined basketry, baked clay artifacts, and worked shell and bone were hallmarks of Windmiller culture. Widely ranging trade patterns brought goods in from the Coast Ranges and trans-Sierran sources, as well as from closer trading partners.
- *Berkeley Pattern* (2200–1300 B.P.) peoples exhibited an increase in the use of acorns as a food source, compared to what was seen previously in the archaeological record. Distinctive stone and shell artifacts differentiated this period from earlier or later cultural expressions. Burials were most often placed in a tightly flexed position and frequently included red ochre.
- The *Augustine Pattern* (1300–200 B.P.) reflected increasing populations, resulting from more intensive food procurement strategies, as well as from a marked change in burial practices and increased trade activities. Intensive fishing, hunting and gathering, complex exchange systems, and a wider variety in mortuary patterns are all hallmarks of this period.

Ethnographic and archaeological research indicate that ARC falls within the traditional boundaries of the Ohlone, whose territory stretched from San Francisco Bay at the north to the southern tip of Monterey Bay, extending 60 miles inland (NASA 2002). The primary social organization of this group was centered around the patrilineal family unit, with a focus on patrilocality, and sovereign tribelets were often defined by territorial holdings (Bennyhoff 1977). ARC is located on Ramaytush and Tamyen (Tamien) lands of the Ohlone sphere of influence and has been specifically associated with the Posol-mi tribelet (a place name likely associated with the Rancho Posolmi discussed below) (NASA 2009; Kroeber 1925). The total number of individuals residing in this area has been estimated as high as 1,200 at the time of European contact; however, the combined effects of missionization and European-borne diseases had a heavy toll on these communities, nearly decimating the population and traditional practices (NASA 2009).

In 1772, the Spanish, led by Juan Bautista de Anza, began exploring the inner coastal region of California. Later, Spanish settlers established a permanent presence by constructing missions and presidios. When Mexico became independent from Spain in 1822, the Spanish missions were secularized and their lands were redistributed to private individuals by way of land grants. Large parcels were developed into cattle ranches, maintained by Mexican grantees.

In 1844, the Rancho Posolmi, on which ARC lands are contained, was granted to Lopez Iñigo (also Indigo or Ynigo), a Native American documented as living in the vicinity of present-day Mountain View and farming what would become ARC lands as early as 1834 (NASA 2009; Garaventa et al. 1991). The grant was later patented in 1881, at which time the grant was known to have been divided into three parts: 448.02 acres to Iñigo's descendants, 847.98 acres to Robert Walkinshaw, and 400 acres to Thomas Campbell. Research indicates that the known remains of buildings associated with these ranchos are located outside of ARC land holdings. Iñigo is thought to have lived on-site until his death in 1864, and a modern marker entitled the "Inigo Grave Site" *[sic]* was erected by the Mountain View Pioneer and Historical Association on the perimeter road near the northeast corner of the airfield (Garaventa et al. 1991). Although the marker is no longer standing, Iñigo's interment is believed located within the boundaries of resource CA-SCI-12/H.

**U.S. Navy Dirigible Operations (1931–1935)**

The agricultural land that would become Naval Air Station (NAS) Sunnyvale was purchased with funds raised by local citizens and civic leaders who were enthusiastic about the prospect of a naval airfield coming to the area. The civic group sold the land to the Navy for $1, and NAS Sunnyvale was officially established on August 2, 1931.

Construction began on NAS Sunnyvale in October 1931. Hangar 1, the massive steel-frame structure built to house the dirigible USS *Macon*, the flagship for NAS Sunnyvale, was completed in April 1933. North and south of Hangar 1, two mooring circles were built to control and secure the USS *Macon*. The nose of the dirigible would attach to a telescoping mooring mast and the tail fin would attach to a stem beam (or bolster beam); the stem beam and mooring mast were attached to a track that allowed the USS *Macon* to be rotated and moved in and out of Hangar 1. West of Hangar 1, the Navy built a campus of buildings to support dirigible operations on the airfield. The Spanish Colonial–style buildings built in the area now known as the NAS Sunnyvale Historic District were based on designs by the Naval Bureau of Yards and Docks. East of Hangar 1, closer to San Francisco Bay, the former agricultural land was cleared and leveled, and an airfield with a single narrow runway was built. This small runway was originally used by F9C *Sparrowhawks*, small biplane fighters that accompanied (and could be carried by) the USS *Macon*. Within a short time, the original runway was expanded and two more small runways were added. NAS Sunnyvale was formally commissioned on April 12, 1933.

The USS *Macon* arrived at NAS Sunnyvale in October 1933 and was stationed there until February 1935, when the dirigible was damaged during a mission off the coast of Point Sur, California, and crashed in the Pacific Ocean. Soon after the crash, the Navy terminated its dirigible program and the airfield at NAS Sunnyvale was transferred to the U.S. Army Air Corps.

**U.S. Army Air Corps (1935–1942)**

In September 1935, the Navy transferred the airfield to the U.S. Army Air Corps for use in pursuit and observation operations. When the Airfield was occupied by the Army Air Corps, the Airfield's focus moved from lighter-than-air (LTA) operations to heavier-than-air aircraft used in pursuit and training operations. The Army Air Corps used bigger aircraft that required longer and wider runways, including the P-36 *Hawk* and BT-13 *Valiant*. In 1938, the Army Air Corps removed the older runway system and built a 2,140-foot-long runway (Runway 14R-32L) using 3-inch-thick asphalt concrete. Historic photographs taken during this period show a wide runway bordered on the west side by an apron or taxiway marked by diagonal lines. Parking areas surrounding Hangar 1 were unpaved earth (Veronico 2006).

In 1940, anticipating the outbreak of World War II, the Army Air Corps converted the airfield to become its West Coast training headquarters. In 1941, to accommodate larger aircraft used to train pilots and their support crew, Runway 14R-32L was extended again.

**U.S. Navy Lighter-than-Air Operations and World War II (1942–1947)**

After the bombing of Pearl Harbor in December 1941, the Navy reassumed control of the airfield, which was renamed the NAS Moffett Field, or simply Moffett Field. LTA operations were needed by the military once again, and Moffett Field became devoted exclusively to LTA aviation, primarily for reconnaissance and surveillance of the Pacific coast. Moffett Field was the headquarters for Fleet Airship Wing Three, composed of three LTA bases on the West Coast: Tillamook, Oregon; Tustin, California; and Sunnyvale, California. The first blimps arrived at Moffett Field as part of the West Coast's first LTA squadron, ZP-32, which launched its first patrol flight over the Pacific coast in February 1942 (Veronico 2006). Moffett Field was also used to train new airship pilots, using free balloons and blimps.

With the increase in LTA activity at Moffett Field, Hangar 1 was once again filled to capacity with K- and L-class nonrigid airships. In 1942, construction started on the first of two new enormous wood-frame hangars on the east side of the runways, which by this time had been expanded and reconfigured by the Army Air Corps. Hangars 2 and 3 were completed in 1943 and used by the Navy Station Assembly and Repair Department to assemble, erect, store, and maintain blimps and balloons (Gleason 1958). LTA operations continued at Moffett Field until August 1947 when the program was deemed obsolete and was terminated, making Moffett Field an exclusively heavier-than-air base (Gleason 1958).

Also during this period, the Navy started to focus more attention on expanding the base, including adding facilities for ammunition storage and heavier-than-air aircraft. In April 1942, the Navy purchased 225 acres east of the airfield, presumably to construct an ammunition storage area (Gleason 1958). In 1943, the Navy built a large munitions storage and loading area off the northeast corner of the airfield. The Navy chose this area because most munitions arrived at the Airfield by boat along the ferry channel, and because that was the most lightly occupied part of the airfield (NASA 2013). The munitions area included five magazines (now known as 070 to 074), a small bunker, an inert ammunition storage building, and nine fortified combat ammunition loading circles. The four magazines were concrete bunkers with cylindrical roofs set into a concrete front wall; lying 8 feet across from the door of these magazines was a matching berm with headwall that served as a blast deflector in case of accidental explosion. Concrete ramps were built to facilitate the transport of munitions from these magazines to the aircraft being readied for their missions. A safety buffer zone was outlined within the explosion arc of these magazines.

Beginning in 1943, the Navy started the first in a series of major changes to the airfield and surrounding areas after the Naval Bureau of Yards and Docks allotted $1.12 million for new construction at Moffett Field (Gleason 1958). By this time, the Navy was flying larger and more powerful aircraft such as the PV-1 *Ventura* and Army B-26 *Marauders*, which required more modifications to the runway (Veronico 2006). In May 1944, Runway 14R-32L was extended to its present length with 11-inch Portland cement concrete, with anticipation of greater use by fixed-wing aircraft in the postwar period (NASA 2013).

### U.S. Navy Transport Operations (1945–1950)

After World War II, Moffett Field became home to Squadron 4 of the Naval Air Transport Service, with support operations dedicated to aircraft maintenance and overhaul. It was during this period that most of the current-day airfield was built. Beginning in 1945, the Navy spent millions of dollars for improvements and new construction at Moffett Field (Gleason 1958). The airfield was expanded and extended to accommodate the Navy's largest transport aircraft, including a huge four-engine transport plane called the R5D *Skymaster* (Gleason 1958). In 1946, Runway 32R-14L was built of 8-inch-thick reinforced concrete to an original length of 7,425 feet. The west and east parallel taxiways were built, along with many of the parking aprons. In 1947, high-intensity approach, taxiway, and runway lights were added to the airfield (Gleason 1958). In the late 1940s, two more air transport squadrons (Squadrons 3 and 5) were commissioned at the base, making Moffett Field the largest Naval Air Transport Service base on the West Coast. Squadron 5—the first squadron in the Navy to have nuclear-weapon capabilities—flew the large patrol bombers P2V *Neptune* and AJ *Savage* (Gleason 1958). Moffett Field's Naval Air Transport Service overhaul and repair operations were closed down in October 1949 (Gleason 1958).

### Korean War and U.S. Navy Jets (1950–1961)

The Korean War started in June 1950 and Moffett Field became the home base for aircraft carrier squadrons and their fighter jets. Jets were first introduced by the U.S. military during World War II, but did not appear at Moffett Field until 1950 with the arrival of the F3D *Skynight*, the Navy's first operational jet night fighter. Navy carrier squadrons stationed at Moffett Field used the airfield for training purposes, including simulated carrier landings. (Runways were equipped with emergency arresting gear similar to the equipment used to stop planes on aircraft carriers.) Moffett Field was also used to train pilots on new jet aircraft before they were first introduced into operational squadrons. Almost every new supersonic jet fighter aircraft in the Navy or U.S. Air Force inventories in the early 1950s was flight-tested at Moffett Field (NASA 2013). To support the new jets stationed at Moffett Field, two new squadrons were commissioned in March 1951 to provide maintenance services: Fleet Aircraft Service Squadron (FASRON) 10 was one of the first all-jet Fleet Aircraft Service squadrons in the Navy. One of its main roles was to repair damaged aircraft serving in the Pacific Fleet. The FASRON groups used Hangars 2 and 3 for maintenance operations.

In June 1951, to accommodate jet operations at Moffett Field, the Navy embarked on the largest post–World War II expansion program at the airfield. Because jet aircraft flew much faster and at higher altitudes than propeller-powered aircraft, the airfield at Moffett Field needed to be modified. Both runways were extended and resurfaced at least once; Runway 32R-14L was extended to 9,200 feet (U.S. Navy 1954). Taxiways were expanded; parking and apron areas were added; and new supply, transportation, garage, and barracks buildings were constructed (Gleason 1958). The Flight Operations Building (Building 158) was completed in February 1954 (Gleason 1958). The northeast area of the airfield near the coastline and magazines also saw changes during this period. Three new high-explosive magazines were built along Marriage Road (Buildings 143, 147, and 528), and an ordnance handling pad (Building 442) was added to the northeast side of the airfield. In 1960, a golf course was built within the safety buffer zone surrounding the magazines as an acceptable low-occupancy use (NASA 2013).

Jet operations at Moffett Field were so extensive that the base was designated a master jet base in 1953 (the first of nine such Navy bases), and operational units on-site reached an all-time high in 1955. However, by the early 1960s, the Navy's operational priorities had changed, and the focus shifted from fighter jets to anti-submarine warfare. Jet operations at Moffett Field ended in 1961.

**U.S. Navy Antisubmarine Warfare Operations (1962–1994)**

In November 1962, Moffett Field was selected as the West Coast's training center for the Navy's anti-submarine warfare in the Pacific Ocean. The training was centered on the new propeller-driven anti-submarine aircraft, the Lockheed P3 *Orion*. The Pacific Fleet's first *Orion* arrived at Moffett Field in late January 1963, and for the next three decades the P3s would be a common sight over Moffett Field (U.S. Navy 1963). Pilots and technical crews were trained on the *Orion* in an area of the airfield nicknamed "Orion University," which included two World War II buildings in the California Air National Guard outlease area reconfigured for this use (Buildings 654, 655, and 669).

The P3 *Orion* had an internal bomb bay that could house torpedoes; nuclear weapons; and various other mines, missiles, and bombs. To store the weapons used for the *Orion* missions, specifically Mark 46 torpedoes, cluster bombs, and Bullpup or Harpoon missiles, the Navy added a new magazine facility to the safety buffer zone in 1965 (Buildings 561 and 484–492). In 1973, Moffett Field became the headquarters of the Commander Patrol Wings, U.S. Pacific Fleet, responsible for patrolling 93 million square miles of ocean from Alaska to Hawaii.

In 1991, the Base Realignment and Closure Commission recommended the closure of Moffett Field as a naval air station. On July 1, 1994, Moffett Field was closed to military operations, renamed Moffett Federal Airfield, and transferred to NASA (with the exception of the military housing units, which were transferred to the U.S. Air Force).

**Jet Fueling Facility**

As part of the program to expand the airfield to accommodate jet aircraft in 1951, the plan for a new fuel storage and distribution system developed. Historically, fuel arrived at Moffett Field by barge directly from refineries via the San Francisco Bay. In 1951, construction began on the jet fuel storage facilities, or fuel farm, consisting of four 15,170-barrel capacity USTs (Plate 1). Construction also began on a barge canal, fuel dock, and wharf at Guadalupe Slough, and a pipeline system that extended from the fuel dock along a jetty and onshore to connect to the fuel farm. Fuel was transported by pipeline from the fuel dock to the fuel farm area for long-term storage. This enabled the Navy to bring in large amounts of fuel by barge directly from the refinery, rather than by truck or railroad, saving time and money. From the fuel farm, an additional pipeline extended to a truck filling rack (Building 141) located southeast of Hangar 3, completed in 1953.


Source: U.S. Navy

**Plate 1. Construction of Fuel Farm, 1951**

The jet fuel facility was further developed in 1955 and 1956. A new branch of pipeline extended northwest from the fuel farm roughly parallel to Macon Road to a new aircraft-ready fuel day tank and pumping station (Building 953). The day tank area was designed for short-term jet fuel storage, holding fuel for a new cutting-edge, high-speed refueling system (MF1003) that was added in October 1956. The high-speed refueling system consisted of four fuel pits with fuel hydrants adjacent to the east parallel taxiway northwest of Hangar 2. The fuel hydrants allowed eight aircraft to be refueled simultaneously at the rate of 5 minutes per plane.

In 1978, additional pipeline was installed under the airfield to a new fuel farm with hydrants on the west side of the airfield for NASA. The NASA fuel hydrants were replaced in 1996. In addition, upgrades to the tanks and system were made in the 1970s and 1990s, including replacement of the jet fuel hydrants (Parsons 1996).

After the Navy vacated NAS Moffett Field in 1993 and Moffett Federal Airfield was transferred to NASA in 1994, the administration and management of fuel facilities became the responsibility of the Defense Logistics Agency (DLA), under the Department of Defense, as part of the Defense Fuel Supply Center (DFSC), a national program administered by the DLA. The DFSC plans, programs, budgets, and funds the operation, maintenance, and repair of Defense Fuel Support Points (DFSPs) worldwide (Parsons 1996). The DFSP at Moffett Federal Airfield received, stored, and distributed JP-8 aviation fuel, ground vehicle fuel, liquid oxygen, and liquid nitrogen in support of military and federal activities through the 1990s (Parsons 1996). The DFSP fueling facility was closed in 2003. In 2012, the former pipeline crossing from the shore to the fuel dock and wharf was removed.

# IDENTIFICATION OF HISTORIC PROPERTIES

The APE has been previously surveyed for archaeological and architectural resources, and was resurveyed for archaeological and architectural resources as part of the current undertaking.

## ARCHAEOLOGICAL RESOURCES

The area just north of the truck filling rack (Building 141) was identified in the NASA Ames Final Programmatic Environmental Impact Statement as a "potentially archaeologically-sensitive area" (Design, Community & Environment 2002). The sensitive area, which is associated with the 19th century Gallimore farm, does not overlap with the APE (Design, Community & Environment 2002; Healy 1859). The remainder of the APE has not been identified as archaeologically sensitive. The project would include ground disturbance in areas where pipelines and USTs would be removed. Additional excavation may occur if contaminated soils are encountered during the pipeline and UST removal process.

A pedestrian survey of the APE was conducted on March 21, 2016, by Jennifer Redmond, M.A., RPA, an archaeologist who meets the Secretary of Interior's Professional Qualifications Standards for Archaeology and History (36 CFR Part 61). Visibility of the APE was generally poor. The truck filling rack, day tank area, and runway apron were paved. The fuel farm and day tank areas were covered with fill. The APE between the truck filling rack and the fuel farm area and between the fuel farm area and Macon Road was covered in dense vegetation. Where the APE parallels Macon Road and East Patrol Road, it was situated in or adjacent to an excavated roadside ditch or ditch spoils. Survey was conducted along the route of the pipeline in the unpaved areas of the APE and exposed soils were closely examined for the presence of archaeological resources. Visible soils in the archaeologically sensitive area along Macon Road were also examined.

No intact archaeological resources were identified during the survey. Fragments of colorless and green bottle glass were identified along East Patrol Road, but these scattered fragments likely represent recent roadside discard. The APE is generally disturbed by prior construction, including the installation of the fuel pipelines, tanks, and other utilities. Exposed soils included fine-grained clay and imported fill, consistent with the U.S. Department of Agriculture's (USDA) classification of the APE as Hangerone basin alluvium (drained, but historically seasonally wet) intermixed with Urban Land (disturbed and human-transported material) (USDA 2016). It is anticipated that ground disturbance would be limited to areas previously excavated for the installation of the pipeline and tanks, although the potential does exist that additional excavation would occur to remove contaminated soils.

## ARCHITECTURAL RESOURCES

In 1999, a cultural resources survey identified 148 buildings and structures buildings and structures at Moffett Federal Airfield built between 1945 and 1989 and evaluated their significance related to the Cold War (SAIC 1999). The resources were evaluated under eligibility criteria for the National Register of Historic Places (NRHP), including Criteria Consideration G, because the resources were not 50 years old at the time of the evaluation. None of the resources in the study were recommended eligible for listing in the NRHP. The SHPO concurred with the determinations of eligibility on May 11, 1999 (see Appendix B). Buildings 137–140, Building 141, and Building 953 were determined not eligible for the NRHP, and are located in the current APE.

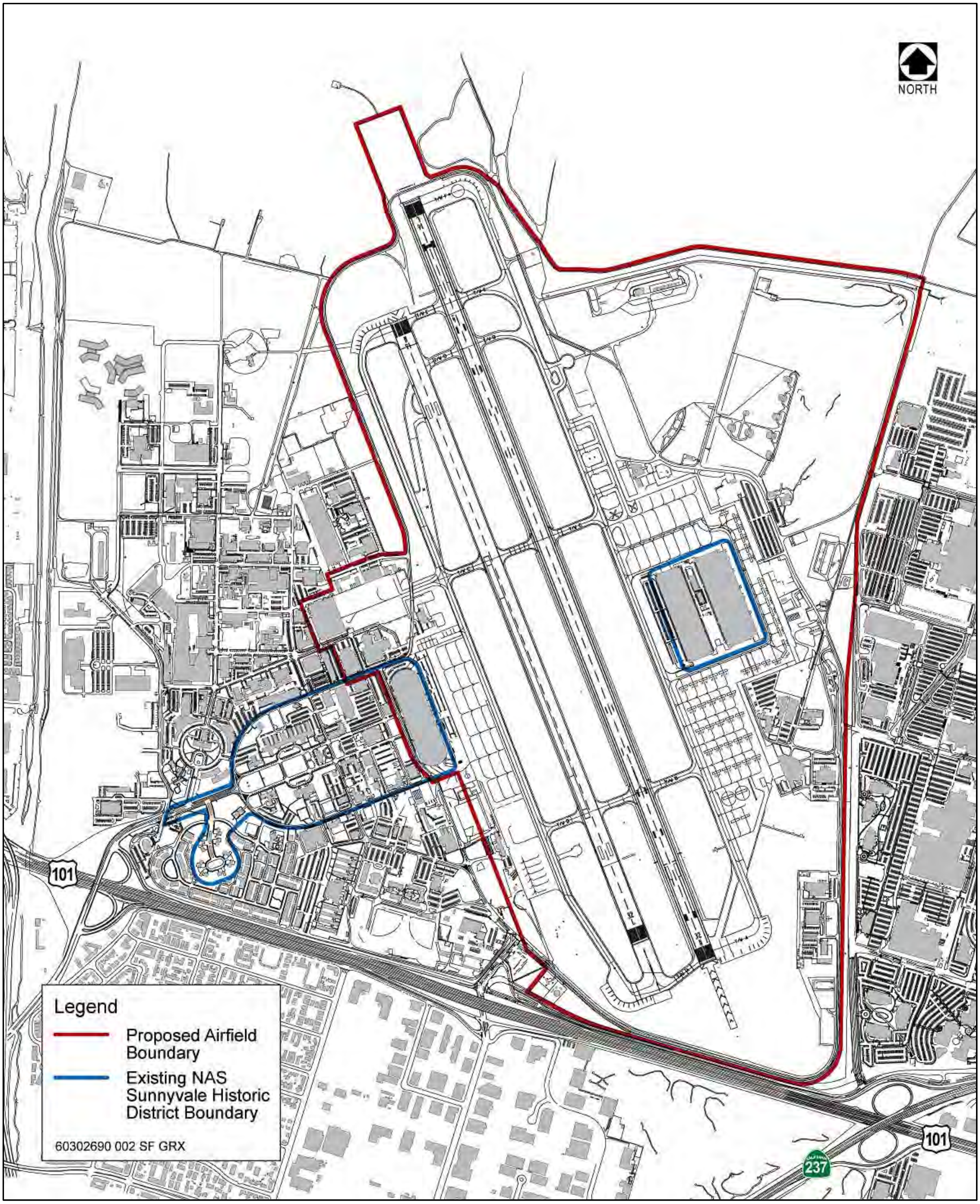
In 2013, NASA submitted a statement of significance for Moffett Federal Airfield to the SHPO and the Advisory Council on Historic Preservation (ACHP). NASA determined that the airfield and its component features were eligible for the NRHP under Criterion A as contributors to the NAS Sunnyvale (Shenandoah Plaza) Historic District, with an additional period of significance of 1942–1961, reflecting the jet aircraft program at the airfield. The SHPO concurred on June 6, 2013, that the airfield contributed to the significance of the NAS Sunnyvale Historic District (see Appendix B). In addition, the SHPO recommended that NASA develop a list or table of contributors to the district, specifying the character-defining features of the airfield, including landscape design. The nomination was not formally updated to include these areas.

At NASA's request and under the SHPO's recommendations, AECOM prepared the *Historic Property Survey Report for the Airfield at NASA Ames Research Center, Moffett Field, California* in 2013. The object of that study was to evaluate the airfield as a landscape, and to evaluate its eligibility and integrity. The study recommended the augmentation of the NAS Sunnyvale Historic District boundary to include the adjacent airfield (Figure 4). The 2013 Airfield study included a statement of significance for the airfield:

> The Airfield is nationally significant under Criterion A as the central core facility of aviation-related research programs, as well as significant transport, training, and other aviation uses at the property. The Airfield's landscape is composed of a collection of buildings and structures that contribute to the adjacent NAS Sunnyvale Historic District under Criterion A. The Airfield's inclusion in the existing historic district expands the district's currently defined significance to include World War II and ongoing use of the Airfield for Cold War–era NACA, NASA, and military missions.

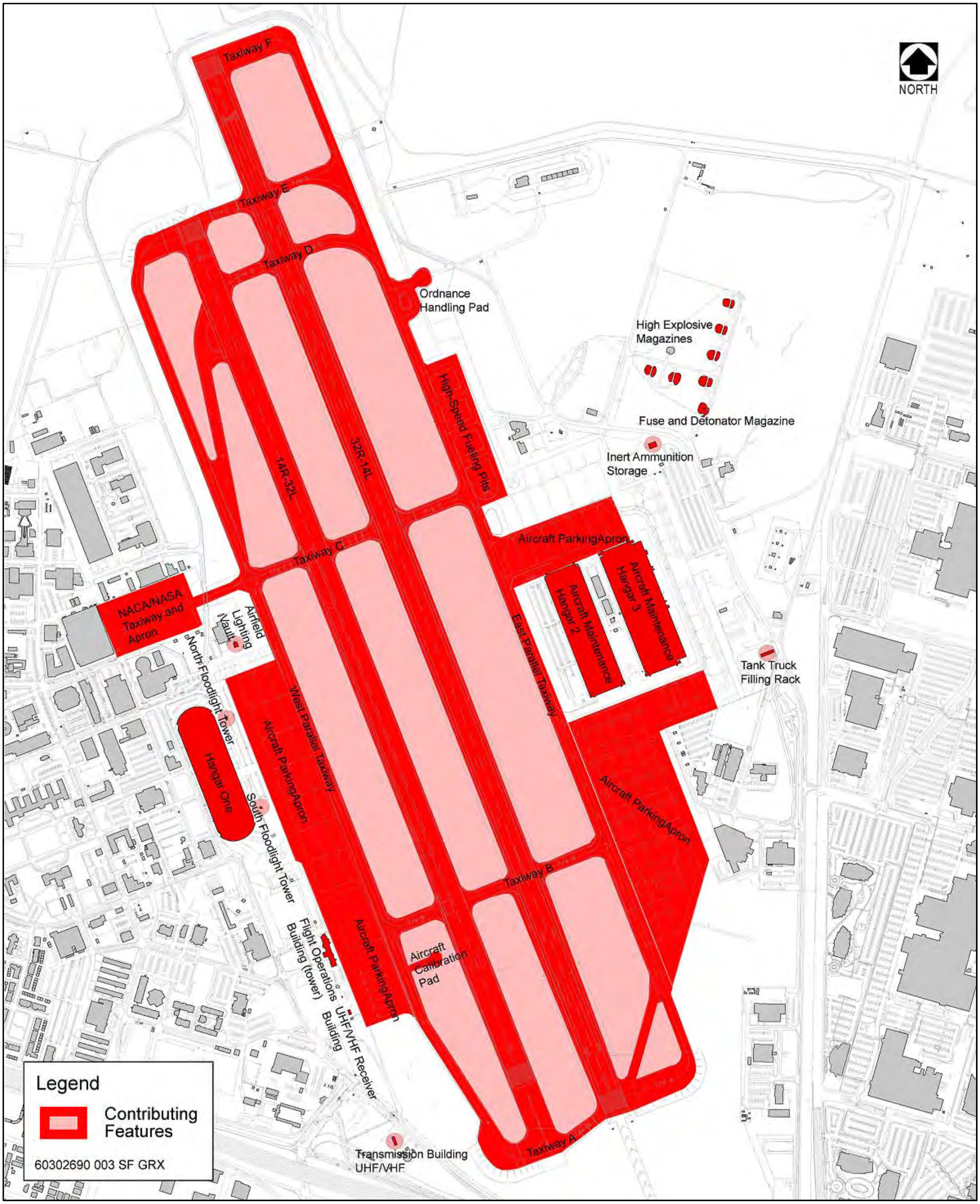
The evaluation also recommended a comprehensive period of significance of 1930–1961 for the NAS Sunnyvale Historic District to include significant post-World War II operations of the airfield (AECOM 2013).

The 2013 Airfield study identified a preliminary list of airfield features that could potentially contribute to the expanded NAS Sunnyvale Historic District that was based on general association and age related to the revised period of significance (Figure 5) (AECOM 2013).




Source: Data compiled by AECOM in 2013

**Figure 4**
**Proposed Revised Boundary, NAS Sunnyvale Historic District**




Source: Data compiled by AECOM in 2013

**Figure 5**
**Preliminary Map of Contributing Airfield Features**

However, these features were not fully evaluated for the NRHP and did not receive a determination of eligibility, and the SHPO did not provide a response regarding concurrence with the 2013 study's preliminary list of airfield features.

The APE includes five resources that were preliminarily identified as airfield features (AECOM 2013):

- Building 69, Inert Ammunition Storage
- Building 141, Tank Truck Filling Rack
- MF1002, Aircraft Parking Apron
- MF1003, High-Speed Aircraft Fueling Pits
- MF1016, Aircraft Taxiway Pavement

Of these resources, Building 141 and MF1003 are part of the DFSP, and are aircraft fueling features. The study pointed out that many of the fueling features were no longer operational and their individual conditions and historic integrity had not yet been determined (AECOM 2013). Secondary features including pipes, valves, and control features associated with former fueling systems were not evaluated because of the limited availability of information about their potential for significance and integrity (AECOM 2013).

An intensive architectural survey of the APE was conducted on March 21, 2016, by M.K. Meiser, M.A., an architectural historian who meets the Secretary of the Interior's Professional Qualifications Standards for Architectural History and History (36 CFR Part 61). The survey identified 15 resources, including previously surveyed features of the airfield and other resources over 50 years old, within the APE (Table 1). The remaining buildings and structures in the APE are not yet 50 years old or do not exhibit the potential for exceptional significance and, therefore, were not included for further evaluation. Of the 15 resources, three resources are listed in the NRHP as contributors to the NAS Sunnyvale Historic District, eight resources are features of the DFSP fueling facility, and the remaining four resources are miscellaneous features of the airfield.

**Resource Descriptions**

***NAS Sunnyvale Historic District***

The NAS Sunnyvale Historic District was listed in the NRHP in 1994 under Criteria A and C in the areas of Architecture and Engineering/Military with a period of significance of 1930–1935 and 1942–1946 (Urban Programmers 1994). The NAS Sunnyvale airfield (now known as Moffett Federal Airfield), including runways, taxiways, and other features, was excluded from the original district boundary, but was found eligible in the 2013 Airfield study as a contributor to the NAS Sunnyvale Historic District (AECOM 2013). This evaluation found that the airfield and its contributing elements were nationally significant under Criterion A as the central core facility of aviation-related research programs. The reevaluation also recommended that the period of significance be revised to 1930–1961 to include early 1950s jet operations, as well as the National Advisory Committee for Aeronautics and early NASA missions during the Cold

**Table 1. Historic Architectural Resources Identified in the APE**

| Building No. | Historic Name (Current Name) | Year Built | Previous NRHP Evaluation |
|---|---|---|---|
| 46 | Hangar 2 | 1942 | Listed (NAS Sunnyvale HD) |
| 47 | Hangar 3 | 1942 | Listed (NAS Sunnyvale HD) |
| 55 | Boiler House (Hangars 2 and 3) | 1943 | Listed (NAS Sunnyvale HD) |
| 69 | Inert Ammunition Storage | 1943 | Potential Character-Defining Feature of Contributor (2013 Airfield Study) |
| 137 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible (1999 Cold War Study) |
| 138 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible (1999 Cold War Study) |
| 139 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible (1999 Cold War Study) |
| 140 | Aircraft Fuel Storage Tank* | 1952 | Not Eligible (1999 Cold War Study) |
| 141 | Tank Truck Filling Rack* | 1952 | Not Eligible (1999 Cold War Study); Potential Character-Defining Feature of Contributor (2013 Airfield Study) |
| 169 | Vehicular Bridge* | 1953 | Not Evaluated |
| 439 | Aircraft Wash Rack | 1942 | Potential Character-Defining Feature of Contributor (2013 Airfield Study) |
| 953 | Aircraft Ready Fuel Day Tank and Pumping Station* | 1956 | Not Eligible (1999 Cold War Study) |
| MF1002 | Aircraft Parking Apron | 1945 | Potential Character-Defining Feature of Contributor (2013 Airfield Study) |
| MF1003 | High-Speed Aircraft Fueling Pits* | 1955 | Potential Character-Defining Feature of Contributor (2013 Airfield Study) |
| MF1016 | Aircraft Taxiway (East Parallel) | 1945 | Potential Character-Defining Feature of Contributor (2013 Airfield Study) |

*feature of the Jet (DFSP) Fueling Facility

War (AECOM 2013). Contributors to the NAS Sunnyvale Historic District that are listed in the NRHP include Hangars 2 and 3 and Building 55. Four other features of the airfield were identified in the 2013 Airfield study as potential contributing features to the NAS Sunnyvale Historic District.

*Buildings 46 and 47 – Hangars 2 and 3*

Hangar 2 (Building 46) and Hangar 3 (Building 47) are monumental features of the NAS Sunnyvale Historic District located on the east side of Moffett Airfield (Plate 2). Built in 1942, these twin structures are redwood-framed blimp hangars characterized by immense porticoes at their north and south ends. The buildings are listed in the NRHP as contributors to the NAS Sunnyvale Historic District. According to the NRHP nomination, the hangars are listed under Criteria A and C, as excellent examples of WWII-era blimp hangars, and are “significant more for their size than their unique styling or design… The more common design does not, however, detract from the sheer magnitude of the two huge buildings side by side. Along with Hangar #1, these two buildings help define the south San Francisco Bay Area from all distant directions” (Urban Programmers 1994).

**Plate 2. Hangar 3 (Hangar 2 behind), view facing northwest from Building 141**

*Building 55 – Boiler House*

The Boiler House (Building 55) is an associated feature of Hangars 2 and 3, located between the structures (Plate 3). It is listed in the NRHP as a contributor to the NAS Sunnyvale Historic District (Urban Programmers 1994). It served as the heat plant for Hangars 2 and 3.

**Plate 3. Building 55, view facing northwest**

*Building 69 – Inert Ammunition Storage Building*
Building 69 is a utilitarian storage facility with a rectangular plan, board-formed concrete walls, and a side-gabled roof covered with corrugated asbestos sheets (Plate 4). The north side of the building has a single entrance with reinforced metal double doors above a raised concrete platform or loading dock with steps and a ramp. The building has minimal fenestration, with two clerestory windows on the north and south sides of the building, and one each in the east and west sides of the building. The windows contain four-light, wood-framed sash. The building features two vents at the ridgeline. Built in 1943, Building 69 was constructed for inert ammunition storage. It continues to be used for storage.

*Building 439 – Aircraft Wash Rack*
This facility consists of a concrete slab, a metal shed structure, and washing equipment (Plate 5). Although originally built circa 1942, this facility has been rebuilt in recent decades and does not retain any discernible period features.

**Plate 4. Building 69, view facing southeast**

**Plate 5. Building 439, at left, view facing southeast**

*MF1002 – Aircraft Parking Apron*
This feature is a concrete apron used for aircraft access to Hangars 2 and 3, maintenance, and parking (Plate 6). The apron pad was added to the airfield in 1945.

**Plate 6. MF1002, apron adjacent to Hangars 2 and 3, view facing southwest**

*MF1016 – Aircraft Taxiway (East Parallel Taxiway)*
MF1016 is the East Parallel Taxiway that is a perimeter aviation circulation feature of the airfield (Plate 7). The taxiway consists of asphalt pavement at grade and extends along the eastern edge of the airfield adjacent to Hangars 2 and 3.

***Jet Fueling Facility***
The jet fueling facility (later known as the DFSP) includes a series of pipelines, tanks, valves, and pumps that once distributed fuel from the fuel dock on Guadalupe Slough to the airfield. Primary aboveground features of the DFSP include the fuel farm (Buildings 137–140); the tank truck filling rack (Building 141); a vehicular bridge (Building 169); the day tank area (Building 953); and four high-speed aircraft fueling pits and hydrants (MF1003). In addition, the facility includes underground pipelines and associated control features that extend from the fuel dock to the fuel farm, from the fuel farm to the filling rack and day tank area, and from the day tank area to the high-speed fueling pits along the east side of the airfield (see Figure 3). Two parallel 10-inch-diameter pipelines once extended 7,038 feet from the fuel dock to the fuel farm, although a portion of the pipelines between the fuel dock and the North Channel over wetland areas was removed in 2012. (The fuel dock [Building 167] was determined not eligible for the NRHP in 1999 [SAIC 1999] and the pipelines were subsequently removed after NASA

determined that the removal would not result in an adverse effect and completed review under the Programmatic Agreement between NASA, the SHPO, and ACHP, which expired in 2012.) Another 6-inch-diameter pipeline extends 1,165 feet from the fuel farm to Building 141. Additional 8-inch-diameter pipeline extends from 2,100 feet from the fuel farm to the day tank. From the day tank to the fueling pits, parallel 6-inch- and 14-inch-diameter pipelines extend 2,270 feet. The DFSP also connected to the NASA fuel facility, which is located on the west side of the airfield, via a 3,690-foot-long 8-inch-diameter pipeline that crosses beneath the taxiways and runways of the airfield, but was removed in 2009. Primary features of the DFSP in the APE are described below.

**Plate 7. MF1016, taxiway pavement, view facing southwest**

*Buildings 137–140 – Aircraft Fuel Storage Tanks*

Buildings 137–140 are four USTs located in the fuel farm (Plate 8). The fuel farm is a fenced area that contains the bulk storage tanks, pumps, an emergency generator, and containment kits. The series of USTs form a wide mound. The USTs are 14-foot-high round tanks with an 88-foot diameter, and each has a 15,170-barrel capacity. The tanks have concrete pad foundations and caps. Each tank is equipped with manual and automatic tank gauging equipment, an access manhole, issue and receipt valves, a motorized main pump, a sump pump, a visual alarm, and an automatic high-level shut-off valve located in pits atop each tank (Parsons 1996). Above each tank, a series of valves and controls are housed beneath sheds. Each shed consists of a steel frame enclosed with chainlink fencing and covered with corrugated metal roofing. Each shed has a single metal-grill door. The tanks are connected to the fuel farm pipeline manifold that connects to the pipeline system extending from the fuel dock and leading to Building 141 and MF1003 at the airfield.


**Plate 8. Sheds housing UST controls (Buildings 137–140), view facing north**

*Building 141 –Tank Truck Filling Rack*

The truck filling rack was constructed in 1952 (Plate 9). The facility is a utilitarian shed structure with steel framing and a corrugated metal pent-gabled roof. The rack has three drive-through bays for filling trucks and pipelines extending beneath the roof to each filling station. The building also has an operator's booth and extensive equipment for the control of the fuel. One bay in the truck filling rack was upgraded circa 2000 with modern equipment prior to closure.

*Building 169 – Vehicular Bridge*

Building 169 is a vehicular bridge that carries East Patrol Road and the DFSP pipelines over North Channel to a 0.75-mile jetty over wetlands and salt evaporation ponds leading to the former fuel dock on Guadalupe Slough (Plate 10). The bridge has concrete abutments, a wood plank deck, and wood rails. The deck has been modified with the addition of reinforced metal grating gauged for heavy vehicular traffic, and additional wood rails have been installed on each side of the deck.

**Plate 9. Building 141, view facing west**

**Plate 10. Building 169 (Bridge), view facing northeast**

*Building 953 – Aircraft Ready Fuel Day Tank and Pumping Station*

The day tank area is a fenced area that contains a 2,750-barrel UST for JP-8 aviation fuel and a pumping station (Building 953), a contaminated fuel storage tank, and a pit containing three transfer pumps (Plate 11). There is also an electrical substation located in the area. The facility processed jet fuel from the fuel farm for delivery to the airfield fueling pits and hydrants (MF1003) and the NASA fuel facility on the west side of the airfield. The UST is contained within an earthen and gravel mound. The day tank is equipped with manual and automatic tank gauging equipment, an access manhole, issue and receipt valves, an automatic high-level shutoff valve, and high-level and low-level sensor and audio and visual alarms (Parsons 1996). Controls for the tank are located above the tank and housed beneath a shed structure. The shed structure consists of a steel-framed shed with a corrugated metal roof. The day tank area includes the contaminated fuel removal system tank, which is a concrete, curbed containment structure with a capacity of 5,000 gallons.


**Plate 11. Building 953, view facing south (Hangars 2 and 3 in the background)**

*MF1003 – High-Speed Aircraft Fueling Pits*

MF1003 consists of four high-speed fueling pits located at the airfield, adjacent to the east parallel taxiway and the parking apron north of Hangars 2 and 3 (Plate 12). The fueling pits consist of four concrete pads surrounded with concrete berms with fueling hydrants at-grade (Plate 13). Four original fuel hydrants were installed by 1956, but were removed and are now capped. Four high-speed fuel hydrant stations were constructed in two phases; originally in 1976 and reconfigured in 1983 to replace the original skid-mounted hydrant stations. The original hydrants were located northeast of the existing hydrant stations, in the center of each aircraft lane. The 1983 fuel hydrants were each equipped with a fire shutoff valve, strainer, filter/separator, control/emergency valve, static-retention chamber, deadman control, two surge suppressors, flow meter, venture, and a header connecting to three different nozzles for a pantograph and pressure refueling hose, a gravity refueling hose, and an additional spare nozzle (Parsons 1996). In the 1990s, four of the fuel hydrants were capable of high-speed pressure refueling and over-the-wing gravity refueling (Parsons 1996). The hydrants were removed circa 2003, although some of the surficial elements of the infrastructure (valves, piping, etc.) remain.


Source: Google Earth

**Plate 12. Aerial photograph of MF1003 (square pads at center)**

**Plate 13. Aboveground fueling pits infrastructure (hydrants removed), view facing north**

**Resource Evaluations**

To be eligible for listing in the NRHP, a property must be at least 50 years old and possess significance in American history and culture, architecture, or archaeology to meet one or more of four established NRHP criteria (36 CFR 60.4) through:

A. Association with events that have made a significant contribution to the broad patterns of our history;

B. Association with the lives of persons significant in our past;

C. Embodiment of 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 components may lack individual distinction; and/or

D. Have yielded, or may be likely to yield, information important in prehistory or history.

Historic resources eligible for listing in the NRHP are considered "historic properties," and may include buildings, sites, structures, objects, and historic districts. A potential historic property less than 50 years of age may be eligible under NRHP Criteria Consideration G if it can be demonstrated that sufficient time has passed to understand its historic importance (National Register Bulletin 15, page 43). In addition to meeting one of the NRHP criteria, a property must also retain integrity to be considered eligible for NRHP listing. The NRHP recognizes seven aspects or qualities that, in various combinations, define integrity: feeling, association, workmanship, location, design, setting, and materials (National Register Bulletin 15, pages 44–45).

***NAS Sunnyvale Historic District***

The NAS Sunnyvale Historic District is listed in the NRHP, including its contributors Hangars 2 and 3, and Building 55. These buildings have not been significantly altered since the district was listed in 1994, and they retain integrity to remain listed in the NRHP.

As described above, the SHPO concurred with NASA that the airfield contributed to the significance of the NAS Sunnyvale Historic District, and was, therefore, eligible for the NRHP. Contributing features to the NAS Sunnyvale Historic District associated with the airfield were preliminarily identified, but not fully evaluated for NRHP eligibility (AECOM 2013). Historic features of the airfield were identified as those "directly associated with the facility's core aircraft, transport, research, maintenance, and training mission, which has evolved throughout its history. These features include those used to support operations involving dirigibles, balloons, airplanes, rotorcraft, and jets. The facilities directly associated with this use include circulation features used by aircraft, such as runways, taxiways, parking and repair aprons, and compass calibration pads; buildings used to house aircraft, such as hangars; and buildings and structures directly involved in aviation operations, such as the fuel transport and storage system, repair shops, control towers, and aids to navigation (such as airport lighting)" (AECOM 2013).

The aircraft parking apron (MF1002) and aircraft taxiway (MF1016) are aviation circulation features that are directly associated with the aviation mission of the airfield dating to 1945 and the early transition of Moffett Field to accommodate jet aircraft immediately following World War II. These features were previously identified as contributing to the airfield (AECOM 2013). These features do not possess individual significance based on associations, design or construction techniques, or potential for historical information (NRHP Criteria A through D). However, as aviation circulation components, they are character-defining features of the airfield, which is in turn a contributor to the NAS Sunnyvale Historic District. Therefore, MF1002 and MF1016 are eligible for the NRHP as character-defining features of a contributor to the NAS Sunnyvale Historic District.

Built in 1943, Building 69 was constructed for inert ammunition storage. Building 69 is a utilitarian, board-formed concrete structure that served a support function to the installation and its mission, and was obsolete for the purposes of inert ammunition storage before the end of World War II. It is located in an isolated area to the north of Hangar 3. Individually, it does not exhibit significance based on associations, design or construction techniques, or potential for historical information (NRHP Criteria A through D). Furthermore, the building is not directly associated with the airfield's core aircraft, transport, research, maintenance, and training mission. The building dates to the period of significance of the NAS Sunnyvale Historic District but does not have significant associations with the qualities that make the district eligible for the NRHP. The building is intact and retains integrity of location, design, materials, workmanship, feeling, and association, with a minimally diminished setting. However, it does not possess the associations necessary to be a character-defining feature of the airfield, or a contributor to the NAS Sunnyvale Historic District. It is not eligible for the NRHP.

Building 439, the Aircraft Wash Rack, was originally built circa 1942 but has been substantially altered and does not retain any discernible period features. It was previously identified as not eligible individually or as a contributing feature of the airfield (AECOM 2013). Due to substantial loss of integrity, this facility does not convey its historical associations, is not a character-defining feature of the airfield, and does not contribute to the NAS Sunnyvale Historic District. It is not eligible for the NRHP.

***Jet Fueling Facility***

Completed in 1953, construction of the jet fueling facility was part of a major effort to expand the airfield’s capacity to accommodate jet aircraft during the Cold War era. The facility is associated with the Cold War build up at NAS Moffett Field as it became an important jet aircraft base, and it supported the aviation mission as a supply system to the airfield. The facility served a utilitarian and prosaic function, providing fuel through various truck and aircraft fueling stations around the airfield. While it represents the modern upgrade of airfield facilities to meet a new supply need related to jet aircraft in the early 1950s, the resource was not an integral factor in the development of the jet aircraft program at Moffett Field, which began in 1945 and terminated in 1961. It does not exhibit historical importance as a fuel supply system within the context of the development of the airfield or jet aircraft. Because of this, the fueling facility does not appear to meet NRHP Criterion A.

Research about the jet fueling facility has not revealed a specific association with a historically significant person. It does not appear to meet NRHP Criterion B.

The design and construction of the jet fueling facility represents the industrial methods of the 1950s. The steel pipelines, at 14-inch-, 10-inch-, 8-inch-, and 6-inch-diameter, are standard gauge pipes made from common materials. The USTs are constructed with concrete pads, tops, and lining, and steel siding, which is a typical design for fuel USTs. Building 141, the truck filling rack, has a utilitarian design including a corrugated metal gabled canopy and steel supports between the three filling bays. The piping and filling equipment, consisting of pipes, valves, and pumps, are standard issue elements, and do not represent a unique design. One component of the jet fueling facility, the high-speed fueling pits (MF1003), was at the forefront of jet aircraft refueling technology at the time it was installed in 1976 and reconfigured in 1983. While the high-speed fueling pits and hydrants have more technological significance related to the jet aircraft program at the airfield, they do not date to the period of significance related to the jet aircraft program at the airfield. In addition, these were not unique fueling hydrants within the Navy’s jet aircraft programs in the 1970s and 1980s. The fueling facility as a whole system, including the former fuel dock, pipelines, fuel farm, day tank area, truck filling rack, and other elements, was not exceptionally engineered as a unique or groundbreaking system. Other, more significant DFSP fueling facilities that serviced the Navy’s jet aircraft technology were also built earlier or in the same era, including the DFSP at San Pedro, California, with 34 USTs that continues to distribute jet fuels for military use. The design, construction, and technology associated with the jet fueling facility at Moffett Federal Airfield does not qualify it under NRHP Criterion C.

The jet fueling facility is well documented through photographs, original drawings and plans, and frequent maintenance records of the pipelines, USTs, day tank area, truck filling rack, and high-speed fueling pits. It is not likely to yield additional historical information that would qualify it under NRHP Criterion D.

Although the jet fueling facility does not meet NRHP criteria for eligibility as an individual resource, components of the system were identified in the 2013 Airfield study as potential character-defining features of the airfield landscape, which in turn was determined eligible for the NRHP as a contributor to the NAS Sunnyvale Historic District under an expanded period of significance of 1930 to 1961. The airfield, through its evolution as NAS Sunnyvale in the 1930s and NAS Moffett Field during World War II, and its associations with the NACA and NASA, was identified as an important aviation training, research, and development facility. In the postwar era, the airfield continued to be on the forefront of aviation technology development, including the development of jet aircraft at the designated master jet base from 1953 until 1961. The 2013 Airfield study identified Building 141, the truck filling rack, and MF1003, the high-speed fueling pits, as potential character-defining features of the airfield. However, the 2013 Airfield study did not evaluate the significance or assess the integrity of these features. The current study revisited these features for further evaluation and to assess their integrity.

Building 141, the truck filling rack, was completed in 1952 and served as a fueling station for large tank trucks that transported fuel from the rack to stations around the airfield. It was determined not eligible for the NRHP in 1999 (SAIC 1999; see Appendix B). The truck filling rack was closed in 2003. The utilitarian structure has undergone few alterations to the canopy and frame of the shed structure. The filling station equipment in each bay has been modified and upgraded over the years, with the most notable alteration being the replacement of the easternmost filling station with new equipment circa 2000. Its supply lines were closed in 2003. Overall, the truck filling rack conveys its historical appearance and purpose. However, the truck filling rack did not have a direct association with the jet aircraft program at the airfield, and does not represent a character-defining feature of the airfield in association with that mission. Building 141 is a minor feature of the airfield and does not exhibit a high level of historical significance related to the airfield and its aviation mission, and is not a character-defining feature of the airfield.

MF1003, the high-speed fueling pits, were not initially identified in the field survey of the 2013 Airfield study, most likely due to the prior removal of the fuel hydrants. The facility was identified due to its original construction date of 1955–56 within the period of significance for the airfield (1930 to 1961). This feature had a direct association with the aviation mission of the airfield. However, the high-speed fueling pits have undergone substantial changes since first constructed. The four original fuel hydrants were removed and their connections to the pipeline permanently capped. In addition, the facility was substantially changed with the introduction of four new fueling stations in 1976, and further reconfiguration in 1983. Most recent changes to the high-speed fueling facility included the removal of the 1983 fuel hydrants for closure in 2003. Due to the substantial alterations in materials and association, this facility does not retain sufficient integrity to convey its historical significance, and therefore, is not a character-defining feature of the airfield.

In summary, the jet fuel facility does not appear individually eligible for the NRHP, and the components of the jet fuel facility that were previously identified as potential character-defining features of the airfield either do not possess the level of significance to be contributing or do not retain sufficient integrity to be eligible as character-defining features of the airfield, which is a contributor to the NAS Sunnyvale Historic District.

# ASSESSMENT OF EFFECTS

The Criteria of Adverse Effect pursuant to 36 CFR 800.5(a)(1) are applied to assess effects of the undertaking on historic properties within the APE:

> (1) Criteria of adverse effect. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

## IMPACTS DISCUSSION

The APE contains contributors to the NAS Sunnyvale Historic District that are listed in or eligible for the NRHP. The APE is located at Moffett Federal Airfield, within an area of the airfield that has been determined eligible for the NRHP for its contributions to an expanded NAS Sunnyvale Historic District (see Appendix B). Hangars 2 and 3, and Building 55 are listed contributors and the airfield (Moffett Field) is an eligible contributor to the NAS Sunnyvale Historic District. Character-defining features of the airfield in the APE besides the listed properties are MF1002 and MF1016. No archaeological resources were identified in the APE.

Under the project, approximately 7 acres would be disturbed. Several segments of pipeline (4,443 lineal feet), the fuel farm (four USTs and associated equipment), and day tank area (one UST and associated equipment) would be excavated and removed. Another 4,102 lineal feet of pipeline and the Truck Filling Stand (Building 141) would be cleaned, closed permanently, and abandoned in place. Surficial elements of the high-speed fueling pits (MF1016) would be removed. The project would not be feasibly reversible, including removal or abandonment in place of the DFSP.

Historic properties identified in the APE will not be directly impacted by the project. Although adjacent to the project, the potential for indirect impacts through the visual or contextual change resulting from the removal of subsurface pipelines and tanks and aboveground features of the fuel farm and day tank area are minimal. These potential is minimal due to the scale and visibility of these structures within the visual context of the NAS Sunnyvale Historic District or its contributors, Hangars 2 and 3, Building 55, and the airfield. The visual context and setting of the historic district are anchored in the formality and symmetry of the Spanish Colonial Revival-style Shenandoah Plaza campus, the utilitarian character and expansive hardscape of the airfield, and punctuated by the massive, iconic, and futuristic Hangar 1. The east side of the airfield is also dominated by Hangars 2 and 3. Hangars 2 and 3 are massive structures, and Building 55 is located between them. The project will not significantly change the setting or any other integrity aspect of Hangars 2 and 3 or Building 55, and will have no adverse effect on these historic properties. Changes to smaller-scale, non-contributing buildings, structures, or features that are in secondary areas of the airfield are unlikely to have an impact on the integrity of the overall district or its primary contributors.

The airfield is an eligible contributor to the NAS Sunnyvale Historic District. The airfield includes the expansive network of runways, taxiways, hangars, and other features related to the aviation missions at Moffett Field in the expanded period of significance from 1930 to 1961. In addition, the airfield's setting reflects its continuous evolution to serve changing aviation missions since the 1930s, including modifications over time to accommodate new types of aircraft and the airfield expansion in the early 1950s through current ongoing changes (AECOM 2013). These changes allowed the airfield to remain at the forefront of scientific and aviation research and permitted its continuing use. The airfield is "defined to a great degree by its continuous evolution to serve the needs of aviation research for nearly a century. The layout of aviation areas has been modified over time to accommodate new types of aircraft and allow the facility to continue to carry out its historic mission of cutting-edge aviation research" (AECOM 2013). As the 2013 Airfield study pointed out, upgrading obsolete aviation features to continue the mission of the Airfield does not have the same negative impacts to integrity that would occur should unrelated new construction destroy historic aviation features (AECOM 2013). Elements of the airfield in the APE that are considered character-defining include MF1002, an aircraft parking apron, and MF1016, an aircraft taxiway. The project will not have direct impacts on these two aviation circulation features of the airfield landscape, and will not indirectly impede their ability to convey their significance related to the airfield.

Overall, the project would not diminish the integrity of the NAS Sunnyvale Historic District as a whole, or any of its characteristics that qualify the property for inclusion in the NRHP. The enlarged district is characterized by its monumental hangars (Hangars 1, 2 and 3), its Spanish Colonial architecture at Shenandoah Plaza, and its associations with aviation missions at the airfield. While the jet fueling facility supported the jet aircraft aviation mission, it is not a character-defining feature of the airfield, and is not a contributor to the district. As an active technological research facility, a greater degree of flexibility when considering changes to support ongoing uses is appropriate, as reflected in guidance in the Advisory Council for Historic Preservation's (ACHP) 1991 *Balancing Historic Preservation Needs with the Operation of Highly Technical or Scientific Facilities* (ACHP 1991) that accounts for the changing nature of scientific research facilities. Periodic modifications to the research facilities are necessary for these facilities to continue their functions and maintain their significance under the NRHP Criteria. The historic properties would continue to convey their historical significance, and their integrity of location, design, materials, workmanship, and association, would not be diminished. Therefore, the project would result in no adverse effect.

An archaeological inventory was completed and no archaeological resources were identified. Although no archaeological resources were identified, the project would have the potential to affect unknown subsurface archaeological resources through excavation related to removal of subsurface elements of the DFSP. Excavation would not exceed the depth or width of the existing pipelines, to an approximate maximum depth of 10 feet in some areas. If there are no objections from the SHPO, NASA will allow the excavation to proceed without further action or monitoring, except responding to the inadvertent discovery of archaeological deposits. In the event there is an inadvertent discovery of archaeological resources during the project, NASA would follow its best practices for unanticipated discoveries as outlined in Standard Operating Procedure 8: Inadvertent Discoveries in the 2014 Draft Integrated Cultural Resources Management Plan (AECOM 2014).

## CONCLUSION

As a result of this evaluation, MF1002, an aircraft parking apron, and MF1016, an aircraft taxiway, are recommended as character-defining features of the airfield, which is an eligible contributor to the NAS Sunnyvale Historic District under NRHP Criterion A.

As a result of the assessment of effects, it appears that the project will have no adverse effect on the NAS Sunnyvale Historic District as a whole, or its contributors located in the APE, including Hangars 2 and 3, Building 55, and the airfield. The significance of these historic properties is associated with aviation missions related to several themes, including the Navy dirigible and LTA operations, the Army Air Corps's research and mission, Navy transport operations, and Navy jet aircraft operations. The project proposes the permanent closure and partial removal of the DFSP, historically the jet fueling facility, which served a supporting utilitarian function of the airfield during the period of significance from 1953 to 1961, and was closed in 2003. Due to its support function and the compromised integrity of some of its significant components directly related to the aviation mission of the airfield, the jet fueling facility does not appear eligible for listing in the NRHP individually, as a contributor to a historic district, or as a character-defining feature of the airfield. In applying the Criteria of Adverse Effect and the ACHP's guidelines for considering the changing nature of highly technical facilities in assessing the effects of project activities, it appears that a finding of no adverse effect is appropriate.

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# APPENDIX A

# PREPARERS' QUALIFICATIONS

AECOM

# Trina Meiser, MA

### Senior Historic Preservation Planner

## Areas of Expertise

Architectural History
Historic Architectural Assessment
Historic Preservation Planning
NHPA Section 106 Consultation
NEPA Compliance
CEQA Compliance

## Education

MA, Historic Preservation Planning, Cornell University

BA, History, Kenyon College

Trina Meiser is a historic preservation planner and meets the Secretary of Interior's qualifications (36 CFR Part 61) in architectural history and history. Ms. Meiser has more than 10 years of experience in identifying and planning for cultural resources, including historic structures, districts, and landscapes. She specializes in technical analysis to support regulatory compliance, specifically under the California Environmental Quality Act (CEQA), Section 106 of the National Historic Preservation Act and the National Environmental Policy Act (NEPA). She conducts cultural resources studies, including inventory, survey, and evaluation reports; impacts analyses and findings of effect; National Register of Historic Places (NRHP) nominations; and Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER) documents. She consults on a variety of rehabilitation, transportation, energy, military, and community projects with clients, designers, and agencies. Her experience in historic preservation provides a strong understanding of federal, state, and local regulations and a thorough knowledge of the Secretary of the Interior's Standards for the Treatment of Historic Properties and their function in architectural design and historic preservation planning.

## Experience

**California High Speed Rail Authority, California High Speed Train Project, Merced to Fresno Segment, Central CA**
Inventoried and evaluated more than 400 properties in Merced, Madera, and Fresno Counties in compliance with CEQA and Section 106. Evaluations were conducted under a Programmatic Agreement between the State Historic Preservation Office and the California High-Speed Train Authority.

**Los Angeles County Metropolitan Transportation Authority (LACMTA) /FTA, Regional Connector Cultural Resources Mitigation Management Plan and HABS, Los Angeles, CA**
Under on-call contract, prepared mitigation management plan to fulfill requirements set forth in an MOA and EIS/EIR in compliance with CEQA and Section 106 for the project to connect two light-rail transit lines in downtown Los Angeles. Prepared HABS CA-2907 documentation of the Atomic Café in Little Tokyo, Los Angeles.

**LACMTA, Lankershim Depot Project, Los Angeles, CA**
Under on-call contract, provided consultation services and review of architectural plans and construction to determine whether the project to rehabilitate a late 19th century railroad depot is in adherence with the Secretary of Interior's Standards, in compliance with CEQA. Consultation services under LACTMA master contract.

**LACMTA, Los Angeles Union Station HVAC and Roofing Replacement Project, Los Angeles, CA**
Provided consultation services and review of architectural plans and construction to determine whether the project to replace the roof and mechanical systems of the historic train station is in adherence with the

Secretary of Interior's Standards, in compliance with CEQA. Consultation services under LACMTA master contract.

**LACTMA, South Bay Metro Green Line Extension Project, Los Angeles County, CA**
Conducted cultural resources technical studies for transportation project through metropolitan LA to meet Section 106 requirements. Prepared technical report and the cultural resources portion of the EIS/EIR in compliance with NEPA and CEQA, including mitigation measures for the treatment of evaluated historical resources.

**Expo Authority, Exposition Corridor Transit Project Phase 2, Los Angeles County, CA**
Prepared technical report for the evaluation of historical resources and the cultural resources portion of environmental impact statement/report under NEPA and CEQA. Elements for Section 106 consultation included the requesting determination of cultural resources and proposing mitigation measures for the treatment of historic properties.

**National Aeronautics and Space Administration (NASA), NASA Ames Research Center Integrated Cultural Resources Management Plan (ICRMP) and Center-wide Programmatic Agreement, Moffett Field, CA**
For NASA, preparing an ICRMP for the Ames Research Center, including the NAS Sunnyvale Historic District. Coordinating with NASA staff to develop best practices for the management of cultural resources. Also drafting the Programmatic Agreement between NASA, CA SHPO, and consulting parties for the streamlined treatment of historic properties.

**NASA, NRHP Nominations for Various Properties at Ames Research Center, Moffett Field, CA**
Preparing NRHP nominations for several properties at the Ames Research Center, including the new Ames Wind Tunnel Historic District, the Administration Building, and the Arc Jet Laboratory.

**Lowe Enterprises, LLC, Town and Country Redevelopment Project, San Diego, CA**
Preparing Historical Resources Technical Report according to the City of San Diego's guidelines for the evaluation of historical resources. This task includes evaluating several buildings with varying architectural styles and periods of significance, and the assessment of impacts to historical resources for an environmental impact report in compliance with CEQA.

**City of San Diego, World Trade Center Rehabilitation Project, San Diego, CA**
Evaluated the condition and integrity of the 1928 Art Deco-style San Diego Athletic Club. Prepared documentation in support of CEQA and Section 106 consultation on behalf of the City of San Diego under requirements of the Department of House and Urban Development.

**City of San Marcos General Plan Update, San Marcos, CA**
Assisted with the comprehensive update of the San Marcos General Plan for cultural resources. Assisted with the preparation of land use alternatives that preserve the City's character while allowing new pedestrian-friendly, mixed-use development in key focus areas of the City, and analyzed potential impacts to historic resources.

**California Department of Transportation (Caltrans), State Route 94 Express Lanes Project, San Diego, CA**
As project manager for cultural resources studies, conducted historic and archaeological surveys and evaluations of resources within the Area of Potential Effects for a segment of State Route 94 widening in a highly urbanized area of San Diego. Prepared Historic Property Survey Report and Historical Resources Evaluation Report to Caltrans standards, in compliance with CEQA and Section 106.

**Caltrans, State Route 76 Mission to Interstate 15 Historical Resources Evaluation Report, San Diego County, CA**
Conducted fieldwork to record and evaluate ranching buildings and residences. Prepared the Historical Resources Evaluation Report per Caltrans standards for the evaluation of historical resources for eligibility to the National Register and California Register, in compliance with CEQA and Section 106.

**Caltrans, Interstate 5/State Route 56 Project, San Diego, CA**
Conducted supplemental cultural resources studies for the project located in San Diego County. Surveyed resources within the Area of Potential Effects to analyze potential impacts to historical resources. Summarized findings in the Historical Resources Evaluation Report and Historic Property Survey Report per Caltrans standards, in compliance with CEQA and Section 106.

**Caltrans, Orangethorpe Avenue Grade Separation Project, Orange County, CA**
Conducted cultural resources studies for the project located in an urbanized area in the cities of Placentia and Anaheim in northeastern Orange County. Evaluated resources within an Area of Potential Effects to recommend eligibility to the National Register and California Register, and completed the Historical Resources Evaluation Report per Caltrans standards, in compliance with CEQA and Section 106.

**Caltrans, Raymond Avenue Grade Separation Project, Orange County, CA**
Conducted fieldwork to evaluate historic resources within the project's Area of Potential Effects located along a primary arterial highway in Fullerton. Completed the Cultural Resources Survey Report with recommendations on eligibility to the National Register and California Register, in compliance with CEQA and Section 106.

**County of San Diego, South Santa Fe Avenue Reconstruction Project – South Segment, San Diego County, CA**
Completed the Historic Property Survey Report and Historical Resources Evaluation Report per Caltrans standards to analyze resources and recommend eligibility to the National Register and California Register, in compliance with CEQA and Section 106.

**County of San Bernardino, Shadow Mountain Grade Separation Project, San Bernardino County, CA**
Prepared technical report for the evaluation of historical resources along a portion of Historic Route 66 in San Bernardino County. Evaluated more than 10 resources and assessed impacts to historical resources under CEQA.

**County of San Diego, Rancho Santa Fe Roundabouts Project, Rancho Santa Fe, CA**
Assessed significant impacts to the significant resource, the community of Rancho Santa Fe, in a Historical Resources Evaluation

Report Addendum and Historic Property Survey Report. Established the historic character-defining features to be preserved in compliance with the Secretary of Interior's Standards, in compliance with CEQA.

**County of San Diego, West Mission Bay Drive Bridge Project, San Diego, CA**
Conducted supplemental cultural resources studies for the bridge improvement project located in San Diego County. Surveyed resources within the Area of Potential Effects to analyze potential impacts to historical resources. Summarized findings in the Historical Resources Evaluation Report and Historic Property Survey Report per Caltrans standards.

**GSA, San Ysidro Land Port of Entry Historic Customs House Rehabilitation Project, San Diego, CA**
Consulted with architects to ensure environmental compliance with the Secretary of Interior's Standards in rehabilitation project design of NRHP-listed Historic Customs House. Prepared documentation for Section 106 consultation.

**US Navy, Naval Base Point Loma Integrated Cultural Resources Management Plan (ICRMP), San Diego, CA**
For NAVFAC, Southwest Division, prepared ICRMP for facilities at Naval Base Point Loma and evaluating World War II- and Cold War-era buildings. Coordinated with NAVFAC staff to develop best practices for the management of cultural resources on the naval base.

**US Navy, National Register Eligibility Assessment for Naval Base China Lake, China Lake, CA**
For Naval Facilities Engineering Command (NAVFAC) Southwest, recorded and evaluated various unrecorded buildings in the NRHP-eligible China Lake Pilot Plant Historic District at Naval Weapons Station China Lake for eligibility to the NRHP. Completed inventory forms and a technical report.

**US Veterans Administration, Veterans Affairs Medical Center (SFVAMC) Seismic Upgrade Project, San Francisco, CA**
Consulted with architects and designers for the rehabilitation and seismic retrofit of the 1930s-era Art Deco SFVAMC buildings. Evaluated design of new additions and alterations to contributing buildings to a National Register-listed historic district. Engaged in Section 106 consultation with the SHPO.

**US Coast Guard, Los Angeles Harbor Light Station Rehabilitation Project, San Pedro, CA**
Under IDIQ contract, evaluated potential adverse effects to NRHP-listed "Angel's Gate" lighthouse. Conducted historical research to determine historically significant and character-defining features. As consultant to US Coast Guard, prepared Finding of No Adverse Effect for Section 106 consultation.

**US Coast Guard, Cape Arago Lighthouse Mothballing Project, Chief's Island, OR**
Under IDIQ contract, prepared a Conditions Assessment with management recommendations for the Cape Arago Lighthouse as part of a mothballing plan. After assessing building materials of the lighthouse, applied technical guidance to identify appropriate treatments for preliminary maintenance prior to mothballing.

AECOM

# Jennifer Redmond, RPA

## Archaeologist

### Areas of Expertise

Historical Archaeology
NHPA Compliance
NEPA/CEQA Compliance

### Education

BA/Anthropology and Earth & Planetary Science/2003/University of California, Berkeley
MA/Cultural Resources Management/2009/Sonoma State University

### Licenses/Registrations

2011/Registered Professional Archaeologist (RPA)

### Years of Experience

| | |
|---|---|
| With AECOM | <1 |
| With Other Firms | 9 |

### Professional Associations

Society for California Archaeology (SCA)
Society for Historical Archaeology (SHA)

### Training and Certifications

2001/Geologic field school (University of California, Berkeley)
2001/Archaeological field school (University of California, Berkeley)
2002/Artifact illustration (University of California, Berkeley)
2004/Mine safety training (Molycorp)
2006/California Historical Resources Information System (CHRIS) internship (Sonoma State University)

Ms. Redmond has nearly ten years of experience in cultural resources management and archaeology throughout California and the Midwest. She conducts archaeological, archival, ethnographic, and historical research and directs field surveys and construction monitoring programs. She has extensive experience coordinating review on federal projects and ensuring compliance with the National Historic Preservation Act (NHPA), including determinations of eligibility, and the National Environmental Policy Act (NEPA). As an archaeologist, Ms. Redmond has assisted with and managed cultural resources programs in support of numerous NEPA and CEQA projects for clients in urban, rural, inland, and coastal settings in California.

### Experience

**Federal Emergency Management Agency (FEMA), 139 N. Main Street Acquisition/Demolition Project, Findlay, OH, 2015 (Environmental and Historic Preservation Specialist)** Coordinated environmental and cultural resources reviews and consulted with the Ohio State Historic Preservation Office, Ohio Emergency Management Agency, and other interested parties to mitigate adverse effects to a property previously listed on the National Register of Historic Places as a contributing element to the Findlay Downtown Historic District. Coordinated development of a Memorandum of Agreement (MOA) pursuant to Section 106 of the NHPA to resolve adverse effects.

**FEMA, Gays Mills Grade School Acquisition/Demolition Project, Gays Mills, WI, 2014-2015 (Environmental and Historic Preservation Specialist)** Coordinated environmental and cultural resources reviews and consulted with the Wisconsin State Historic Preservation Office, Wisconsin Emergency Management, and other interested parties to mitigate adverse effects to a property previously determined eligible for listing on the National Register of Historic Places. Coordinated development of an MOA pursuant to Section 106 of the NHPA to resolve adverse effects and completed archival research and recordation fieldwork to satisfy stipulations in the MOA.

**FEMA, Loyalsock Game Farm, Lycoming County, PA, 2012 (Historic Preservation Specialist)** Conducted archaeological and historical research, directed cultural resources monitoring during construction activities, and prepared Section 106 compliant documentation.

**FEMA, Holmes Run Sewer Replacement Project, Alexandria, VA, 2012 (Historic Preservation Specialist)** Conducted archaeological and historical research, directed cultural resources monitoring during construction activities, coordinated with construction crews and City of Alexandria Archaeology Museum staff, and prepared Section 106 compliant documentation.

**Forest Preserve District of Cook County, Cal-Sag Trail Expansion Project, Riverdale, Cook County, IL, 2011 (Archaeologist)** Assisted with fieldwork and laboratory analysis for Phase III excavation in advance of bicycle trail construction.

**Verizon Wireless, E. 550N Road Proposed Cell Tower Project, Gibson City, Ford County, IL, 2011 (Archaeologist)** Conducted archaeological, historical, and archival research; directed the Phase I archaeological survey; and prepared an Archaeological Survey Short Report.

**Verizon Wireless, 2350 W. Highway 176 Cell Tower and Access Route Project, Mundelein, Lake County, IL, 2011 (Archaeologist)** Conducted archaeological, historical, and archival research; directed the Phase I archaeological survey; and prepared an Archaeological Survey Short Report.

**enXco, Goose Lake-Memo Proposed Solar Facility Development Project, Kern County, CA, 2010 (Archaeologist/Cultural Resources Lead)** Conducted archaeological, historical, and archival research and consulted with local Native American tribal representatives. Directed the archaeological survey, and co-authored a cultural resources assessment report.

**enXco, Lost Hills-Dulgarian Proposed Solar Facility Development Project, Kern County, CA, 2010 (Archaeologist/Cultural Resources Lead)** Conducted archaeological, historical, and archival research and consulted with local Native American tribal representatives. Directed the archaeological survey, and co-authored a cultural resources assessment report.

**Caltrans, South Main Street and Soda Bay Road Widening and Bike Lanes Project, Lakeport, CA, 2009 (Archaeologist)** Assisted with fieldwork and laboratory analysis for Phase I and II excavations in advance of bicycle trail construction. Contributed to preparation of the Archaeological Survey Report (ASR), Extended Phase I (XPI), Phase II Archaeological Evaluation Report (AER), and Historic Property Treatment Plan (HPTP).

**Treasure Island Development Authority, Treasure Island Redevelopment Plan Project, San Francisco, CA, 2008 (Archaeologist)** Conducted archaeological, archival, ethnographic, and historic research for inclusion in an Archaeological Research Design and Treatment Plan (ARDTP).

**Forest City Residential Inc., Uptown Mixed-Use Project, Oakland, CA, 2007 (Archaeologist)** Assisted with laboratory analysis, historical research, and report preparation for CEQA compliance.

**Chronology**
08/15 – Present: AECOM, Archaeologist, Oakland, CA
10/11 – 06/15: Federal Emergency Management Agency, Environmental Protection Specialist/Historic Preservation Specialist, Chicago, IL
07/11 – 12/11: Illinois State Archaeological Survey, Archaeological Specialist, Rockford, IL

09/08 – 09/10: LSA Associates, Inc., Cultural Resources Analyst, Pt. Richmond, CA
06/06 – 10/08: Archeo-Tec, Consulting Archaeologist, Oakland, CA

**Contact Information**

AECOM
1333 Broadway, Suite 800
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Direct: 510.874.3265
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# APPENDIX B

# SHPO CORRESPONDENCE

STATE OF CALIFORNIA – THE RESOURCES AGENCY

GRAY DAVIS, *Governor*

**OFFICE OF HISTORIC PRESERVATION**
**DEPARTMENT OF PARKS AND RECREATION**
P.O. BOX 942896
SACRAMENTO, CA 94296-0001
(916) 653-6624 Fax: (916) 653-9824
calshpo@mail2.quiknet.com

May 11, 1999
REPLY TO: NASA981026A

Michael D. Makinen, Historic Preservation Officer
National Aeronautics and Space Administration
Ames Research Center
MOFFETT FIELD CA 94035-1000

Re: Cold War Era Survey, Moffett Federal Airfield, Santa Clara County and Crows Landing Flight Facility, Stanislaus County.

Dear Mr. Makinen:

Thank you for submitting to our office the Final Inventory and Evaluation of Cold War Era Historical Resources (Survey) for Moffet Federal Airfield, Santa Clara County and the National Aeronautics and Space Administration (NASA) Crows Landing Flight Facility, Stanislaus County. The final Survey report was submitted by NASA in response to a request contained in our letter of February 24, 1999. In that letter we requested the final version of the Survey as a contingency document for our earlier concurrence with NASA on the eligibility of 148 properties located at Moffett Field and Crows Landing for inclusion on the National Register of Historic Places (NRHP).

Our review of the submitted Survey report lead us to conclude that the documentation contained in the final version of the Survey is consistent with earlier versions of the study that led to our original concurrence on the National Register eligibility of the aforementioned 148 properties.

Thank you again for consulting with our office regarding your project. If you have any questions, please contact staff historian Clarence Caesar at (916) 653-8902.

Sincerely,

Daniel Abeyta, Acting
State Historic Preservation Officer

STATE OF CALIFORNIA – THE NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *Governor*

**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
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www.ohp.parks.ca.gov

June 6, 2013 Reply In Reference To: NASA_2013_0417_001

Keith Venter
Historic Preservation Officer
Facilities Engineering Branch
NASA Ames Research Center
Mail Stop 213-8
Moffett Field, CA 94035

RE: Section 111 Outlease for Hangar One and Moffett Federal Airfield, NASA Ames Research Center, Moffett Field, CA

Dear Mr. Venter:

Thank you for your April 15, 2013, letter regarding the proposed undertaking in at NASA Ames Research Center (ARC). NASA is consulting with the State Historic Preservation Officer (SHPO) in order to comply with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470f), as amended, and its implementing regulations at 36 CFR Part 800. Along with the letter, NASA also provided property maps and a report entitled "Moffett Federal Airfield, Construction History and Historical Significance," dated April 12, 2013.

The proposed undertaking, as described, involves the proposed offer for lease to a private sector entity, pursuant to Section 111 of the NHPA, of Hangar One and Moffett Federal Airfield. On behalf of NASA, the General Services Administration (GSA) will issue a request for proposal (RFP) that will include a commitment by the lessee to rehabilitate and adaptively reuse Hangar One and manage and maintain Moffett Federal Airfield in compliance with the Secretary of the Interior's Standards for the Treatment of Historic Properties.

NASA defined the Area of Potential Effects (APE) as the entire NASA Ames Research Center. Known historic properties located within the APE include the U.S. Naval Air Station Sunnyvale, CA, Historic District (commonly referred to as the Shenandoah Plaza Historic District), which is listed in the National Register of Historic Places (NRHP). Other individually eligible buildings, including one National Historic Landmark, are also located within the APE. The APE also contains a number of archaeological sites and sensitivity areas, but these are not described in detail in the information provided by NASA.

Although the historic district was listed in 1994, the nomination did not address the airfield or adjacent Safety Buffer Zone. In the report submitted, NASA concludes that Moffett Federal Airfield (under NRHP Criterion A) and the Safety Buffer Zone (no NRHP Criterion specified) are both contributors to the historic district. The period of significance for the historic district is currently 1930-1935 and 1942-1946, and NASA proposes a period of significance for the airfield of 1942-1961. No period of significance is specified for the Safety Buffer Zone.

NASA requests SHPO concurrence with the new determinations of eligibility for these properties. Upon receipt of responses to the RFP, GSA and NASA will choose the best qualified lessee and submit the proposal to SHPO for further consultation.

After reviewing the information submitted to my office, the SHPO offers the following comments:

- The SHPO concurs that leasing Moffett Federal Airfield and Hangar One constitutes an undertaking.
- The SHPO recommends that NASA and GSA officially designate a lead agency for the consultation pursuant to 36 CFR 800.2(a)(2).
- The APE appears to be sufficient pursuant to 36 CFR 800.4 (a)(1) and 800.16(d).
- The SHPO concurs that Moffett Federal Airfield and the Safety Buffer Zone contribute to the significance of the Shenandoah Plaza Historic District. However, further information should be developed specifying the character defining features of these contributors, including landscape design.
- The SHPO recommends that NASA develop a list or table of contributors to the district for submission to this office and for the information of the potential lessees. It is unclear from the report submitted to this office if the golf course or munitions magazines contribute to the district.
- Has NASA prepared an integrated cultural resources management plan (or similar document) that includes treatment plans for archaeological resources? If so, how will the treatment plan be accounted for in the Section 111 lease?

The SHPO agrees with the proposed plan for continuing consultation on this undertaking. Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions, please contact Mark Beason of my staff at (916) 445-7047 or mark.beason@parks.ca.gov.

Sincerely,

Carol Roland-Nawi, Ph.D.

Carol Roland-Nawi, Ph.D.
State Historic Preservation Officer

AGREED: ______________________________ DATE: _________________

Keith Venter
Historic Preservation Officer
NASA Ames Research Center

CC: Jane Lehman, Regional Historic Preservation Officer
General Services Administration