



## **2011 ANNUAL BIOLOGICAL MONITORING REPORT FORMER FORT ORD, CALIFORNIA**

Prepared for:

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## TABLE OF CONTENTS

List of Figures .....	ii
List of Photographs .....	ii
List of Acronyms and Abbreviations .....	iii
1.0 General Introduction .....	1
2.0 OUCTP Lower 180-foot Aquifer Groundwater Remediation – First Year of Follow-up Biological Monitoring .....	3
2.1 Introduction .....	3
2.2 Methods .....	4
2.3 Results and Discussion .....	5
2.3.1 Sand Gilia Survey - Results and Discussion .....	5
2.3.2 Monterey Spineflower Survey - Results and Discussion .....	6
2.3.3 Non-Native Annual Grass Survey - Results and Discussion .....	7
2.4 Mitigation and Avoidance Measures to Reduce Impacts during Groundwater Remediation Activities .....	8
2.4.1 HMP Species Reported Encounters and Avoidance Measures .....	9
3.0 References .....	11

## **FIGURES**

- |         |  |
|---------|--|
| 1.1     | Location of Site and Wells                         |
| 1.2 A&B | 2011 Sand Gilia Locations and Density              |
| 1.3 A&B | 2011 Monterey Spineflower Total Distribution       |
| 1.4 A&B | 2011 Monterey Spineflower with Cover >3%           |
| 1.5 A&B | 2011 Non-Native Annual Grass Locations and Density |

## **PHOTOGRAPHS**

- |         |  |
|---------|--|
| 2.1 A&B | Two views of main access route through the FONR South Reserve.   |
| 2.2     | Plywood boards for staging the drill rig and support truck at well site MP-BW-49.  |
| 2.3     | Drill rig and support truck staged on plywood boards at well site MP-BW-49.  |
| 2.4     | The road edge opposite the MP-BW-49 site with fencepost and flagging to protect Monterey spineflower habitat close to the work area. |
| 2.5     | Mats of high density Monterey spineflower along the main road edge.  |
| 2.6 A&B | Views of well site MP-BW-49 in June 2011 after work completion.  |
| 2.7     | MP-BW-51 equipment staging area near main road.  |
| 2.8     | Drill rig in place at well site MP-BW-51 with soil core lay-down area (plastic tarp).  |
| 2.9 A-C | Views of access route from the main road (a,b) to the well site MP-BW-51 (c).  |
| 2.10    | Well site MP-BW-51 in June 2011 after work completion, showing the sparse vegetation due to soil compaction.                         |
| 2.11    | Black legless lizard encountered at well site MP-BW-51 in January 2011 during the drilling operation.                                |
| 2.12    | Sand gilia area fenced off along main access route.  |
| 2.13    | Typical sand gilia plant in FONR reserve during survey.  |

## **ACRONYMS AND ABBREVIATIONS**

Ahtna	Ahtna Engineering Services, LLC
Army	U.S. Department of the Army
BLL	Black Legless Lizard
BRAC	Base Realignment and Closure
CTS	California Tiger Salamander
FONR	Fort Ord Natural Reserve
GPS	Global Positioning System
HMP	Habitat Management Plan
km	kilometer
MBEST	Monterey Bay Education, Science and Technology Center of the University of California, Santa Cruz
OUCTP	Operable Unit Carbon Tetrachloride Plume
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

## 1.0 General Introduction

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This report summarizes the results of the 2011 first follow-up biological monitoring survey performed by Ahtna Engineering Services, LLC (Ahtna) associated with the installation of three new monitoring wells as part of the Operable Unit Carbon Tetrachloride Plume (OUCTP) groundwater remediation project. Ahtna prepared this report under contract #W91238-08-D-0034, Delivery Order 0016.

Adherence to biological protection measures is required as part of the *Installation-Wide Multispecies Habitat Management Plan (HMP) for Former Fort Ord, California* (U.S. Army Corps of Engineers [USACE], 1997).

In addition to the HMP, four Biological Opinions have been issued by the U.S. Fish and Wildlife Service ([USFWS], 1999, 2002, 2005, and 2007) as a result of consultation with the Army. These contain additional mitigation measures and recommendations relating to biological monitoring at former Fort Ord cleanup sites.

The HMP identifies rare, threatened, or endangered species and habitats on former Fort Ord that are designated for protection and future management. The habitat types requiring biological surveys for monitoring of protected species are: central maritime chaparral, wetlands and vernal ponds, and other habitats where listed species are known or suspected to occur, including coastal scrub, coast live oak woodlands, and grasslands with a significant native component of grasses or forbs.

The following special-status species are listed in the HMP and are addressed in these surveys. There are three special-status annual plants that may occur in maritime chaparral, coastal scrub, grasslands, or disturbed areas: sand gilia (*Gilia tenuiflora arenaria*), Monterey spineflower (*Chorizanthe p. pungens*), and Seaside bird's beak (*Cordylanthus rigidus littoralis*). Five special status shrub species may occur within maritime chaparral: Hooker's manzanita (*Arctostaphylos h. hookeri*), sandmat manzanita (*Arctostaphylos pumila*), Monterey manzanita (*Arctostaphylos montereyensis*), Monterey Ceanothus (*Ceanothus cuneatus rigidus*), and Eastwood's Ericameria (*Ericameria fasciculata*). The California Black Legless Lizard (BLL) (*Anniella pulchra nigra*) is an HMP-recognized rare variety of the California legless lizard that inhabits dune sand type habitats on Fort Ord.

Wetland species considered include: California tiger salamander (CTS) [*Ambystoma californiense*], California linderiella (*Linderiella occidentalis*), and Contra Costa goldfields (*Lasthenia conjugens*). These species are typically found in vernal or seasonal ponds, though

CTS may be found up to 2 kilometers (km) upland of a vernal pool breeding pool during the dry season.

Before and after the completion of munitions removal, soil remediation, groundwater remediation, and other related environmental cleanup operations within Fort Ord lands designated as Habitat Reserve, baseline biological and follow-up surveys are conducted to: establish whether protected species are present prior to work operations; map the locations and quantify abundance; and monitor the protected species and habitat after work completion. Follow-up monitoring helps determine whether work activities have significantly impacted rare species or habitat.

As well as outlining biological monitoring requirements, the HMP also provides avoidance and mitigation measures recommended to reduce significant impacts to HMP special-status species or habitats. It also addresses habitat restoration requirements which would be necessary if U.S. Department of the Army (Army) cleanup activities are found to significantly impact these habitats and species.

To determine whether mitigation measures will be needed to restore populations of affected special-status species during groundwater remediation activity, a baseline biological survey is conducted within a work site, and three monitoring events are conducted following completion of the cleanup operation. Monitoring data are compared relative to a site's baseline data to assess whether there have been significant impacts related to the operation, and whether recovery or restoration of the protected habitat (maritime chaparral, wetlands, etc.) and special-status species is proceeding toward baseline conditions.

### **2011 Biological Activities Included in this Annual Report**

- **OUCTP Lower 180-Foot Aquifer Well Installation and First Year Follow-up Biological Monitoring** – Ahtna was tasked by USACE with installing two monitoring wells, and with conducting the first year follow-up monitoring survey at well installation sites on the University of California's Fort Ord Natural Reserve (FONR)-South. Well installation occurred between December 2010 and January 2011. The biological survey was conducted between April and July 2011.
- **Mitigation and Avoidance Measures Implemented by Ahtna in 2010/2011**

This report also describes mitigation and avoidance measures that were implemented during this work from late 2010 to early 2011.

## 2.0 OUCTP Lower 180-foot Aquifer Groundwater Remediation – First Year of Follow-up Biological Monitoring

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### 2.1 Introduction

Ahtna was tasked with installation of three new groundwater monitoring wells as part of the ongoing investigation and remediation of OUCTP within the University of California's FONR-South. Wells MP-BW-49, MP-BW-50, and MP-BW-51 were installed between December 2010 and January 2011. Well MP-BW-50 was moved from its original location on habitat reserve land to the University of California's Monterey Bay Education, Science and Technology (MBEST) property. MBEST property is designated for future use as development lands, and has no HMP requirement for biological monitoring of work sites. The current monitoring survey therefore addresses only the work conducted at MP-BW-49 and MP-BW-50.

The location of the wells, access routes and the biological survey area are shown in Figure 2.1.

The design details for this phase of the ongoing groundwater OUCTP remediation is contained in the *Final Operable Unit Carbon Tetrachloride Plume Lower 180-Foot Aquifer Remedial Design, Former Fort Ord, California* (USACE, 2010b). The site specific work plan details are contained in the *Draft Final Operable Unit Carbon Tetrachloride Plume Lower 180-Foot Aquifer Well Installation Work Plan, Former Fort Ord, California* (Ahtna, 2010).

The baseline vegetation survey for these well sites was conducted in 2010 by Shaw Engineering and Infrastructure, Inc. (USACE, 2011). The baseline survey area covered all proposed well locations and potential access routes, and incorporated a 100-foot zone on either side of the potential routes. A larger survey zone was delineated at the time of the baseline survey, when the final locations for the wells and access routes had not been established. Since the locations are now known, the monitoring survey area has been reduced to a 20-foot zone around all access roads, wells and work zones. The 20-foot buffer is considered sufficient to incorporate all areas of potential impacts associated with the work project.

The vegetation survey was conducted between April and July 2011, during the respective peak bloom periods for the HMP species found in the biological baseline survey. These included two annual plant species: the Federally Endangered sand gilia (*Gilia tenuiflora arenaria*), and Federally Threatened Monterey spineflower (*Chorizanthe pungens*). Two other protected species, State Endangered Seaside bird's beak (*Cordylanthus rigidus littoralis*) and Federally Endangered Yadon's Piperia (*Piperia yadonii*), were surveyed for but not encountered on the site. These species were also not encountered during the baseline survey in 2010. Two HMP-listed shrubs, sandmat manzanita (*Arctostaphylos pumila*) and Monterey Ceanothus (*Ceanothus*

*cuneatus rigidus*) were both present within the maritime chaparral plant community on the site, but not within the established work zones.

In addition to HMP species, monitoring of non-native annual grasses was included in the species surveys to determine whether they are intruding into disturbed areas. Ground and soil disturbances associated with work projects often result in an increase in non-native species due to their tendency to out-compete native species. Annual grass species are particularly prolific in their spread onto disturbed sites. Non-native species intrusions can degrade the habitat quality for native plants both short-term and potentially long-term, and are a particular threat in areas occupied by rare HMP species, such as sand gilia and Monterey spineflower.

Well sampling will continue quarterly for several more years. In accordance with the HMP and Biological Opinions' requirement for all habitat reserve areas, three years of follow-up monitoring after completion of the project will be conducted in work areas within the FONR.

Photographs of the well locations and main access routes are shown in Photographs 2.1 through 2.12.

## **2.2 Methods**

For consistency with past surveys, the methods used for the current survey were the same as those used by prior groundwater remediation biological contractors on the FONR property (USACE, 2007, 2008, 2009, 2010a).

The sand gilia population was surveyed between in April to early May as close to the peak bloom as possible. Sand gilia patches were mapped using a Trimble GeoExplorer hand-held Global Positioning System (GPS) unit. The total number of plants was recorded for each patch. A patch was defined as a discrete grouping of plants within approximately 6 feet of an adjacent plant. Sand gilia tend to form discrete groupings as a result of localized seed dispersal.

The Monterey spineflower survey was conducted between mid-May and mid-June when plants are at maximum plant size. Abundance is measured as percent of ground cover, since at their maximum size plants are often tangled into mats where individuals are not distinguishable. Monterey spineflower areas were mapped to show both overall distribution over the study site, and also distribution of patches in the higher density classes, which are those greater than "Very Sparse" (i.e. greater than 3% of ground cover). The total occupied area of Monterey spineflower was mapped by hand onto aerial photo maps in the field, and later digitized into a Geographic Information System. Monterey spineflower areas with density class greater than 3% were mapped using a Trimble GeoExplorer GPS unit.

Monterey spineflower density classes (consistent with previous FONR surveys) were as follows:

Very Sparse = <3% of ground cover

Sparse = 3-25% of ground cover

Medium Low = 26-50% of ground cover

Medium = 51-75% of ground cover

Medium-High = 76-97% of ground cover

High = 98-100% of ground cover

Non-native annual grass areas were mapped by hand onto aerial photo maps in the field, and later digitized into a Geographic Information System. The following density cover classes were used for annual grasses:

Very Low = <5% of ground cover

Low = 6-25% of ground cover

Medium = 26-50% of ground cover

High = 51-75% of ground cover

Very High = >75% of ground cover

## **2.3 Results and Discussion**

### **2.3.1 Sand Gilia Survey - Results and Discussion**

The locations and abundance of sand gilia found in the 2011 survey are shown in Figures 2.2a and 2.2b. Photograph 2.13 shows a typical sand gilia plant on the site.

**Total area of sand gilia in 2011 within biological survey area = 0.04 acres**

**Total number of sand gilia plants in 2011 within biological survey area = 383**

Monitoring well MP-BW-50 and its access route were re-located from their original proposed locations from FONR property to property of the University of California's MBEST, which is designated in the HMP for future development. This move avoided impacts to a large sand gilia population along a walking path in the northeast portion of the surveyed area, as shown in the baseline survey (USACE, 2011). Since the HMP does not require baseline survey of HMP species within lands categorized for development, no sand gilia data were collected on MBEST property.

Wells MP-BW-49 and MP-BW-51 were located in areas that in the baseline survey had no sand gilia plants. However, the main access route was close to two sand gilia patches at the edge of the road. To prevent accidental intrusion into sand gilia and other rare plant habitat, these sand gilia were fenced off using metal fence posts and rope (Photograph 2.12).

Except for areas in the vicinity of the two wells, and the staging area for MP-BW-51, there was no off-road use that would have caused soil disturbances and effects on sand gilia populations during this period.

The areas impacted by well installation will have two more years of follow-up monitoring to document any change in HMP annual plant populations within affected work zones. After that, the baseline and monitoring data will be compared to determine whether there have been significant effects on HMP plant habitat or populations.

### **2.3.2 Monterey Spineflower Survey - Results and Discussion**

The total distribution of Monterey spineflower within the survey area is shown in Figures 2.3a and 2.3b. The total occupied area at all densities was 2.2 acres.

Locations of higher densities of Monterey spineflower (>3% of ground cover) are shown in Figures 2.4a and 2.4b.

Eighty-seven percent of the mapped spineflower area was in the “Very Sparse” (0-3%) cover category. The remaining area consisted of patches of “Sparse” (4-25%) through “Medium” (26-50%). None of the mapped areas had greater than “Medium” cover.

2011 Total acreage and acreage for each cover class is shown below.

**Total area occupied by Monterey spineflower = 2.2 acres**

**Area at Very Sparse cover (0-3%) = 1.9 acres**

**Area at Sparse cover (3-25%) = 0.01 acres**

**Area at Medium-Low cover (26-50%) = 0.25 acres**

**Area at Medium cover (51-75%) = 0.01 acres**

Both wells, their access routes and staging areas were located in areas of Very Sparse (<3%) cover as mapped in the baseline survey. In 2011, there was a notable absence of Monterey spineflower in the areas impacted by the well installation, and total vegetation cover was also very low in both these areas, as shown in Photographs 2.6 and 2.10. Monitoring in the next two years will determine the recovery of plant species as the soil conditions improve with time.

Well MP-BW-49 access route was close to a patch of Monterey spineflower in the Sparse (3-25%) cover class, but not close enough to affect it.

Areas very close to MP-BW-49 and along main access route had relatively high densities of Monterey spineflower (Photograph 2.5). High density areas close to the well work site were marked off with fence posts, rope and flagging to ensure there would be no vehicle intrusion or other disturbances (Photograph 2.4). Except for areas in the vicinity of the two wells, and the staging area for MP-BW-51, there was no off-road use that could cause soil disturbance and effects on the Monterey spineflower populations outside of the roadbeds during the work period.

### **2.3.3 Non-Native Annual Grass Survey - Results and Discussion**

Non-native annual grass location and densities are shown in Figures 2.5a and 2.5b.

The following numbers indicate the acreage occupied by annual grass at each cover class.

**Area at Very Low cover (< 5%) = 1.06 acres**

**Area at Low cover (5-25%) = 1.81 acres**

**Area at Medium cover (26-50%) = 1.09 acres**

**Area at High cover (51-75%) = 0.11 acres**

**Area at Very High cover (>75%) = 0.0 acres**

None of the mapped areas had greater than 75% cover.

Except for areas in the vicinity of the two wells, and the staging area for MP-BW-51, there was no off-road use that would have caused soil disturbances and associated changes in grass densities during this period.

The main access routes to the wells had annual grasses in the Very Low cover class in 2011. Surveyed areas along either side of access routes had grass cover in all cover classes ranging from Very Low to High. Grass density in the area of MP-BW-51 was Very Low, except for a small patch at Low density in the disturbed work area. Density at MP-BW-49 varied from Very Low to Medium in the work area. Low density of vegetation, including annual grasses, in the year following the work completion is often the result of heavy equipment soil compaction. Compacted soil deters plant germination. These soil conditions change with time and future monitoring events will likely reflect these changes. Photographs 2.6a and b, and Photograph 2.10 show the impacted well areas with relatively low vegetation cover during the late spring following work completion.

## 2.4 Mitigation and Avoidance Measures to Reduce Impacts during Groundwater Remediation Activities

Measures were taken to reduce impacts to HMP species and habitat where possible, and some of these are already described in sections of this report. Mitigation measures for groundwater remediation are specifically addressed in the HMP, and the 2002 and 2005 Biological Opinions (USFWS, 2002, 2005 Amendment). These measures are summarized here:

- Access routes and staging areas for each site were planned ahead of time to select the least damaging locations to surrounding habitat and HMP species. Existing roads and trails, and pre-existing paved, graded, or disturbed areas, and areas known to be unoccupied by HMP annual species (based on previous surveys) were used for access and staging, wherever available.
- Employee Natural Resources Training: Nine Ahtna workers and sub-contractors received a natural resources training by a qualified biologist on rare species and habitat recognition and natural resource protection measures before starting work on the site. The training included the following topics:
  - Relevant Federal Protection Laws on Fort Ord
  - Identification of sensitive HMP-protected habitat and HMP species that could potentially be encountered in the work area. These included California Tiger Salamander, black legless lizard, and the maritime chaparral plant species: sand gilia, Monterey spineflower, Seaside bird's beak, Yadon's Piperia, sandmat manzanita, Eastwood's Ericameria, and Monterey Ceanothus.
  - The established protocol in case of CTS or black legless lizard encounters. The protocol involved reporting the find immediately to the Ahtna biologist who was qualified to handle and relocate CTS. BLL could be handled and relocated under the guidance of the biologist.
  - Direction on minimizing all work impacts and work footprints, and avoiding areas flagged for sensitive species where marked in the field.
  - Information about the locations information about the locations of designated work areas, access routes and staging areas to be used, and rare plant areas to be avoided.
- BLL were reported and relocated under the guidance of a qualified biologist when encountered during well installation activities. The single encounter in 2011 is described below in Section 2.4.1.1.

- CTS protection measures were implemented. Employee briefings were conducted to ensure the field staff followed the protocols for CTS recognition and reporting.
- Photographs were taken both before, during and after work completion to document the site conditions during all phases of work.
- A qualified biologist was available during all phases of work to monitor activity and ensure the mitigation measures were followed.

## **2.4.1 HMP Species Reported Encounters and Avoidance Measures**

### **2.4.1.1 Black Legless Lizard**

The type of sandy soils and vegetation type at the site are known potential habitat for the Black Legless Lizard (*Anniella pulchra nigrens*, *BLL*). They have historically been encountered on the FONR.

Ahtna site personnel were briefed on identification of this species, where it might be found, and the protocol to be followed if found. The Ahtna biologist was the contact person for BLL encounters.

One BLL was encountered during Ahtna work in 2011. A BLL was turned up at the site of MP-BW-51 in January during maneuvering of the drilling rig, which resulted in disturbance of the surface soil. The individual was alive and uninjured, and was relocated to a sandy area outside of the work zone. The Ahtna biologist documented the encounter, oversaw relocation, and submitted a report to the Army. A photo of the BLL and the location and where relocated is shown in Photo 2-11.

### **2.4.1.2 California Tiger Salamander**

While there are no vernal ponds on the FONR property, CTS (*Ambystoma californiense*) could potentially be encountered on site during migration periods. Site personnel were briefed on identification of this species, and the protocol to be followed if found. The Ahtna biologist was responsible for work crew education and handling and relocation of CTS in the event of an encounter. Any CTS individuals encountered are required to be reported immediately to both the Ahtna biologist and the Fort Ord Base Realignment and Closure (BRAC) Office Natural Resource Manager. Proper handling and relocation, if necessary, is permitted by USFWS for these persons only on Ahtna projects.

There were no CTS encounters during work activities in 2011.

### **2.4.1.3 HMP Habitat and Maritime Chaparral Plant Species**

The well locations were adjusted between 10 to 150 feet from proposed locations to limit the impacts to maritime chaparral habitat and rare plant populations. MP-BW-50 was moved outside of habitat reserve area into development property. MP-BW-51 was moved to the center of an existing trail, and MP-BW-49 was moved immediately adjacent to the main road to eliminate the need for off-road access.

The work sites, access routes, and staging areas were defined clearly by fencing and flagging to limit the footprint of the impact.

Wells were located as close as possible to pre-disturbed areas to avoid and reduce impacts to potential rare species habitat. Both MP-BW-49 and MP-BW-51 were moved from their original locations to avoid impacts. MP-BW-49 was located next to the main access road through the FONR. Staging areas were marked out with fence posts and colored tape. Adjacent areas with populations of known Monterey spineflower adjacent to MP-BW-49 were also fenced off to prevent accidental intrusion into these areas.

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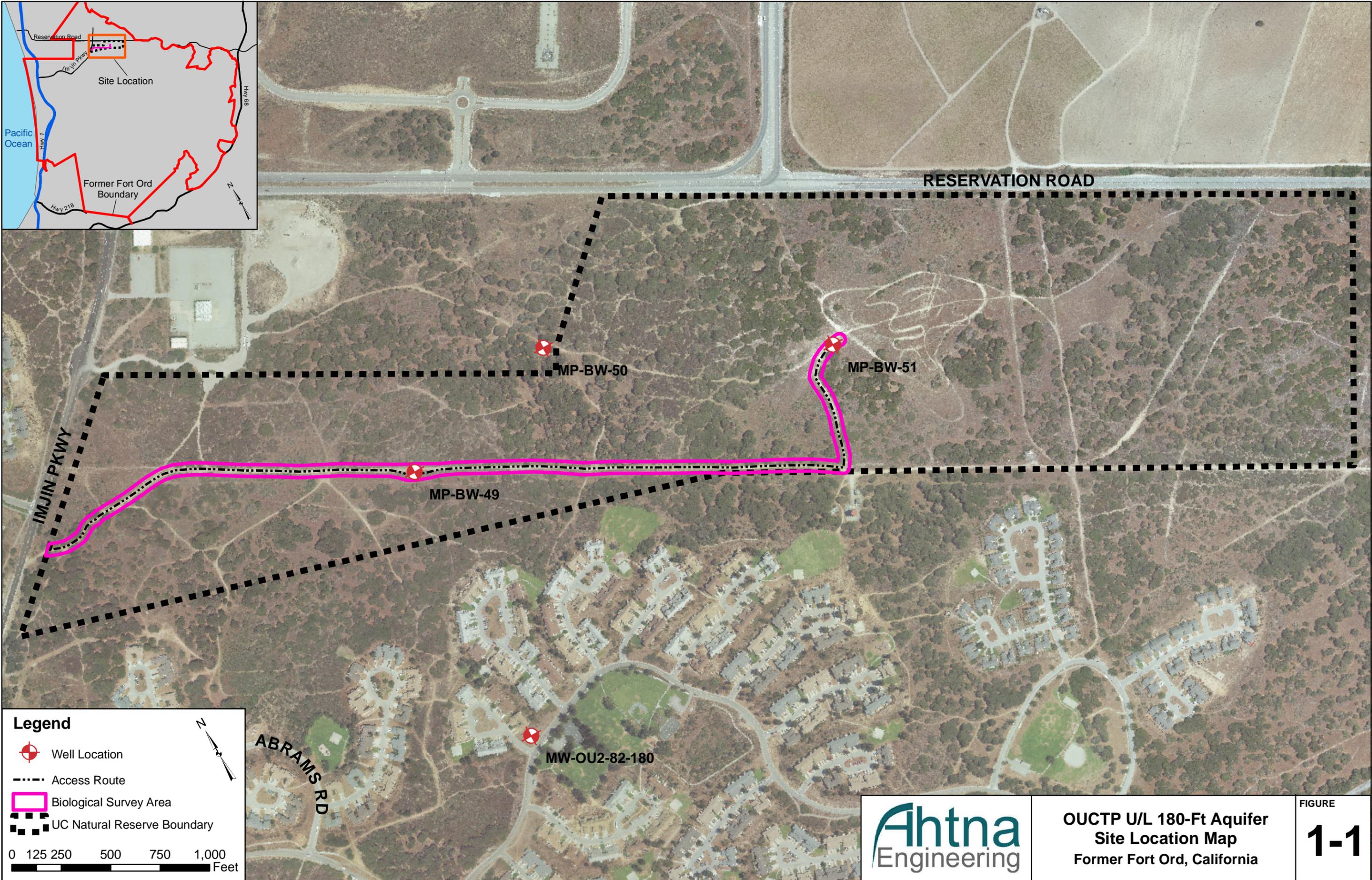
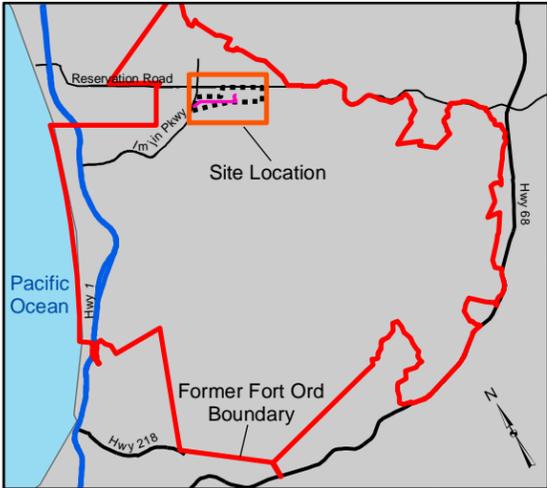
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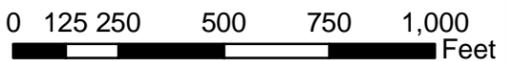
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## Figures

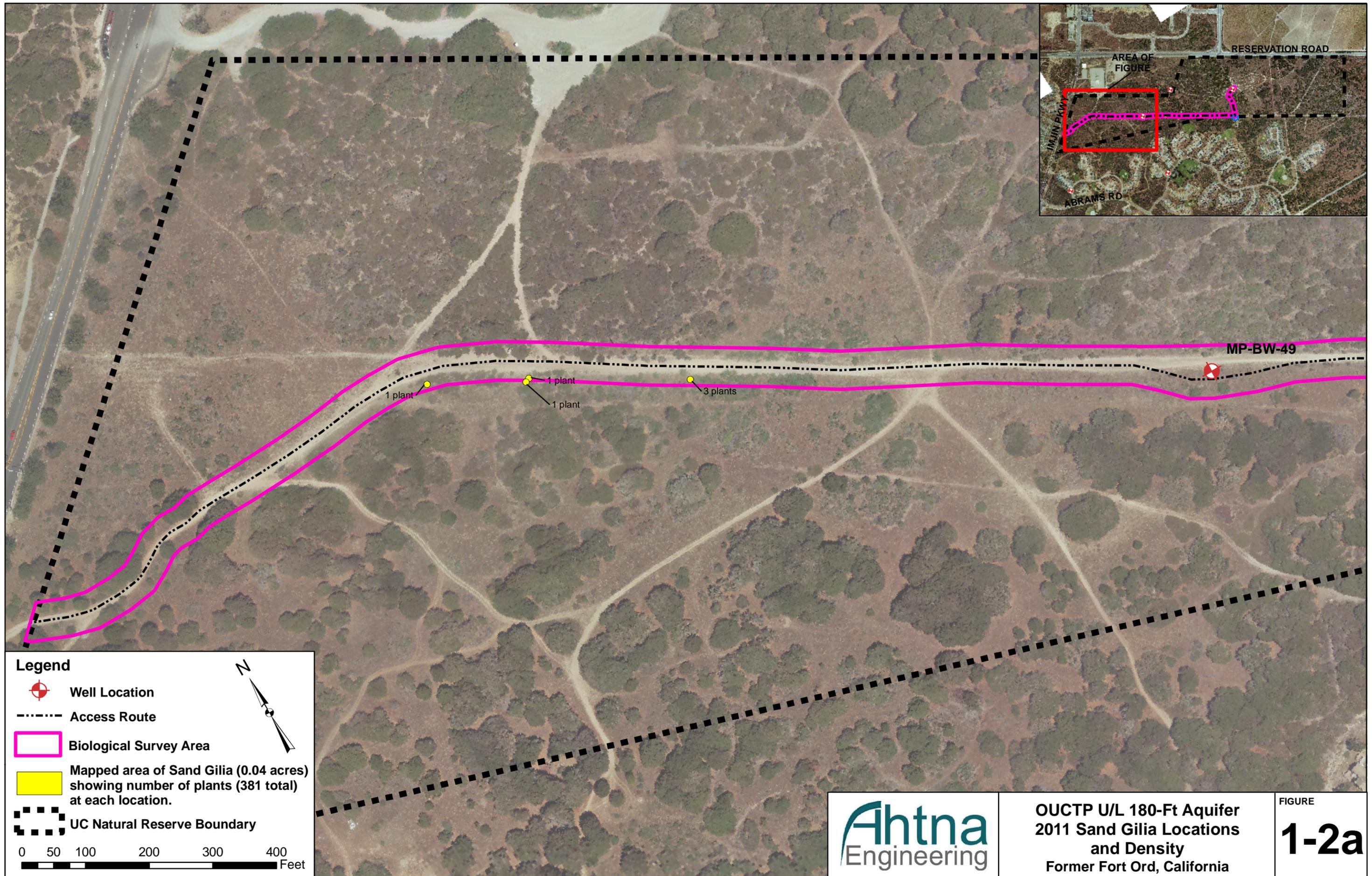


- Legend**
- Well Location
  - Access Route
  - Biological Survey Area
  - UC Natural Reserve Boundary



**OUCTP U/L 180-Ft Aquifer  
Site Location Map  
Former Fort Ord, California**

FIGURE  
**1-1**



**Legend**

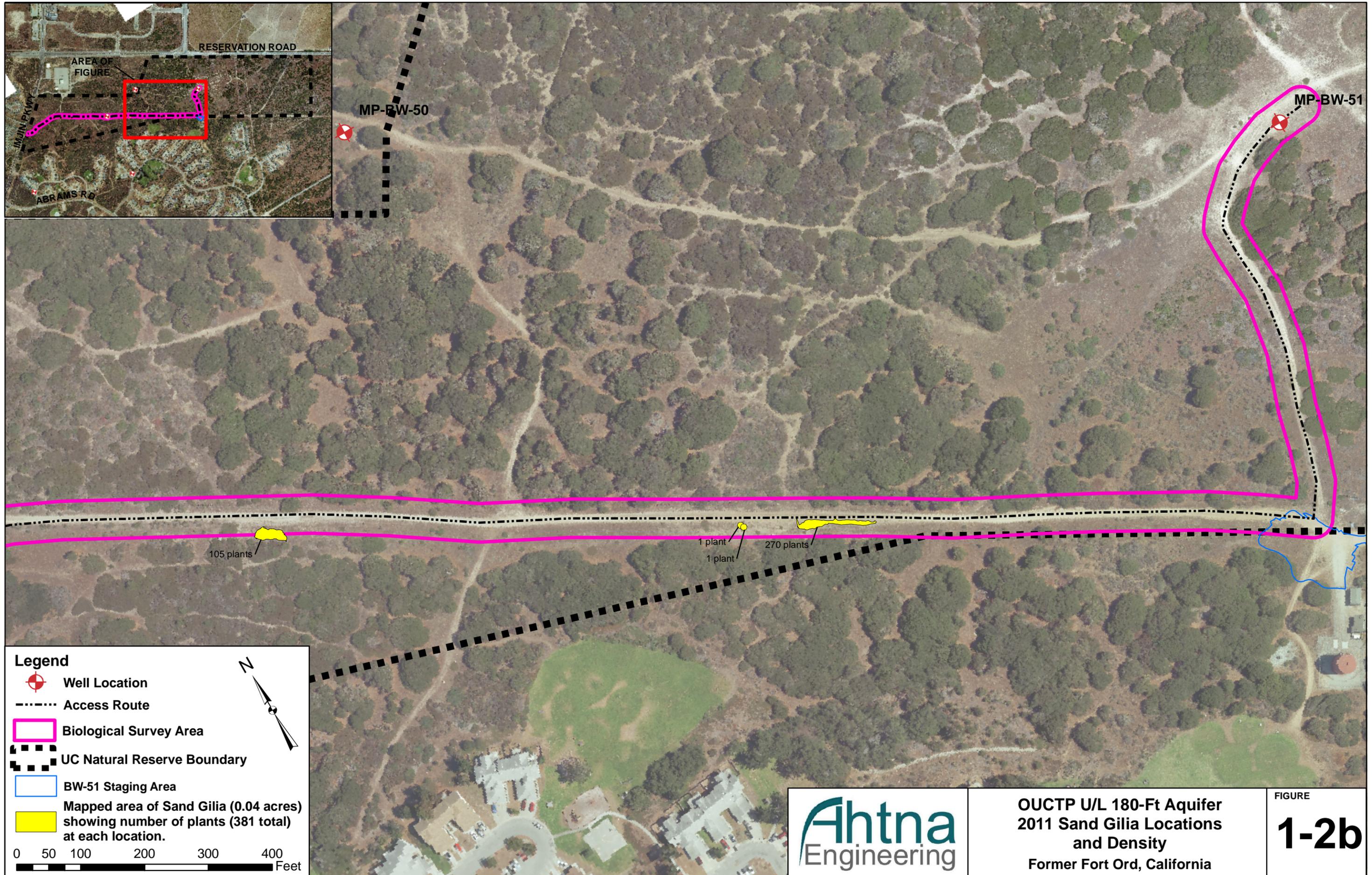
- Well Location
- Access Route
- Biological Survey Area
- Mapped area of Sand Gilia (0.04 acres) showing number of plants (381 total) at each location.
- UC Natural Reserve Boundary

0 50 100 200 300 400 Feet



OUCTP U/L 180-Ft Aquifer  
 2011 Sand Gilia Locations  
 and Density  
 Former Fort Ord, California

FIGURE  
**1-2a**



**Legend**

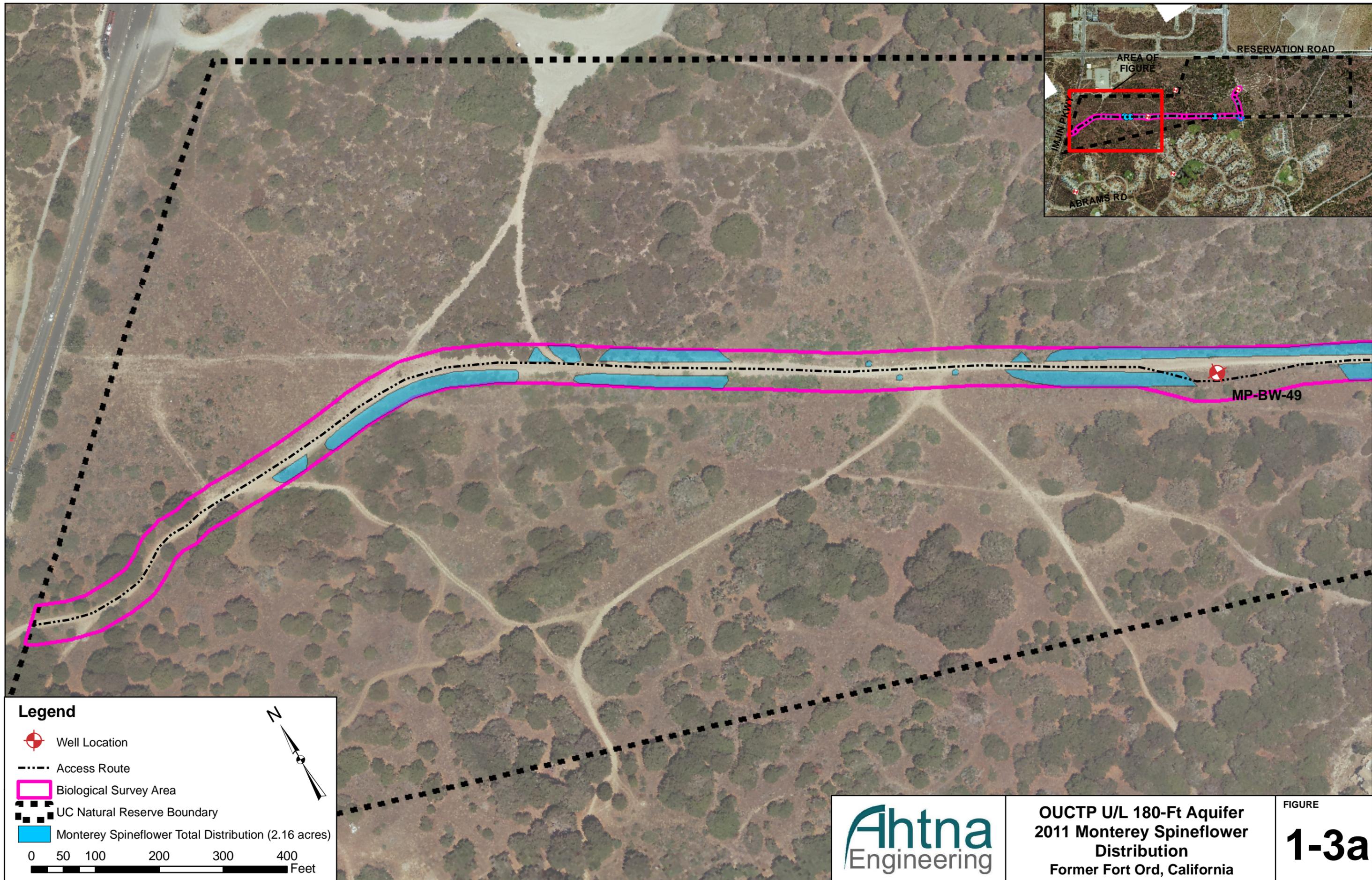
- Well Location
- Access Route
- Biological Survey Area
- UC Natural Reserve Boundary
- BW-51 Staging Area
- Mapped area of Sand Gilia (0.04 acres) showing number of plants (381 total) at each location.

0 50 100 200 300 400 Feet



OUCTP U/L 180-Ft Aquifer  
 2011 Sand Gilia Locations  
 and Density  
 Former Fort Ord, California

FIGURE  
**1-2b**



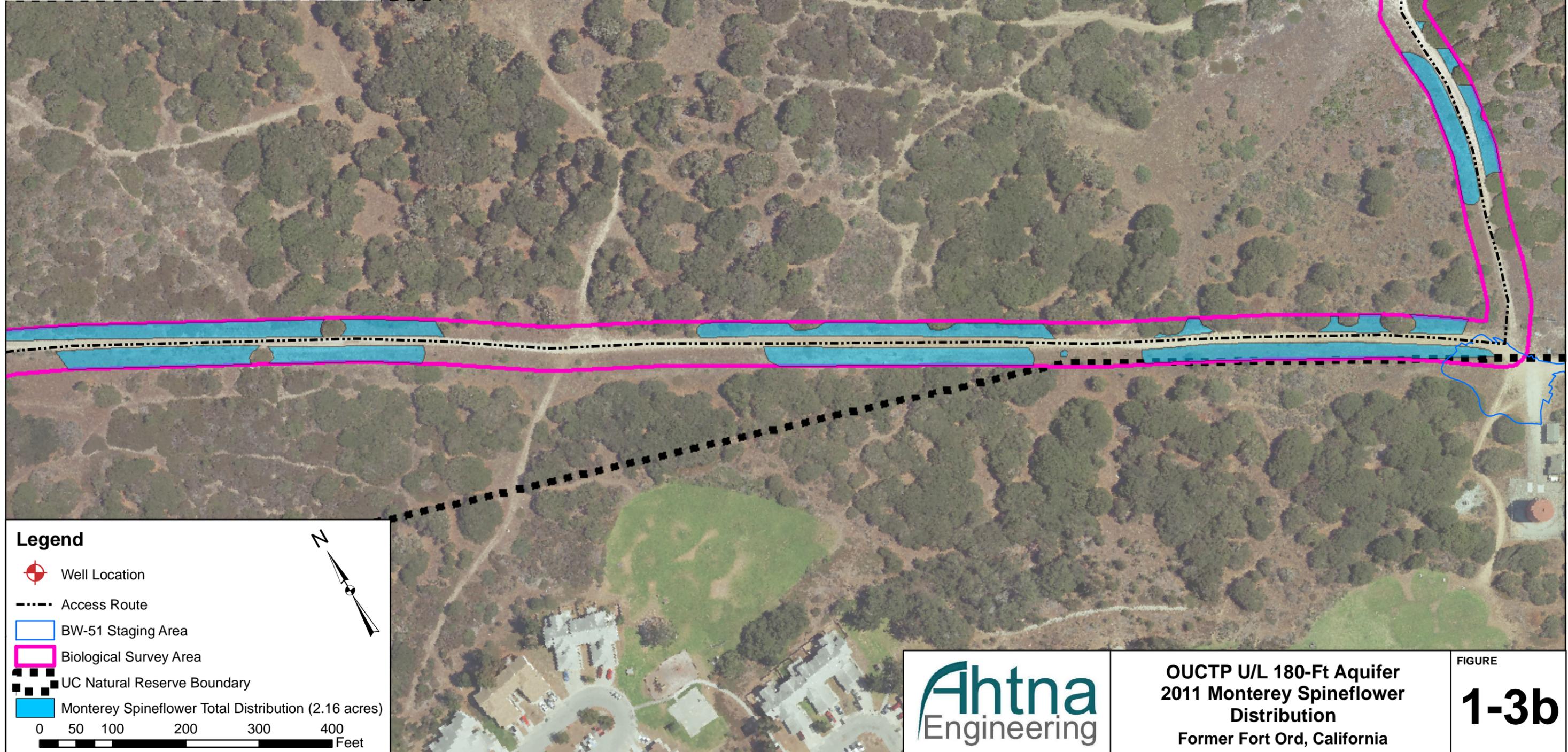
**Legend**

-  Well Location
  -  Access Route
  -  Biological Survey Area
  -  UC Natural Reserve Boundary
  -  Monterey Spineflower Total Distribution (2.16 acres)
- 0 50 100 200 300 400 Feet



OUCTP U/L 180-Ft Aquifer  
 2011 Monterey Spineflower  
 Distribution  
 Former Fort Ord, California

FIGURE  
**1-3a**



**Legend**

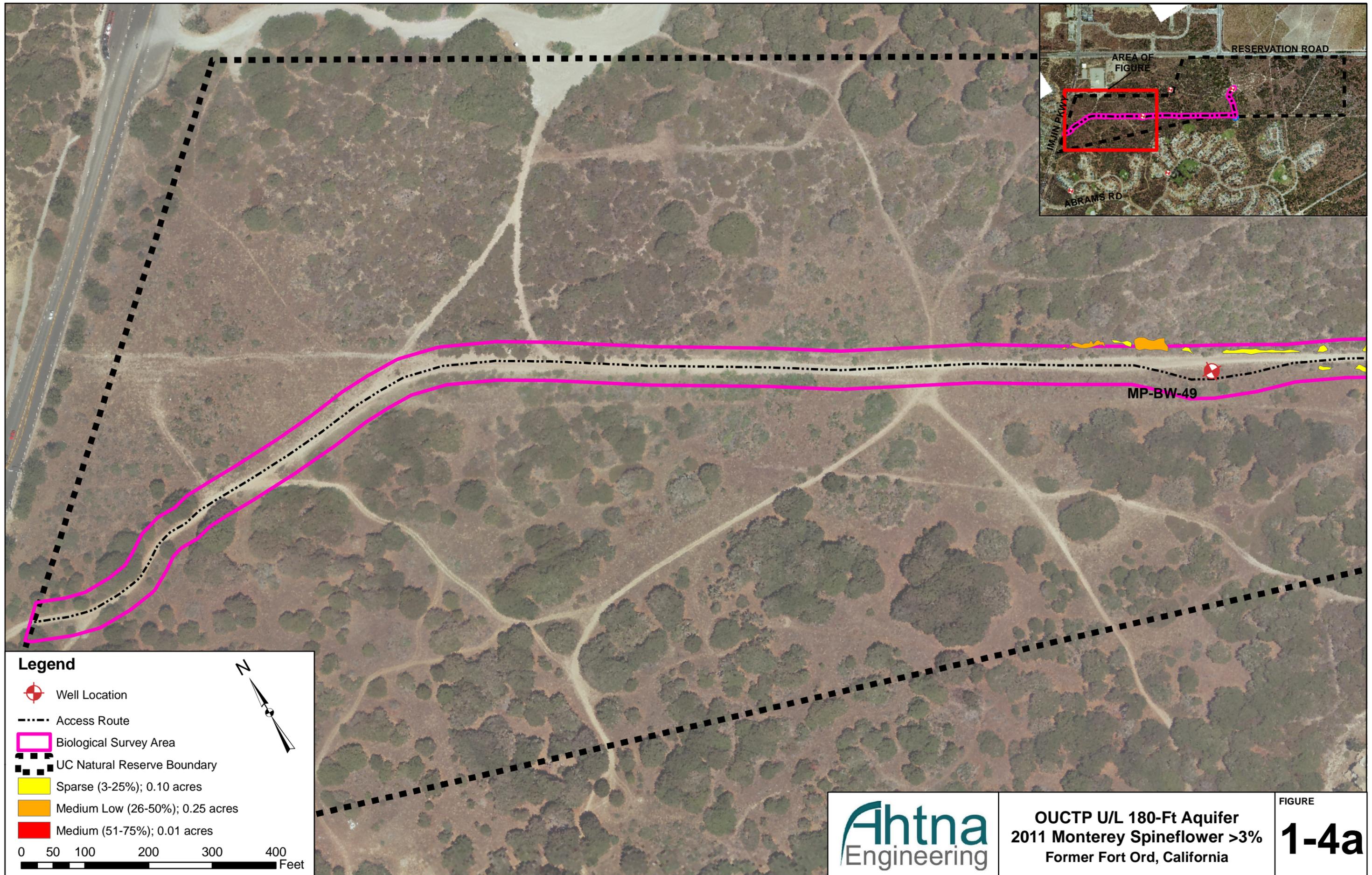
-  Well Location
-  Access Route
-  BW-51 Staging Area
-  Biological Survey Area
-  UC Natural Reserve Boundary
-  Monterey Spineflower Total Distribution (2.16 acres)

0 50 100 200 300 400 Feet



OUCTP U/L 180-Ft Aquifer  
 2011 Monterey Spineflower  
 Distribution  
 Former Fort Ord, California

FIGURE  
**1-3b**



**Legend**

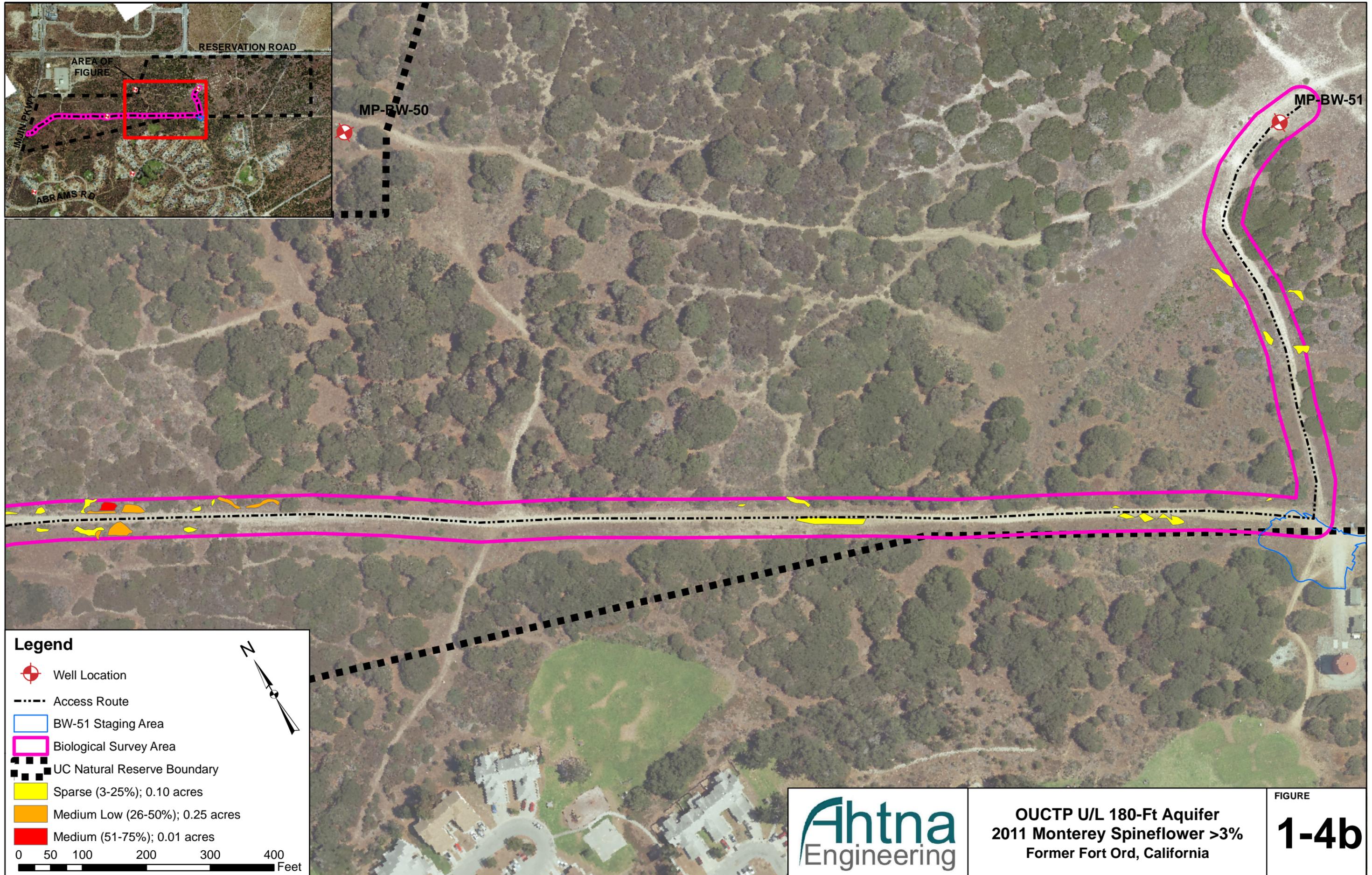
- Well Location
- Access Route
- Biological Survey Area
- UC Natural Reserve Boundary
- Sparse (3-25%); 0.10 acres
- Medium Low (26-50%); 0.25 acres
- Medium (51-75%); 0.01 acres

0 50 100 200 300 400 Feet



OUCTP U/L 180-Ft Aquifer  
 2011 Monterey Spineflower >3%  
 Former Fort Ord, California

FIGURE  
**1-4a**



**Legend**

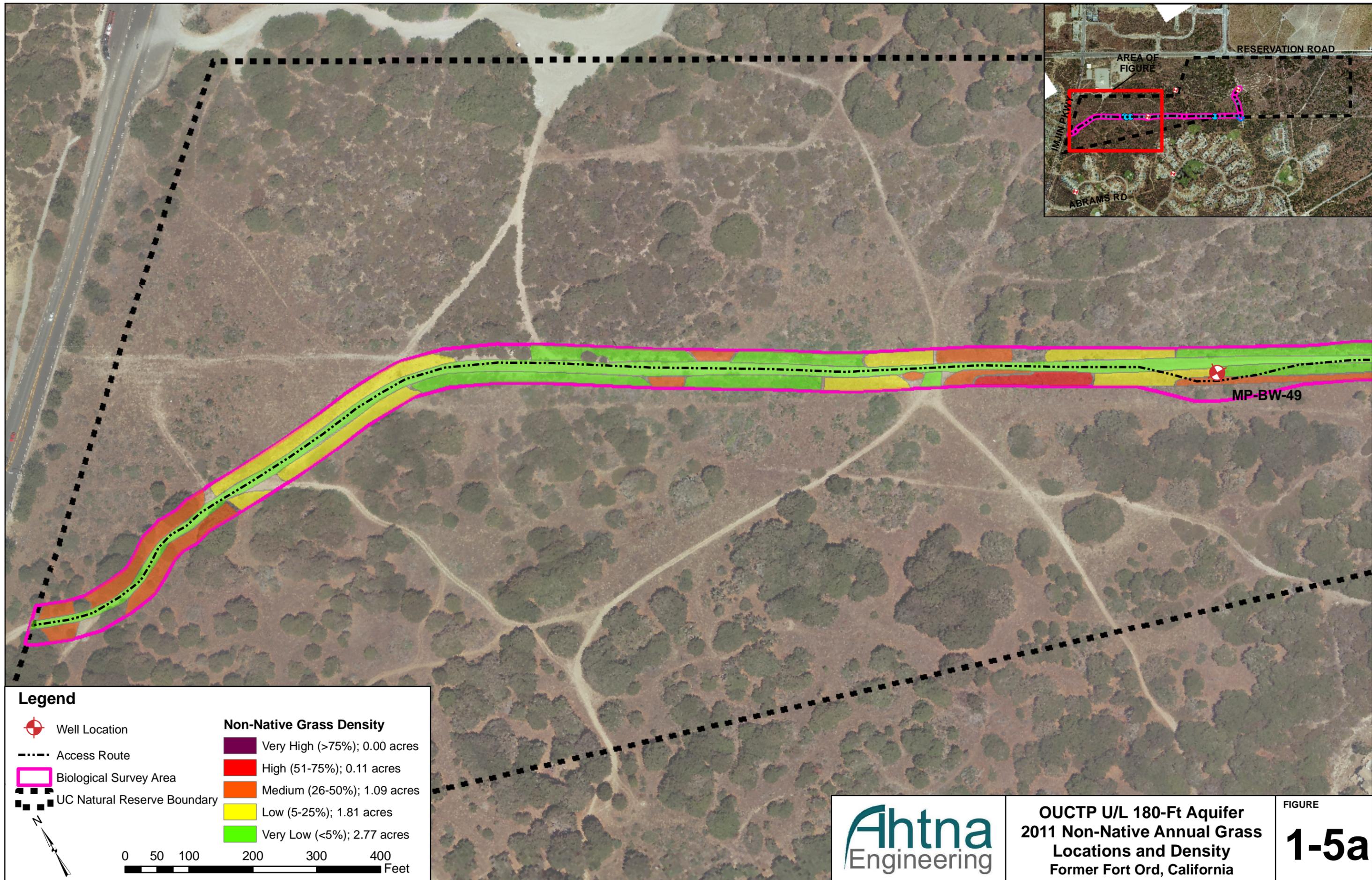
- Well Location
- Access Route
- BW-51 Staging Area
- Biological Survey Area
- UC Natural Reserve Boundary
- Sparse (3-25%); 0.10 acres
- Medium Low (26-50%); 0.25 acres
- Medium (51-75%); 0.01 acres

0 50 100 200 300 400 Feet



OUCTP U/L 180-Ft Aquifer  
 2011 Monterey Spineflower >3%  
 Former Fort Ord, California

FIGURE  
**1-4b**



**Legend**

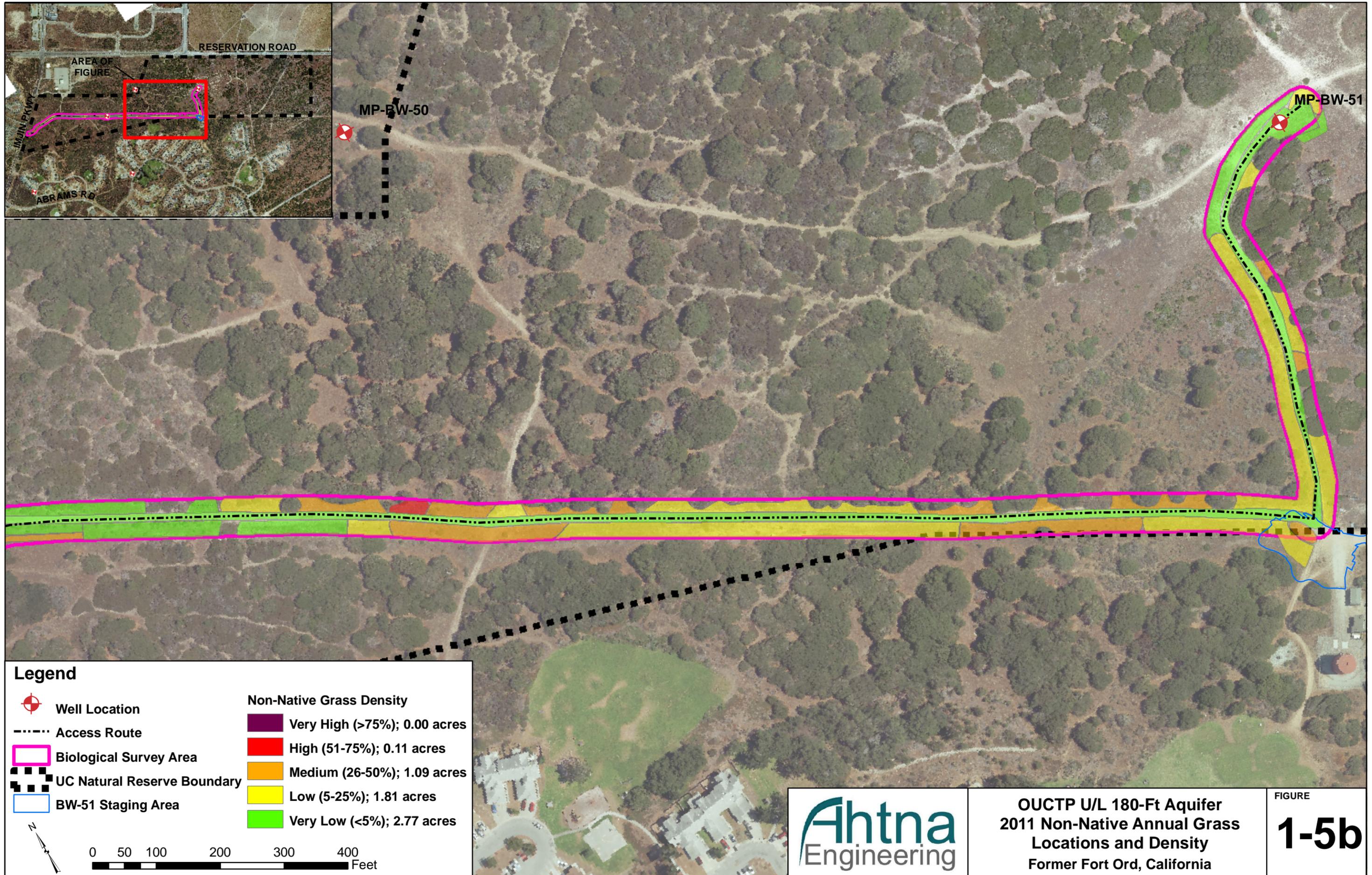
-  Well Location
-  Access Route
-  Biological Survey Area
-  UC Natural Reserve Boundary

Non-Native Grass Density	
	Very High (>75%); 0.00 acres
	High (51-75%); 0.11 acres
	Medium (26-50%); 1.09 acres
	Low (5-25%); 1.81 acres
	Very Low (<5%); 2.77 acres



OUCTP U/L 180-Ft Aquifer  
 2011 Non-Native Annual Grass  
 Locations and Density  
 Former Fort Ord, California

FIGURE  
**1-5a**



**Legend**

- Well Location
- Access Route
- Biological Survey Area
- UC Natural Reserve Boundary
- BW-51 Staging Area

Non-Native Grass Density	
	Very High (>75%); 0.00 acres
	High (51-75%); 0.11 acres
	Medium (26-50%); 1.09 acres
	Low (5-25%); 1.81 acres
	Very Low (<5%); 2.77 acres

0 50 100 200 300 400 Feet



OUCTP U/L 180-Ft Aquifer  
 2011 Non-Native Annual Grass  
 Locations and Density  
 Former Fort Ord, California

FIGURE  
**1-5b**

## Photographs



Photograph 2.1a, b – Two views of main access route through the FONR South Reserve (Old County Road). Work vehicles remained on roads at all times except to use designated turnaround and staging areas.



Photograph 2.2 –Plywood boards for staging the drill rig and support truck at well site MP-BW-49.



Photograph 2.3 – Drill rig and support truck staged on plywood boards at well site MP-BW-49.



Photograph 2.4 – The road edge opposite the MP-BW-49 site with fencepost and flagging to protect Monterey spineflower habitat close to the work area.



Photograph 2.5 – Mats of high density Monterey spineflower along the main road edge. Traffic remained inside the roadbed of the main route and did not impact these areas.



Photograph 2.6a,b – Views of well site MP-BW-49 in June 2011 after work completion. Views show areas of both low vegetation cover in compacted soil areas (top), and patches of annual grasses (bottom).



Photograph 2.7 – MP-BW-51 equipment staging area near main road. This area was degraded habitat with iceplant mats (foreground) so there was no impact to rare HMP-listed species.



Photograph 2.8 –Drill rig in place at well site MP-BW-51 with soil core lay-down area (plastic tarp).



(a)



(b)



(c)

Photograph 2.9a-c –Views of access route from the main road (a,b) to the well site MP-BW-51 (c).



Photographs 2.10 – Well site MP-BW-51 in June 2011 after work completion, showing the sparse vegetation due to soil compaction.



Photographs 2.11 – Black legless lizard encountered at well site MP-BW-51 in January 2011 during the drilling operation.



Photograph 2.12 – A sand gilia area fenced off along main access route.



Photograph 2.13 – Typical sand gilia plant in FONR reserve during survey.