2011 ANNUAL BIOLOGICAL MONITORING REPORT
FORMER FORT ORD, CALIFORNIA

WORLDWIDE ENVIRONMENTAL REMEDIATION SERVICES
CONTRACT NO. W912DY-10-D-0024

AND

TOTAL ENVIRONMENTAL RESTORATION CONTRACT
CONTRACT NO. DACW05-96-D-0011

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List of Acronyms and Abbreviations

Army	U.S. Department of the Army
BLL	Black Legless Lizard
BLM	Bureau of Land Management
BRAC	Army's Base Realignment and Closure
cm	centimeter
CTP	Carbon Tetrachloride Plume
CTS	California Tiger Salamander
DD&A	Denise Duffy & Associates, Inc.
FONR	Fort Ord Natural Reserve
ft	foot
GIS	Geographic Information System
GPS	Global Positioning System
HA	Historical Area
HMP	Habitat Management Plan
HRP	Habitat Restoration Plan
ITSI	Innovative Technical Solutions, Inc.
m	meters
OU	Operable Unit
OUCTP	Operable Unit Carbon Tetrachloride Plume
Shaw	Shaw Environmental, Inc.
TERC	Total Environmental Restoration Contract
U/L	Upper/Lower
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WERS	Worldwide Environmental Remediation Services Contract

1.0 Introduction

This report contains results of the 2011 biological monitoring surveys which are 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). This report was prepared by Innovative Technical Solutions, Inc. (ITSI) under the Worldwide Environmental Remediation Services (WERS) No. W912DY-10-D-0024 and includes biological monitoring activities conducted by Shaw Environmental, Inc. (Shaw) under the Total Environmental Restoration Contract II (TERC) No. DACW05-96-D-0011. In addition to the HMP, four Biological Opinions have been issued by the U.S. Fish and Wildlife Service ([USFWS], 1999, 2002, 2005, and 2011) as a result of consultation with the Army, which contain additional mitigation measures and recommendations relating to biological monitoring at former Fort Ord cleanup sites.

This report includes: results of biological monitoring performed by ITSI/Shaw in 2011 and a description of the mitigations and avoidance measures, biological trainings, HMP species encounters, and other habitat and species protection measures required by the HMP and the Biological Opinions.

The HMP identifies rare, threatened, or endangered species and habitats occurring on the 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 the monitoring surveys. There are three special-status annual plants that may occur within maritime chaparral, coastal scrub, grasslands, or disturbed areas: sand gilia (*Gilia tenuiflora arenaria*), Monterey spineflower (*Chorizanthe pungens pungens*), and Seaside bird's-beak (*Cordylanthus rigidus littoralis*). Five special-status shrubs or perennial species may occur within maritime chaparral: Hooker's manzanita (*Arctostaphylos hookeri hookeri*), sandmat manzanita (*A. pumila*), Monterey manzanita (*A. montereyensis*), Monterey ceanothus (*Ceanothus cuneatus* var. *rigidus*), Eastwood's goldenbush (*Ericameria fasciculata*), and Yadon's piperia (*Piperia yadonii*). The California Black Legless Lizard (*Anniella pulchra nigra*; BLL) is an HMP-recognized rare variety of California legless lizard that inhabits dune sand-type habitats on the former Fort Ord. Wetland species listed in the HMP are: California tiger salamander (*Ambystoma californiense*; CTS), California linderiella (*Linderiella occidentalis*), and Contra Costa goldfields (*Lasthenia*

conjugens). These species are typically found in vernal or seasonal ponds on the former Fort Ord.

The HMP also outlines avoidance and mitigation measures, such as habitat restoration, which are necessary if the U.S. Department of the Army (Army)'s cleanup activities significantly impact protected species or habitats. These cleanup activities include munitions removal, soil remediation, groundwater remediation, and other related environmental cleanup operations within Fort Ord lands designated as Habitat Reserve. To determine whether mitigation measures would be needed to restore populations of affected HMP-listed species, the HMP requires that a baseline biological survey is conducted within a proposed cleanup site to establish whether protected species are present prior to work operations, and map the locations and quantify abundance. The HMP subsequently requires three to five monitoring events following completion of the cleanup operations to determine whether work activities have significantly impacted rare species or habitat. Monitoring data are compared to a site's baseline data to determine if recovery or restoration of the protected habitat (maritime chaparral, wetlands, etc.) and associated species are proceeding toward baseline conditions.

2011 Biological Monitoring Sites Included in This Report

For the 2011 monitoring season, ITSI/Shaw was tasked by USACE to conduct the following baseline and follow-up biological surveys for former Fort Ord sites where work related to the environmental cleanup has either already begun or will begin in the future:

- **OUCTP System 2B:** Second year of follow-up monitoring after well installation and groundwater remediation activities on the University of California's Fort Ord Nature Reserve (FONR)-North.
- **OUCTP Upper/Lower (U/L) 180-ft Aquifers:** First year of follow-up vegetation survey for one well location, underground pipeline, and associated staging areas on the University of California's FONR-South.
- **Soil remediation sites HA-28, HA-34, and HA-37:** Baseline vegetation monitoring for additional excavation areas.
- **BLM North:** Baseline vegetation monitoring for mowing of meandering transects in order to conduct digital geophysical mapping.

Other Activities in 2011 Included in This Report

In addition to annual monitoring, this report describes mitigation and avoidance measures that were implemented during work conducted by ITSI/Shaw in 2011 on the following sites:

- **Soil remediation sites:** HAs 18, 19, 26, 28, 34, 37, 38, 39/40, and 44
- **Munitions removal sites:** Units 4, 11, 12, 15, 21, 32, and 34.

2.0 OUCTP System 2B (Groundwater) – Second Year Follow-Up Biological Monitoring Survey

2.1 OUCTP System 2B - Introduction

Vegetation monitoring was conducted within the FONR where 16 wells were installed between January and March 2010 (Figure 2-1). The wells were installed as part of the ongoing groundwater remediation of the Carbon Tetrachloride Plume (CTP) within the Lower 180-foot Aquifer (System 2B). In June and July 2011, an aboveground pipeline system connecting wells to the sampling trailer was installed. Groundwater remediation activity and sampling continued through 2011. The description of the project is in the *Final Operable Unit Carbon Tetrachloride Plume Remedial Action Work Plan, Former Fort Ord, California* (USACE, 2009b).

Three years of follow-up monitoring after completion of the project is required for sites in HMP-designated habitat areas where groundwater remediation takes place. This report summarizes results of the second year follow-up monitoring for the OUCTP System 2B area. The baseline and first year of follow-up monitoring surveys are presented in the 2009 and 2010 *Annual Biological Monitoring Reports* (USACE, 2010, 2011) respectively. At least one more year of monitoring will be conducted to assess the condition of HMP annual plant populations within this study area relative to the baseline data. An additional year will be conducted if deemed necessary, because the first monitoring event occurred so soon after the well installations in 2010.

2.2 OUCTP System 2B - Methods

For consistency with past surveys, the methods used for the 2011 surveys were the same as those used for vegetation surveys at FONR completed previously by Hydrologic, Inc. with Denise Duffy and Associates, Inc. (DD&A); and Shaw (USACE, 2008, 2009a, and 2010a, 2011).

Sand gilia populations were surveyed between late April and early May to capture the peak bloom. Sand gilia patches were mapped using a Global Positioning System (GPS), and the total number of plants was recorded for each patch.

The Monterey spineflower survey was conducted between mid-May and mid-June to capture peak densities, as measured by percent ground cover. Monterey spineflower areas were mapped to show both overall distribution over the study site and also distribution of the patches in the higher density classes (i.e. those greater than "Very Sparse"). Monterey spineflower density classes (consistent with previous FONR surveys) were as follows:

Very Sparse = <3%
Sparse = 3-25%

Medium-Low = 26-50%
Medium = 51-75%
Medium-High = 76-97%
High = 98-100%

Seaside bird's-beak was searched for during Monterey spineflower surveys when the species is visible but not yet in bloom. Peak bloom for census is in late August.

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

Very Low = <3%
Low = 3-25%
Medium = 26-50%
High = 51-75%
Very High = >75%

2.3 OUCTP System 2B - Results and Discussion

Monterey spineflower and sand gilia were both observed during the surveys; however, Seaside bird's-beak was not found. Additionally, two HMP-listed shrub species, sandmat manzanita and Monterey ceanothus, were observed on site. Views of the locations of some of the well sites taken during the monitoring survey are shown in Photographs 2-1 through 2-9.

2.3.1 Sand Gilia Survey

The results of the 2011 monitoring for sand gilia are shown below in Table 2-1 with a comparison to the results of monitoring in 2010 and 2009. A total of 771 sand gilia individuals were observed within an area of approximately 0.1 acre. The location and total area of sand gilia observed during the survey are shown in Figure 2-2, with total number of plants per patch identified. The term "patch" refers to the location of a close grouping of plants which are likely to be germinating from a local seed bank.

Table 2-1. OUCTP System 2B Sand Gilia Survey Results

	2011	*2010*	*2009*
Total Area	**0.1**	0.1	0.06
Total Number of Plants	**771**	1,836	213

The overall number of plants was over 1,000 less than in 2010. This reduction in population is particularly apparent in the larger patches of sand gilia, which were reduced by more than 50% of their 2010 counts. It is unlikely that the reduction in population resulted from the groundwater monitoring work conducted in 2011, as evidenced by the reduction in sand gilia

counts in other survey areas of the former Fort Ord (please refer to survey results in Sections 3.3.1 and 4.2 below). Additionally, the overall total for 2011 was still more than three times greater than what was observed in 2009, which suggests that the population is recovering well from the disturbance.

2.3.2 Monterey Spineflower Survey

The results of the 2011 monitoring for Monterey spineflower are shown below in Table 2-2 with a comparison to the results of monitoring in 2010 and 2009. The total area of Monterey spineflower observed within the OUCTP System 2B area was 2.2 acres, as shown in Figure 2-3. Approximately 87% of occupied spineflower habitat was in the very sparse cover category. The remaining 13% of the mapped area consisted of patches of sparse, medium-low, and medium density Monterey spineflower. Areas with cover greater than very sparse (i.e. >3% cover) are shown in Figure 2-4. Distribution of Monterey spineflower was concentrated within two to five feet of shrub edges where non-native grass cover tended to be low. In these areas, cover was very often in the higher cover classes. Monterey spineflower was mostly absent on mowed fuel breaks greater than four to six feet from the shrub edges.

Table 2-2. OUCTP System 2B Monterey Spineflower Survey Results

Cover Class	**Area (acres) of Monterey Spineflower**		
	2011	*2010*	*2009*
Very Sparse (0-3%)	**1.92**	1.56	1.6
Sparse (4-25%)	**0.10**	0.05	0.13
Medium-Low (26-50%)	**0.11**	0.12	0.01
Medium (51-75%)	**0.07**	0.05	0
Medium High (76-97%)	**0**	0.02	0
High (98-100%)	**0**	0	0
Total Area:	**2.2**	1.8	1.74

The total area of Monterey spineflower within the OUCTP System 2B area has increased slightly since 2010; however, the majority of the area inhabited remains within the very sparse cover class. This data suggests that the Monterey spineflower population is recovering well from the disturbance.

2.3.3 Seaside Bird's-Beak Survey

No Seaside bird's-beak plants were encountered during the 2011 survey. This species was not found during any of the previous surveys of this work site.

2.3.4 Annual Grass Survey

The results of the 2011 monitoring for annual grasses are shown below in Table 2-3 with a comparison to the results of monitoring in 2010 and 2009. The location and densities of annual grasses within the site are shown in Figure 2-5.

Table 2-3. OUCTP System 2B Annual Grass Survey Results:

Cover Class	Area (acres) of Non-Native Annual Grasses		
	2011	*2010*	*2009*
Very Low (0-5%)	**7.8**	7.8	7.7
Low (6-25%)	**0.8**	0.3	0
Medium (26-50%)	**1.0**	1.7	1.9
High (>50%)	**0.2**	0	0
Total Area:	**9.8**	9.8	9.6

Total annual grass cover was distributed mainly in the very low cover class and in the same general location as the 2010 and 2009 data. Most of the perimeter fuel break had grass at medium and low density. Within the shrub line and along a swathe about two to five feet from the shrub line, annual grasses occurred at very low density. Some small sections of the access routes had annual grass cover decrease from medium to low cover. This appeared to be due to ground compaction and general disturbance, resulting from well installation activity in 2010. Examples are access routes to wells BW-145A, BW-147A, and BW-149A. However, there were also areas that increased from medium to high cover, and the area around BW-132A increased from either very low or low to medium cover. These locations, particularly those that were originally in the very low cover class, will continue to be monitored in the future to determine whether there is significant encroachment of non-native annual grasses in these areas, particularly where sand gilia or Monterey spineflower are present.

Annual grass encroachment, if persistent, can obscure available habitat for these sensitive HMP annual species. Annual Fusilade® treatment or seasonally-timed mechanical vegetation clearance are possible methods that will be considered for well locations and access routes if it is determined, through continued monitoring, that there is a significant increase in grass densities in previously low cover areas that results in a reduction of HMP species abundance.

2.4 OUCTP System 2B - HMP Species Mitigation and Avoidance

2.4.1 Black Legless Lizard Encounters

No BLLs were encountered during the work conducted in 2011 at the CTP System 2B site. The sandy soils and vegetation types at the site are known to be potential habitat for this species, which are historically known to be present on the FONR. Site personnel were briefed on

identification of this species and the protocol to be followed if found. The ITSI biologist was the contact person in case of BLL encounters.

2.4.2 California Tiger Salamander Encounters

No CTS were encountered during work conducted in 2011 at the OUCTP System 2B site. While there are no vernal ponds on the FONR property, CTS could potentially be encountered on site during migration periods. As such, work was planned during the dry season as much as possible. Site personnel were briefed on identification of this species and the protocol to be followed if found. Any CTS individuals encountered are required to be reported immediately to both the ITSI biologist and the Army's Base Realignment and Closure (BRAC) Natural Resource Manager. The USFWS permits only these persons to properly handle and relocate CTS, if necessary.

2.4.3 Sandmat Manzanita

Sandmat manzanita stands occur in several areas of the work site. There were two well locations, BW-148A and BW-150A, where wider access required mowing in 2010 of one to two feet on each side of an existing pathway within sandmat manzanita stands. While many species of chaparral shrubs crown-sprout after cutting, sandmat manzanita does not re-sprout from branches cut to the ground. Typically, mowed sandmat will regrow slowly from the remaining leafy plant branches, if in healthy condition. Shrub regrowth was observed in 2011, as shown in Photograph 2-4, and will continue to be monitored during future follow-up surveys.

2.4.4 Other Site Impacts

Work zones, access routes, and all staging of equipment were planned to avoid sensitive maritime chaparral habitat and HMP species areas as much as possible. There were no additional work impacts in the year between the baseline and this current monitoring survey. During well installation, some areas of brush were cut, pruned, or mowed to widen the access route into several wells that are set back in the vegetation. A cleared width of eight feet was needed to access the following wells: BW-132A, BW-143A, BW-148A, BW-149A, BW-150A, and BW-152A. The total distance mowed (including the sandmat areas) was approximately 820 feet by four feet on average of shrub cover. Vegetation within these areas, other than the sandmat manzanita areas discussed above, consisted of shaggy bark manzanita (*Arctostaphylos tomentosa*), chamise (*Adenostoma fasciculata*), and California sagebrush (*Artemisia californica*). Some small coast live oak trees (*Quercus agrifolia*) were also pruned to gain access to some well locations. Additionally, heavy-duty synthetic matting was placed on the ground on access routes into all wells in areas considered sensitive due to known presence of HMP annuals, or with a significant percentage of native plants and low cover of weedy annual grasses.

3.0 OUCTP Upper/Lower 180-ft Aquifer (Groundwater) – First Year Follow-up Monitoring Survey

3.1 OUCTP U/L 180-ft Aquifer - Introduction

A vegetation survey was conducted in the southern portion of the FONR where well EW-OU2-09-180 and an associated underground pipeline were installed (Figure 3-1). The well was installed in June 2010, while the underground pipeline was installed in January 2011. Groundwater remediation activity and sampling continued through 2011. The description of this phase of the ongoing OUCTP remediation is contained in the *Final Operable Unit Carbon Tetrachloride Plume Upper 180-foot Aquifer Remedial Design, Former Fort Ord, California* (USACE, 2010b) and *Final Operable Unit Carbon Tetrachloride Plume Lower 180-foot Aquifer Remedial Design, Former Fort Ord, California* (USACE, 2010c).

In accordance with the HMP and Biological Opinions, three years of follow-up monitoring after completion of the project will be required for areas impacted by work activities within the FONR. This report summarizes results of the first year follow-up monitoring for the OUCTP Upper/Lower (U/L) 180-foot Aquifer area. The baseline monitoring surveys are presented in the 2010 *Annual Biological Monitoring Reports* (USACE, 2011). The area will be subject to two more years of follow-up monitoring to document any change in HMP annual plant populations within the impacted area. The 2011 data presented here will be used for comparison along with reference data presented in Section 4.

3.2 OUCTP U/L 180-ft Aquifer - Methods

Methods for the 2011 surveys within the OUCTP U/L 180-ft Aquifer area were the same as those described in Section 2.2 above. The biological survey area covered the well location, underground pipeline, and access routes, including a 50-foot swath on either side of the access routes. The surveys were conducted in April and May, at the respective peak bloom times for sand gilia and Monterey spineflower, and when Seaside bird's beak can be identified. Although the well was installed in 2010, this was the first follow-up survey for both the well and underground pipeline, as 2011 was the first spring season following the installation. The biological survey area showing the well location, access routes, and underground pipeline route is shown in Figure 3-1.

3.3 OUCTP U/L 180-ft Aquifer - Results and Discussion

Monterey spineflower and sand gilia were both observed during the surveys within the OUCTP U/L 180-ft Aquifer area; however Seaside bird's-beak was not found. Additionally, two HMP-listed shrubs, sandmat manzanita and Monterey ceanothus, were both observed within the

maritime chaparral plant community on the site. Views of the locations of the access route and exclusion flagging taken during the monitoring survey are shown in Photographs 3-1 and 3-2.

3.3.1 Sand Gilia Survey

The results of the 2011 monitoring for sand gilia are shown below in Table 3-1 with a comparison to the results of monitoring in 2010. The location and total area of sand gilia observed during the survey are shown in Figure 3-2, with the total number of plants per patch identified. As shown in this figure, the access and pipeline routes for the EW-OU2-09-180 extraction well were close to the sand gilia patches. Avoidance measures, as identified below in Section 3.4, were employed in order to minimize impacts to this species and other rare plant habitat

Table 3-1. OUCTP U/L 180-ft Aquifer Sand Gilia Survey Results

	2011	*2010*
Total Area	**0.10**	0.04
Total Number of Plants	**138**	768

The overall number of plants decreased significantly from that observed in 2010. This reduction in population is largely due to no individuals being observed within an area north of the well that supported over 400 individuals in 2010. It is unknown why sand gilia was not observed in this area in 2011, as no work activities or access routes occurred within this area. Additionally, it is unknown at this time if the reduction in the overall population resulted from the groundwater monitoring work conducted in 2011, as there was also a reduction in sand gilia counts in other survey areas of the former Fort Ord (please refer to survey results in Sections 3.3.1 and 4.2).

3.3.2 Monterey Spineflower Survey

The results of the 2011 monitoring for Monterey spineflower are shown below in Table 3-2 with a comparison to the results of monitoring in 2010. The total distribution of Monterey spineflower within the survey area is shown in Figure 3-3. This figure also shows that the access routes for the EW-OU2-09-180 extraction well were close to the Monterey spineflower patches. Avoidance measures, as identified below in Section 3.4, were employed in order to minimize impacts to this species and other rare plant habitat.

Table 3-2. OUCTP U/L 180-ft Aquifer Monterey Spineflower Survey Results

Cover Class	Area (acres) of Monterey Spineflower	
	2011	*2010*
Very Sparse (0-3%)	**0.20**	0.48
Sparse (4-25%)	**0.00**	0.01
Medium-Low (26-50%)	**0.00**	0.01
Medium (51-75%)	**0.00**	0.00
Medium High (76-97%)	**0.00**	0.00
High (98-100%)	**0.00**	0.00
Total Area:	**0.20**	0.50

The total area of Monterey spineflower within the OUCTP U/L 180-ft Aquifer area has decreased by more than half since 2010. However, as this is the first year of follow-up monitoring within this area, continued monitoring is required determine if the installation of the well, underground pipeline, and access routes have significantly reduced the Monterey spineflower population within the site.

3.3.3 Seaside Bird's Beak Survey

No Seaside bird's beak plants were encountered in this survey. This species was not found during the baseline surveys of this work site.

3.3.4 Annual Grass Survey

The results of the 2011 monitoring for annual grasses are shown below in Table 3-3 with a comparison to the results of monitoring in 2010. The location and densities of annual grasses are shown in Figure 3-4.

Table 3-3. OUCTP U/L 180-ft Aquifer Annual Grass Survey Results:

Cover Class	Area (acres) of Non-Native Annual Grasses	
	2011	*2010*
Very Low (0-5%)	**0.50**	0.64
Low (6-25%)	**0.70**	0.78
Medium (26-50%)	**0.80**	1.35
High (51-75%)	**0.00**	0.10
Very High (>75%)	**0.00**	0.00
Total Area:	**2.00**	2.87

Overall cover of annual grasses within the OUCTP U/L 180-ft Aquifer area decreased slightly in 2011, with a reduction in all cover classes previously observed. No high density areas were observed in 2011, compared to approximately 0.1 acre observed in 2010.

These locations will continue to be monitored to determine whether there is significant encroachment of non-native annual grasses in these areas, particularly where sand gilia or Monterey spineflower are present.

Annual grass encroachment, if persistent, can obscure available habitat for these sensitive HMP annual species. Annual Fusilade® treatment or seasonally-timed mechanical vegetation clearance are possible methods that will be considered for the well location and access routes, if a significant increase in grass densities in low cover areas is observed during future monitoring that results in a reduction of HMP species abundance.

3.4 OUCTP U/L 180-ft Aquifer - HMP Species Mitigation and Avoidance

3.4.1 Black Legless Lizard Encounters

BLL were not encountered during the work conducted by ITSI/Shaw in 2011. The sandy soils and vegetation type at the site are known habitat for the BLL, and the species has historically been encountered on the FONR. Site personnel were briefed on identification of this species and the protocol to be followed when encountered.

3.4.2 California Tiger Salamander Encounters

CTS were not encountered on site during ITSI/Shaw work in 2011. CTS could potentially be encountered during migration periods. As such, work was planned during the dry season as much as possible. Site personnel were briefed on identification of this species, and the protocol to be followed if found. Any CTS individuals encountered are required to be reported immediately to both the ITSI Biologist and the BRAC Natural Resource Manager. The USFWS permits only these persons to properly handle and relocate CTS, if necessary.

3.4.3 Maritime Chaparral and HMP Plant Species

Work zones, access routes, and all staging of equipment were planned to avoid sensitive maritime chaparral habitat and HMP species areas as much as possible. The work site, access routes, and staging areas were defined clearly by fencing and flagging to minimize work footprint. Additionally, heavy-duty synthetic matting was placed on the ground on access routes into areas considered sensitive due to known presence of HMP annuals, or with a significant percentage of native plants and low cover of weedy annual grasses.

4.0 Plant Survey Reference Plots

4.1 Reference Plots - Introduction

Three reference plots were established within the FONR in spring 2010 to monitor population abundance trends of the HMP-listed annual plant species, sand gilia and Monterey spineflower. These 100-square meter plots (mostly 5x20 m configuration) were set up in areas that had high sand gilia and Monterey spineflower abundance in 2010. In addition to these plots, two small locations (Reference Plots 4 and 5) within the OUCTP Pilot Study Survey Area will continue to provide sand gilia reference data. These are not established plots but rather natural openings in the chaparral in undisturbed locations. They have been included in the plant monitoring for four consecutive years. These areas will also continue to be monitored annually for sand gilia reference data as long as they remain undisturbed. Plot locations are shown in Figure 4-1.

Variation in population abundance from year to year is particularly evident in sand gilia, and reference plots provide data on natural environmental factors, such as rainfall and temperature patterns. This makes it possible to separate out the effect of work impacts from variation due to natural environmental causes.

The established plots were monitored on April 26, 2011. The results will be used to interpret the monitoring data for HMP species on the CTP and other habitat reserve project sites.

4.2 Reference Plots - Results

The results of the 2011 monitoring for sand gilia are shown below in Table 4-1 with a comparison to the results of monitoring in previous years. Figure 4-1 shows the location of the plots and numbers of sand gilia plants in relation the surrounding site.

Table 4-1. Reference Plot Sand Gilia Results

Year	Number of Sand Gilia Plants Per Reference Plot				
	Plot 1	*Plot 2*	*Plot 3*	*Plot 4*	*Plot 5*
2011	**122**	**190**	**125**	**126***	**158**
2010	130	100**	120	455	1645
2009	N/A	N/A	N/A	248	1000
2008	N/A	N/A	N/A	14	33
2007	N/A	N/A	N/A	93	52

* Please note that there was a lot of gopher activity in the plot, leaving mounds of bare soil.

** Please note that this count is much lower than the number of plants present because plants were diminutive and most had gone to seed and were not visible at the time of the count. The number of plants is likely much higher.

In addition, Monterey spineflower data was collected within Reference Plot 2. The results of the 2011 monitoring for Monterey spineflower are shown below in Table 4-2 with a comparison to the results of monitoring in 2010.

Table 4-2. Reference Plot 2 Monterey Spineflower Results

Cover Class	Area (sqm) of Monterey Spineflower	
	2011	**2010**
Very Sparse (0-3%)	**50.5**	0.0
Sparse (4-25%)	**56.7**	0.0
Medium-Low (26-50%)	**1.5**	71.5
Medium (51-75%)	**0.0**	0.0
Medium High (76-97%)	**0.0**	0.0
High (98-100%)	**0.0**	0.0
Total Area:	***108.7***	*71.5*

5.0 Site 39 - Soil Remediation Activities

5.1 Baseline Vegetation Monitoring for Additional Excavation Areas

There are several former ranges, or Historical Areas (HAs), on former Fort Ord where soil remediation for lead or munitions-related contamination is necessary. To protect wetland habitats and rare, threatened, or endangered species that could be impacted by these activities, baseline monitoring surveys are conducted before work begins. Baseline surveys consist of shrub transect surveys to characterize the maritime chaparral vegetation communities on the sites and in the surrounding areas, and annual plant surveys to identify locations and population size of the HMP annual species sand gilia, Monterey spineflower, and Seaside bird's-beak. Transect data has been recorded for many of these sites in previous monitoring reports.

This section presents shrub transect data, and quadrat data where appropriate, that was needed as a result of additional excavation areas that were identified in 2011 during follow-up soil sampling of HA-28 and HA-37. Shrub transect data was also needed for HA-34; however, due to the presence of munitions and unstable terrain, no transects were installed. Instead, visual observations and a species list were made to characterize the site's vegetation. The locations of these sites within the Site 39 (Impact Area) are shown in Figure 5-1.

Annual plant surveys were not conducted within these areas in 2011, as no HMP annuals were identified within these ranges during previous surveys and they have a low potential to occur.

The transect data, quadrat data, and species lists provided in this report describe and quantify species abundance in habitats surrounding the disturbed range areas. The baseline data will be used as a reference for the success criteria that will assess the recovery of protected species or habitats on the sites following restoration (if restoration is required), or to ascertain that natural recovery of sites is adequate to ensure conservation of HMP species or habitats.

5.1.1 Additional Excavation Areas - Baseline Vegetation Monitoring - Methods

Methods for vegetation monitoring were consistent with the *Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-wide Multispecies Habitat Management Plan at Former Fort Ord* (USACE, 2006b), with exceptions as noted below.

The line-intercept vegetation sampling was conducted along transects approximately 50 meters (m) in length. Line transects were placed to represent a variety of different locations, vegetation stand-ages, species diversity, and disturbance levels within the sites. Cover for each shrub or perennial species, bare ground, woody litter, or herbaceous cover was measured as the distance in centimeters (cm) covered by each species or ground cover along the length of the transect. Percent cover for each species was then estimated as the relative distance covered by each

species along the transect. Additional species occurring within 10 meters of the transect were also noted to provide additional species diversity data for each location.

Quadrat data was also collected along transects that exhibited a large proportion of herbaceous species cover in order to assess the suite of species present. One-quarter meter square (50x50cm) quadrats were placed at 100 cm intervals along the transect starting at 0 cm. The percent relative cover of each species within the quadrat was recorded.

Species lists were compiled for each HA and included species observed on the transects and within 20 feet on either side of the transects.

5.1.2 Additional Excavation Areas - Baseline Vegetation Monitoring - Results

Summary descriptions of the transects within each HA are provided below to characterize the conditions within the additional excavation areas. Overall habitat quality has already been mapped for all three HA sites in previous reports. Transect and quadrat data and the species list for each range are provided in Tables 5-1 through 5-6.

5.1.2.1 HA-28

The additional excavation areas within HA-28 were on a north-facing slope consisting primarily of disturbed maritime chaparral with a significant component of non-native weed species and bare ground (Figure 5-2). Transect surveys were conducted on January 19 and 20, 2011. Four transects were established to characterize this vegetation, as the excavation area was located on different aspects. Overall habitat quality was determined to be high due to the presence of chaparral and the HMP species, Monterey manzanita. Transect data, quadrat data, and a species list are presented in Tables 5-1 through 5-3. The location of the additional HA-28 excavation areas are shown on Figure 5-2. The exact locations of the transects are not known and as such are not shown on this figure. However, the cover type is consistent with the expansion area on the north-facing slopes, and the data will be used as the baseline data for the restoration of the hillside.

Transect 1: This transect was located in disturbed maritime chaparral along the grade of the steep slope. The area had patches of bare ground and old target boxes present, indicating prior disturbance. Shaggy-barked manzanita was the most common species in cover, followed by sandmat manzanita and Monterey manzanita. A portion of the transect (approximately 6.8 m) was within an area that had already been excavated. As such, this area was not included in the data analysis and is not included in the data presented in Table 5-1.

Transect 2: This transect covered coyote brush scrub near the base of the slope and herbaceous cover in the flat area on the edge of the wetland (approximately 28 m of the transect). Within the scrub, coyote brush (*Baccharis pilularis*) was the most common species in cover, followed by

poison oak (*Toxicodendron diversilobum*) and sticky monkey flower (*Mimulus aurantiacus*). Coyote brush was also present within the wetland edge; however, forb and grass species were dominant within this habitat type. As such, quadrat data was taken along this transect to assess the suite of herbaceous species present. Dominant herbaceous species observed within the quadrats included Baltic rush (*Juncus balticus*), unidentified grasses, and short-stemmed sedge (*Carex brevicaulis*). Table 5-2 includes the data collected within the quadrats.

Transect 3: This transect was located in disturbed maritime disturbed chaparral along the grade of the slope. This transect has had significant past disturbances, as indicated by the presence of target boxes, gravel, and invasive plant species, such as pampas grass (*Cortaderia jubata*) and acacia (*Acacia longifolia*).

Transect 4: This transect was located in coyote brush scrub along a moderate slope. This transect has had significant past disturbances, as indicated by the presence of multiple target boxes and associated underground electrical wiring. This was reflected in the patchy shrub cover and areas of established pampas grass and iceplant (*Carpobrotus edulis*). However, there was substantial forb diversity and the lower coyote brush-dominated zone was moister and had large areas of dead iceplant litter, which provides good substrate for many native seedlings. Coyote brush was the most common species in cover, followed by poison oak and California blackberry (*Rubus ursinus*). Additionally, some areas were dominated by Baltic rush, which is an obligate wetland indicator species listed on the *National List of Vascular Plant Species that Occur in Wetlands* (USFWS, 1988).

5.1.2.2 HA- 34

The additional excavation area within HA-34 could not be accessed for transect sampling due to the combined density of vegetation and the steepness of the terrain (Figure 5-3). As such, shrub species composition was observed from the outside of the area. The survey was conducted in July 2011. Shrub species observed include chamise, Monterey manzanita, and shaggy-barked manzanita. Scattered coast live oak trees were also present. Hooker's manzanita was likely also present within the interior of the area based on previous surveys within the range. Habitat quality was determined to be high due to the presence of chaparral, the absence of non-native species in the shrub canopy, and the presence of HMP species Monterey manzanita. The location of the additional HA-34 excavation area is shown on Figure 5-3.

5.1.2.3 HA- 37

Four additional excavation areas were identified in June 2011 at HA-37. A general habitat assessment was conducted for these areas; however, transect data was not taken as the areas were small (less than 50 meters wide). Subsequently, a larger excavation area was identified in October 2011. Due to the size of this additional area, four transect surveys were conducted from October 17 through 19, 2011. The transects were placed in areas exhibiting different vegetation

types in order characterize the different habitats and suite of species present within the area. Overall habitat quality was determined to be high, due to the presence of chaparral and the absence of non-native species in the shrub canopy. The location of the additional HA-37 excavation areas identified in both June and October 2011 and the placement of the transects are shown on Figure 5-4. Transect data and species lists are presented in Tables 5-4 through 5-6. A summary of the results of both surveys is outlined below.

June 2011 Survey Results

Area 1: This site was a flat area that exhibited low quality habitat. Approximately 40% of the area was bare ground. Of the 60% vegetated area, approximately 50% of the species were non-native, including non-native annual grass species.

Area 2: This site was on a significant slope that supported central maritime chaparral on the upper 25% of the site but was dominated by herbaceous species in the lower portion of the site, including non-native annual grass species.

Area 3: This site supported predominantly central maritime chaparral but also some upland wetland edge habitat. Approximately 70-80% of the area was covered by shrubs, including shaggy-barked manzanita, coyote brush, chamise, hooker's manzanita, and coast silk tassel (*Garrya elliptica*). Within the open areas, approximately 48% of the cover was native perennial and annual species, 50% was covered by mowed woody litter, and 2% of the cover was non-native annual species. No HMP annual species were observed, and the habitat was not typical of any of these species.

Area 4: This site was within burned central maritime chaparral. Approximately 60% of the site was vegetated, mostly with herbaceous species. Less than 5% of the site was covered by shrubs, including chamise, shaggy-barked manzanita, and coyote brush. The abundance of native annual herbaceous species was much greater than non-natives.

October 2011 Survey Results

Transect 1: This transect was located in a flat area dominated by herbaceous species with sparse shrub cover. The most common shrub species identified was coyote bush, followed by poison oak.

Transect 2: This transect was located in central maritime chaparral that had been mowed and then burned in 2010. Vegetation was re-sprouting; however, vegetation cover was still low. Most of the area was open with large areas of bare ground and woody litter. The most common shrub species identified was shaggy-barked manzanita, followed by poison oak, chamise, and coyote brush.

Transect 3: This transect was located mostly in coyote brush scrub, with about 10 meters within central maritime chaparral, on the steeper sloped portions of the transect. Vegetation was low-growing, and shrub and herbaceous cover was very sparse. Most of the area was open with large areas of bare ground and leaf litter. The most common shrub species identified was coyote bush, followed by California blackberry and poison oak. Rush rose (*Helianthemum scoparium*), a low-growing perennial, was also dominant.

Transect 4: This transect was located in coyote brush scrub that had been mowed but not burned. Most of the area was open with large areas of woody litter and leaf litter. The most common shrub species identified was coyote brush, followed by sticky monkey flower and yellow bush lupine (*Lupinus arboreus*). Herbaceous cover was also present in small areas.

5.2 Site 39 Soil Remediation Activities - HMP Species Mitigation and Avoidance

During 2011, soil remediation activities were conducted at four of the Site 39 ranges: HAs 28, 34, 37, and 38. Activities included mowing of vegetation within the remediation footprint, excavation, staging and soil stockpiling, site recontouring, and erosion control. Measures were taken to reduce impacts to HMP species and habitat where possible. Mitigation measures for soil remediation are specifically addressed in the HMP, in the 1999 Biological Opinion (USFWS, 1999), and in the *Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord* (USACE, 2006a). These measures are summarized as follows:

- Access routes and staging areas for each site were planned ahead of time to minimize impacts to surrounding habitat and HMP species as much as possible. Existing roads and trails; 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, staging, and soil stockpiling wherever available.
- No grading for access roads was permitted in areas of high quality habitat where HMP species were present or in central maritime chaparral. Oak trees outside of remediation areas were avoided. Some branch pruning was conducted, as needed, to allow access using best management practices to create clean cuts.
- CTS measures were implemented from November through June or when adjacent vernal ponds were wet. Escape boards were placed in each corner of every excavation hole, regular ground checks were made during the rainy season, and employee briefings were conducted to ensure the field staff followed the protocols for CTS avoidance and reporting. The CTS encounters in 2011 are described below in Section 5.2.1.

- CTS exclusion fencing was installed in May 2011 along Barloy Canyon Road, near Pond 4 on Bureau of Land Management (BLM) land, and around a portion of Pond 10 to discourage any CTS from entering the HA-34 and HA-37 excavation areas, respectively.
- Work was stopped and excavation areas were surveyed by the ITSI biologist and workers trained to identify CTS, if substantial rainfall occurred (greater than 0.5-inches of rain in a 24-hour period). Work activities resumed once the ITSI biologist and the search crew determined that no CTS had dispersed into the area.
- Excavation areas and soil stockpiles were protected from erosion using appropriate erosion control materials (straw wattles and silt fencing).
- Erosion problems were treated by a combination of light grading of access routes to remove erosion ruts and to prevent further soil runoff, and use of straw wattles, silt fencing, and loose straw.
- Completed sites were treated for erosion control and preparation for future plant restoration. Excavation areas were re-contoured using heavy equipment to grade the excavation edges into the surrounding area. Barley seed was spread at the rate of 100 pounds per acre and rice straw (certified weed-free) was spread at a rate of 40 bales per acre, using a mechanical straw blower, and crimped into the soil to stabilize it. Habitat restoration plans are provided in the *Final, Habitat Restoration Plan, Site 39 Inland Ranges, Former Fort Ord, California* (HRP; Army, 2009).

Soil remediation activities within HAs 18, 19, 26, 39/40, and 44 (Figure 5-1) were completed in 2010; however, erosion control measures were not put into place until early 2011. As such, monitoring for erosion issues within these four ranges was conducted until all measures were put into place.

6.0 BLM North Parcel Baseline Vegetation Monitoring

The area remaining for digital geophysical mapping in the northern portion of the BLM North parcel required vegetation removal to access the areas, as shown on Figure 6-1. The area was composed of central maritime chaparral, blueblossom chaparral, and coast live oak woodland habitats. In addition to being the dominant species within the oak woodland habitat, coast live oak trees were also scattered throughout the chaparral habitats. However, no coast live oak trees were removed, as the transects meandered throughout the habitats to avoid this species and the HMP species described below.

6.1 Central Maritime Chaparral Investigation

The area designated central maritime chaparral is dominated by three species of manzanitas and a variety of other shrubs. It contains a significant proportion of the HMP shrub species, Monterey manzanita and Hooker's manzanita. Other HMP shrub species present include Eastwood's goldenbush and Monterey ceanothus.

The HMP manzanita species both require fire for regeneration of seedlings and do not typically regenerate after being cut. Because of this, it was recommended that the mowed transect paths be adjusted from the proposed straight line transects to avoid these plants where possible, particularly large tree-sized Monterey manzanitas and individual or small clusters of either species. The goal was to cut as few as possible of these manzanita species so that they could continue to generate a seedbank until the next burn. The result of this was that vegetation was removed along the meandering transects displayed in Figure 6-1 to reduce impacts to these species. The total area mowed in central maritime chaparral habitat, assuming a mowing width of six feet along the transect lines shown on Figure 6-1, was approximately 2.5 acres.

There were no rare annual plant surveys on the site, so it is not known what impacts were to sand gilia, Monterey spineflower, or Seaside bird's-beak. However, because the area was heavily vegetated, the open habitat available for annual plants is very limited, and these species had a low potential to be present. Mowing left a thick woody mulch layer in the mowed path, which will likely inhibit all growth of annual plants until the mulch decomposes or is burned in a fire.

6.2 Blueblossom Chaparral Investigation

The areas designated as blueblossom chaparral are composed primarily of a tree-forming ceanothus species, blueblossom (*Ceanothus thyrsiflorus*), coyote brush, and poison oak. As large numbers of HMP shrubs were absent within this habitat type, transects were mowed at intervals of approximately 300 feet; however, the transects did meander somewhat, as shown on Figure 6-1. The total area mowed in blueblossom chaparral habitat, assuming a mowing width of six feet along the transect lines shown in Figure 6-1, was approximately 0.7 acres.

Though this habitat type does not typically have a significant component of rare or endangered annual plant species, the mulch left by mowing these areas is likely thick enough to obscure the ground and inhibit annual plant germination in these areas.

6.3 Impacts to HMP Species

As described, there was a loss of some of HMP species, including Monterey manzanita, Hooker's manzanita, Eastwood's goldenbush, and Monterey ceanothus on the site. This loss would persist at least until the time of the next burn on the site. A total of approximately 2.5 acres was cut in central maritime chaparral, an HMP habitat. An unknown percentage of this is comprised of the rare manzanita species. Mowed areas left a thick mulch layer that will inhibit seedling germination of rare annual plants, if present in the seed bank. This condition will persist until decomposition of the mulch or until the site burns.

7.0 Other Biological Support Activities in 2011

7.1 HMP Species Reports

7.1.1 California Tiger Salamander Encounters

In 2011, there were four CTS encounters by ITSI/Shaw on Fort Ord, on the three days discussed below. CTS were encountered at HA-34, HA-37, and at the OU2 landfill within a stockpile of soil excavated from HA-37. A Field Report Form for CTS was completed for each encounter and provided to the BRAC Natural Resources Manager. The following summarizes each encounter.

On June 23, 2011, a juvenile CTS was found alive and uninjured in a soil stockpile during soil excavation at HA-37. The encounter was documented by ITSI's biologist, Shirley Tudor, who relocated the individual to the east side of Pond 10, a known CTS breeding pond, approximately 600 feet from the soil stockpile. The report was submitted to the BRAC office on the June 23, 2011.

On September 9, 2011, two adult CTS were found alive and uninjured within the excavation area of HA-34, during removal of a buried concrete target box. The encounter was documented by ITSI's biologist, Shirley Tudor, and the salamanders were relocated to adjacent habitat, located approximately 750 feet away on the opposite side of a Barloy Canyon Road from the excavation site. The relocation area had numerous ground squirrel burrows, and the released salamanders were observed to enter a burrow. The relocation site is located approximately 300 feet from a vernal pool (Pond 4) which is not currently known to support CTS breeding. The nearest known CTS breeding pond is located approximately 3,000 feet from the encounter site at Pond 14. The report was submitted to the BRAC office on the September 9, 2011.

On September 12, 2011, one juvenile CTS was found alive and uninjured during a UXO sweep of a soil stockpile at the OU2 landfill, following truck transport from the HA-37 excavation. Target boxes are present within HA-37, which may have been the location of the individual prior to excavation. The encounter was documented by ITSI's biologist, Shirley Tudor, who transported and relocated the individual to the east side of Pond 10. The CTS was released into a mammal burrow located approximately 900 feet from the estimated location of the individual prior to excavation. The report was submitted to the BRAC office on the September 12, 2011.

7.1.2 Black Legless Lizard Encounters

In 2011, one BLL was encountered during ITSI/Shaw work on Chinook Road, near the intersection with Broadway Avenue, during MEC removal. The individual was found in a fuel break area of mowed maritime chaparral near the road edge by Josh Faust of UXO Team 2. The individual was reported alive and uninjured.

7.2 Employee Education

New ITSI/Shaw employees and sub-contracting workers receive a natural resources training on Fort Ord natural resource protection prior to starting work. In 2011, ITSI/Shaw provided training to 58 new employees on natural resource protection.

Training includes the following topics:

- Identification of sensitive HMP-protected habitats and HMP species specific to the work area. Habitats covered focus specifically on maritime chaparral, vernal ponds and wetlands, and beach dunes. Species covered include CTS, Contra Costa goldfields, California linderiella, BLL, sand gilia, Monterey spineflower, Seaside bird's-beak, Yadon's piperia, Monterey manzanita, sandmat manzanita, Hooker's manzanita, Eastwood's goldenbush, Monterey ceanothus, snowy plover, and Smith's blue butterfly.
- Specific guidance for CTS protection, including the ability to recognize the species, the protocol for reporting all encounters to the ITSI or Army biologists (who are permitted by USFWS to handle and relocate CTS), placing escape ramps or covering open trenches, and checking excavations for trapped CTS during migration seasons.
- Instructions for minimizing all work impacts and work footprints, and for avoidance of areas flagged for sensitive species wherever marked in the field.
- Instructions for restricting vehicle movement and parking to roads, staging areas, and other designated work areas wherever possible.
- How to reduce soil disturbances in sensitive habitat, particularly areas containing seed bank or live individuals of HMP-listed plant species.

8.0 References

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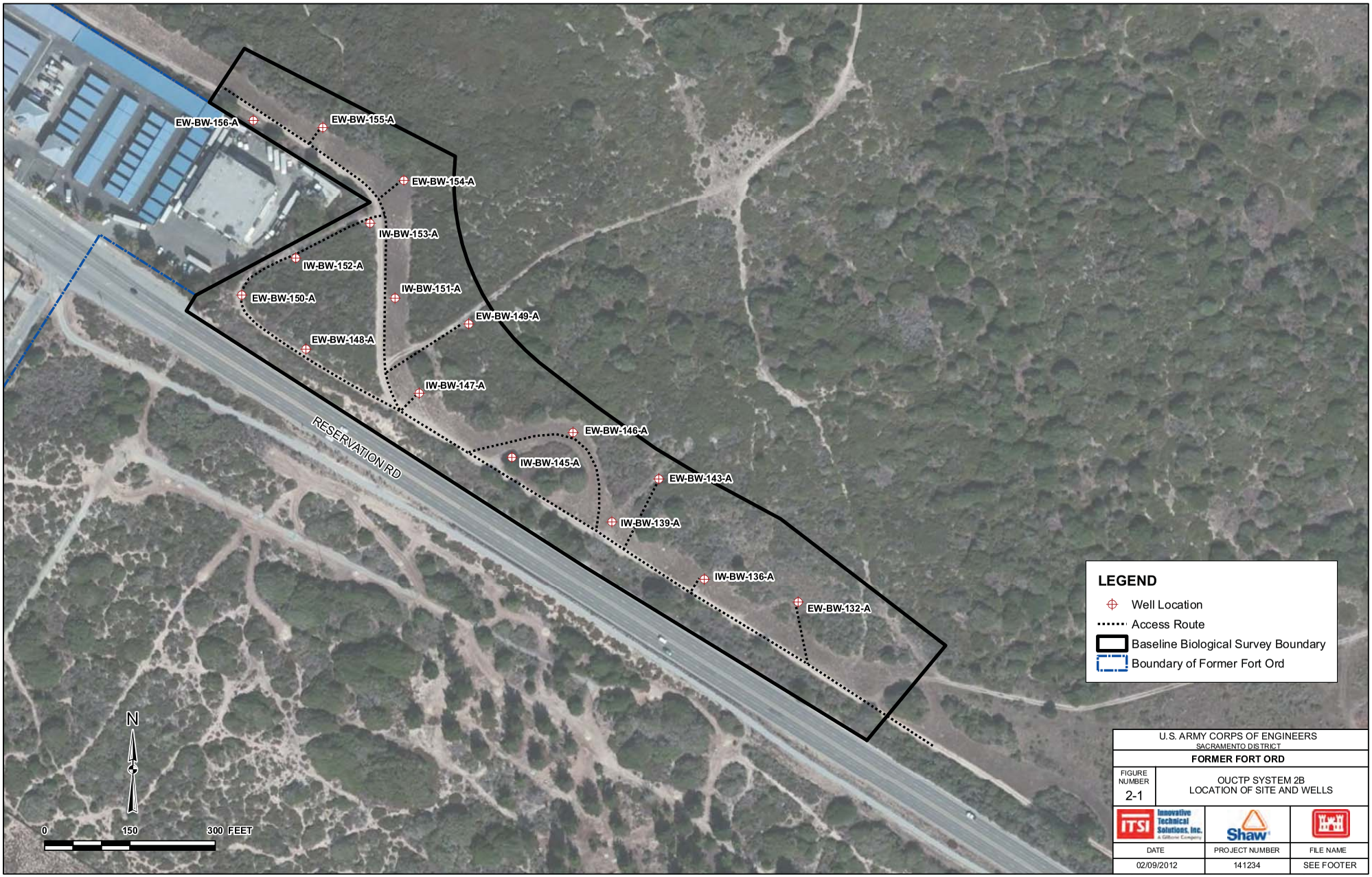
Figures

List of Figures



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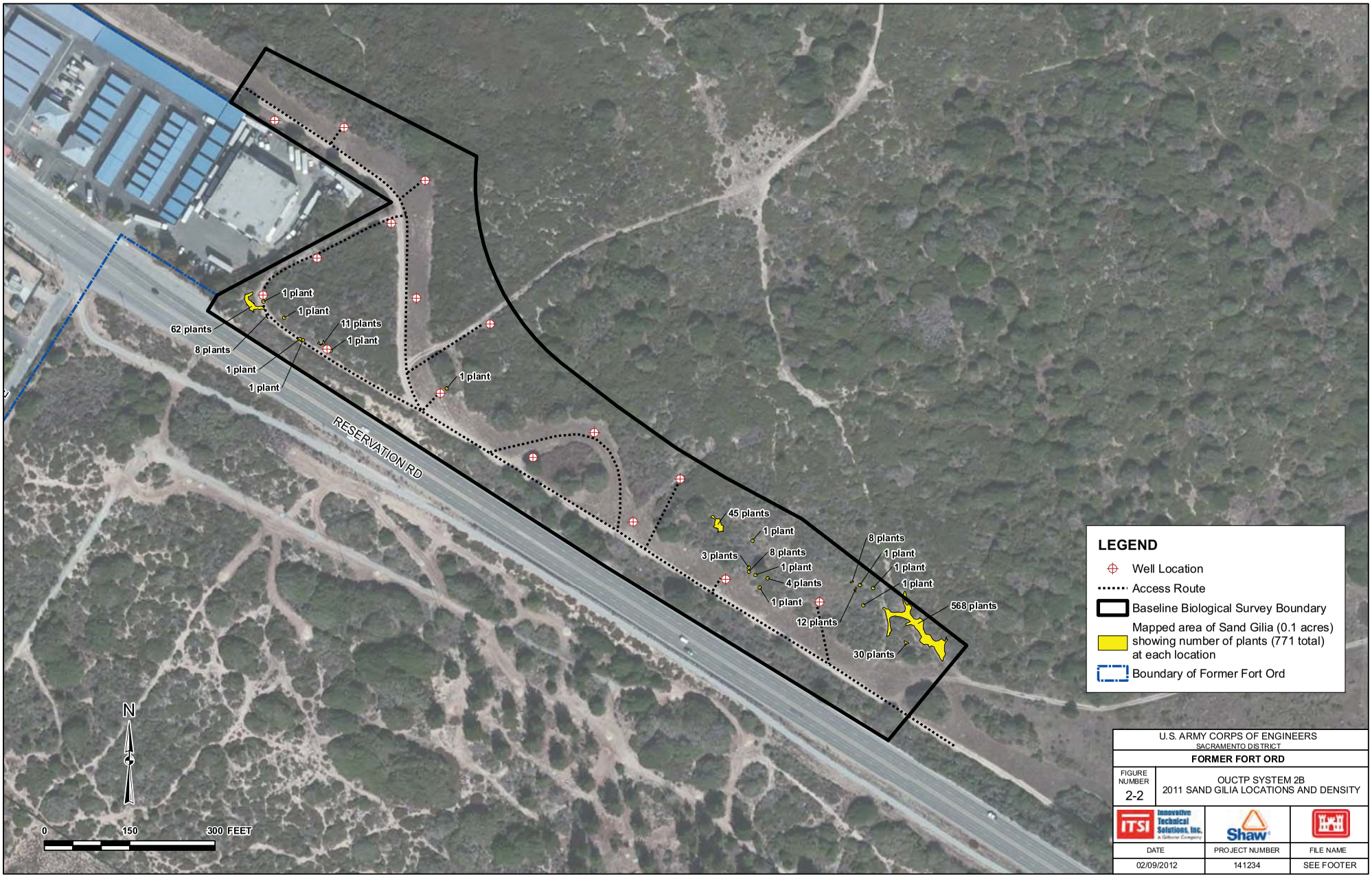

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	OUCTP SYSTEM 2B 2011 SAND GILIA LOCATIONS AND DENSITY
2-2	

DATE	PROJECT NUMBER	FILE NAME
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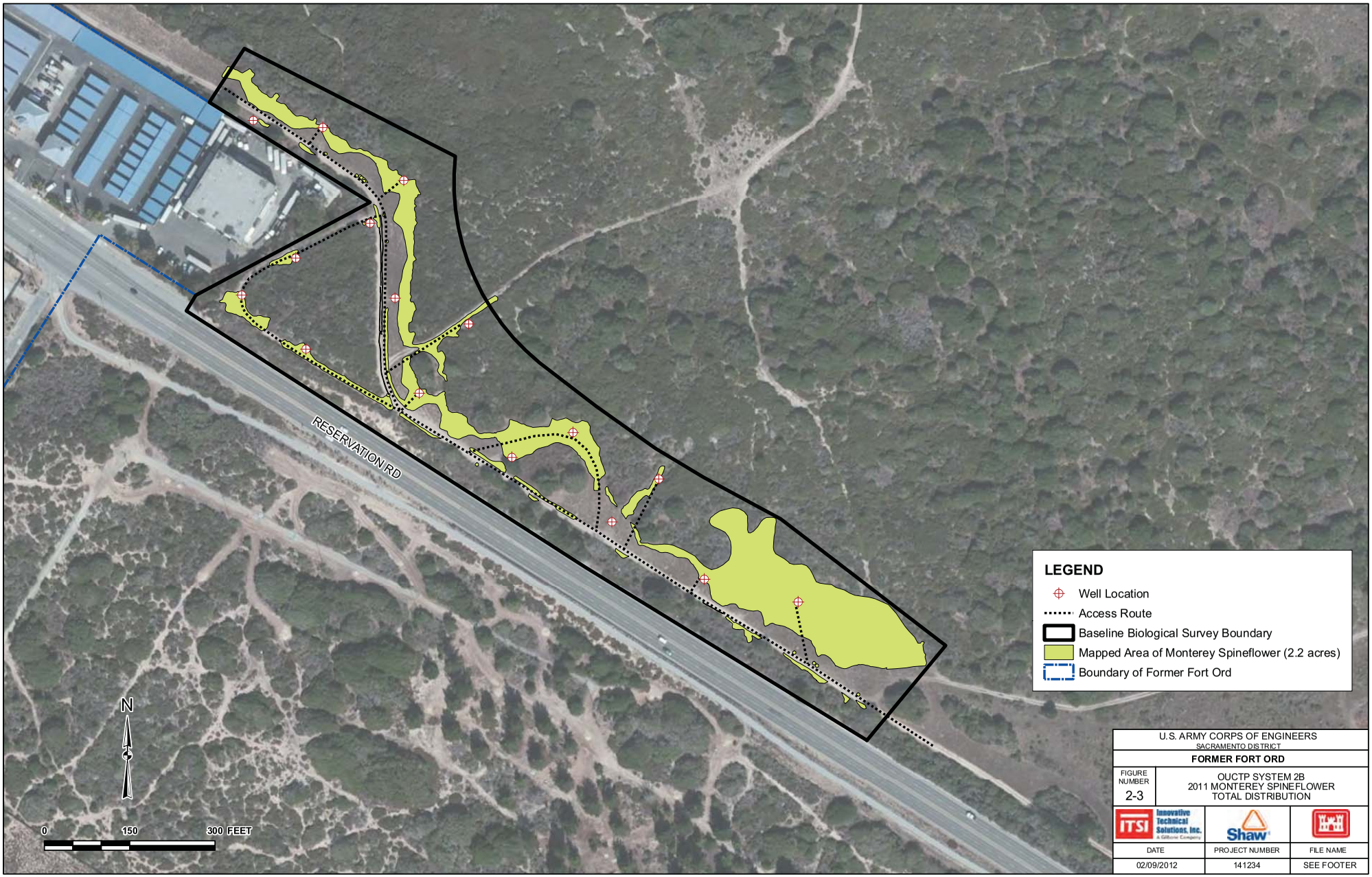

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SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	OUCTP SYSTEM 2B 2011 MONTEREY SPINEFLOWER TOTAL DISTRIBUTION
2-3	

DATE	PROJECT NUMBER	FILE NAME
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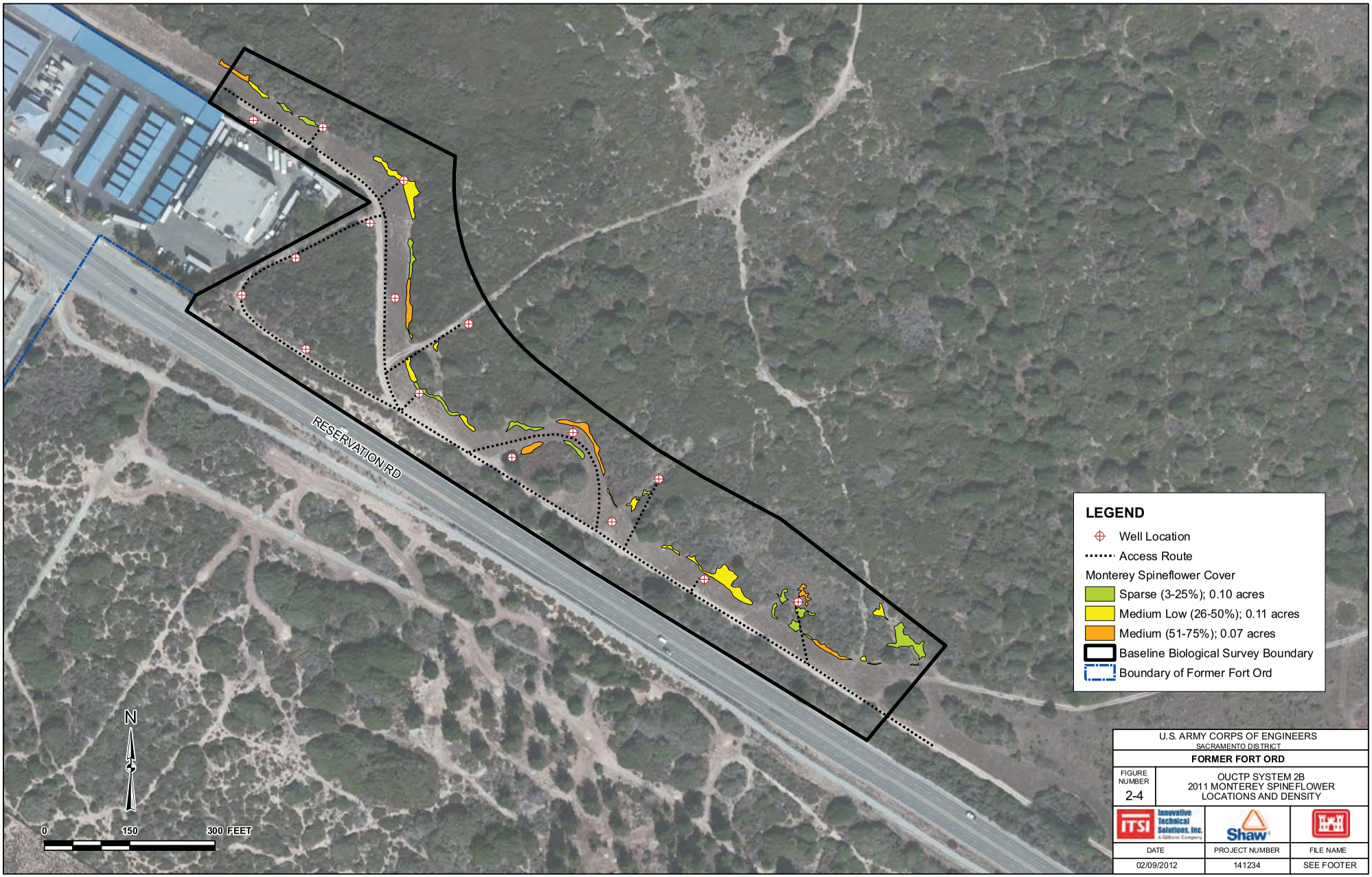

U.S. ARMY CORPS OF ENGINEERS SACRAMENTO DISTRICT		
FORMER FORT ORD		
FIGURE NUMBER 2-4	OUCTP SYSTEM 2B 2011 MONTEREY SPINEFLOWER LOCATIONS AND DENSITY	
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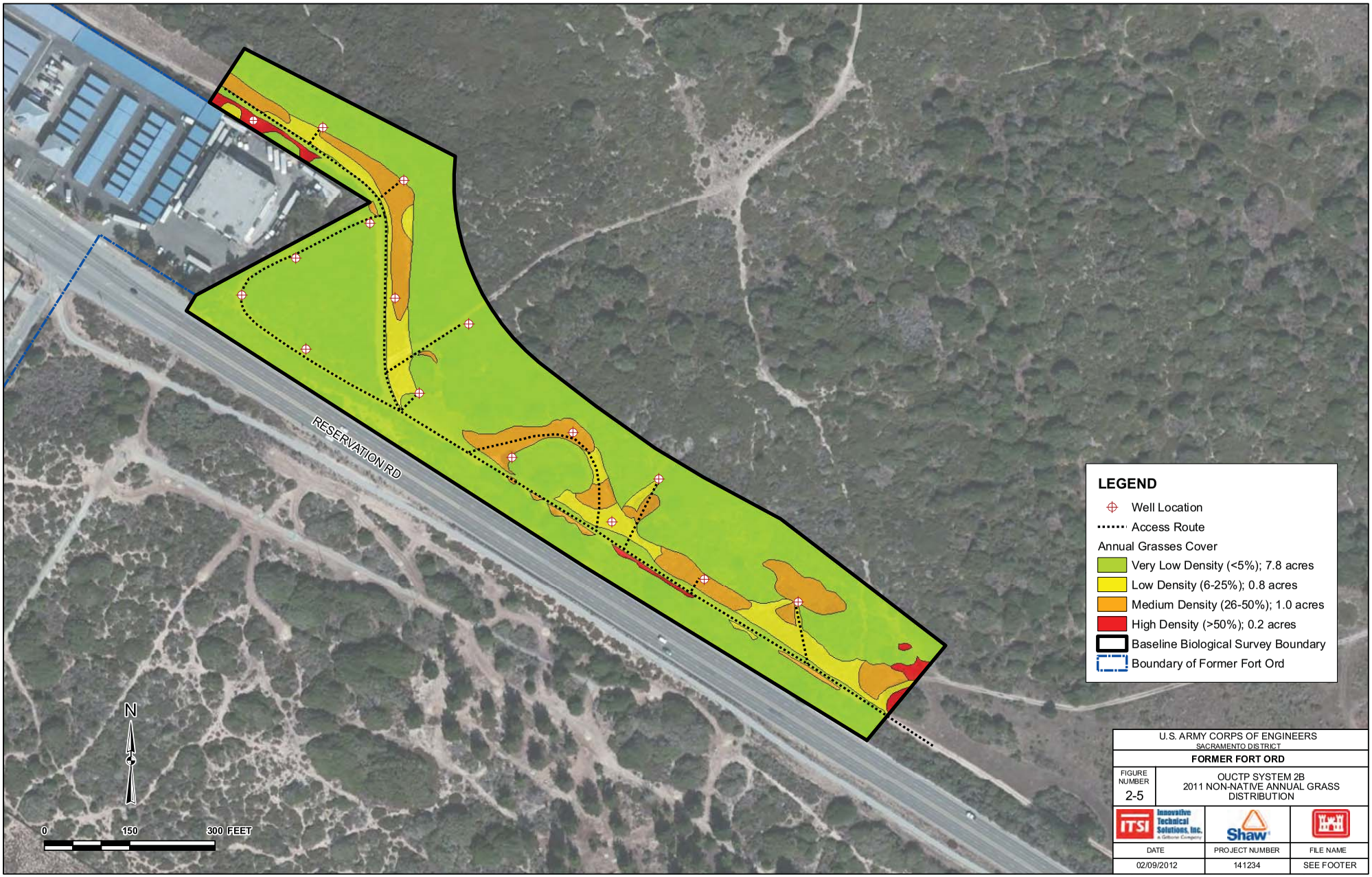

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FIGURE NUMBER 2-5	OUCTP SYSTEM 2B 2011 NON-NATIVE ANNUAL GRASS DISTRIBUTION	
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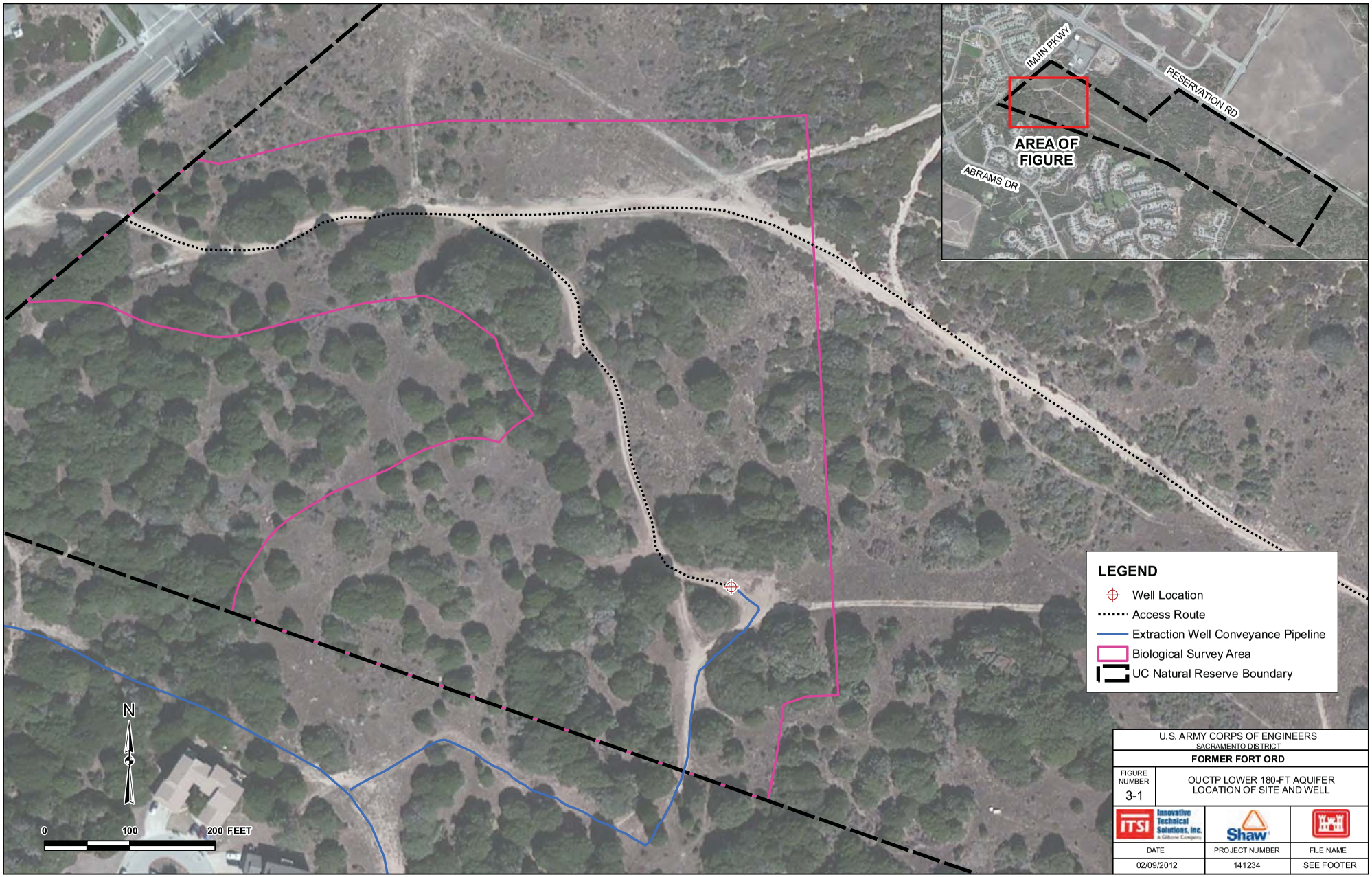

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FORMER FORT ORD		
FIGURE NUMBER 3-1	OUCTP LOWER 180-FT AQUIFER LOCATION OF SITE AND WELL	
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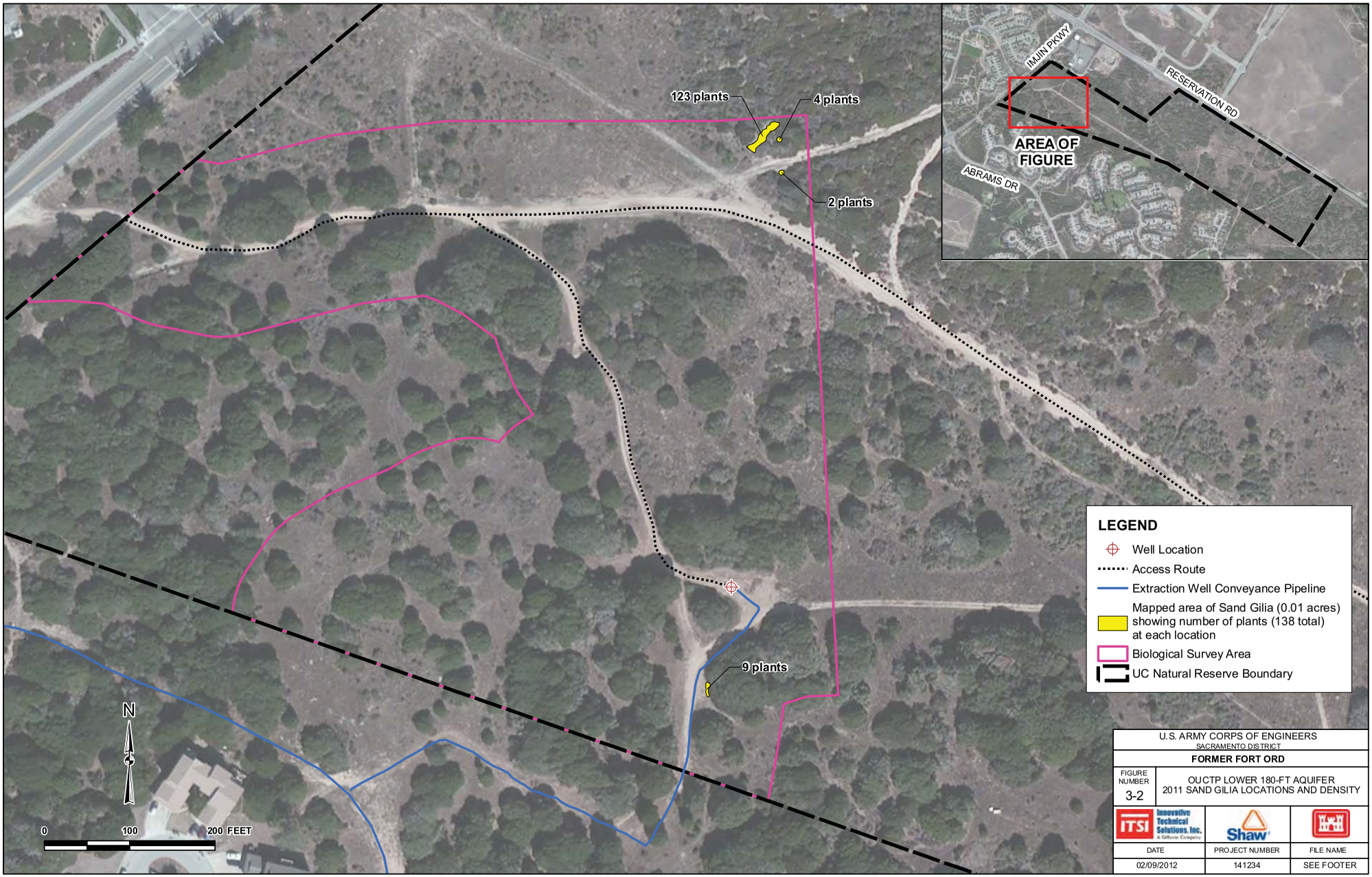

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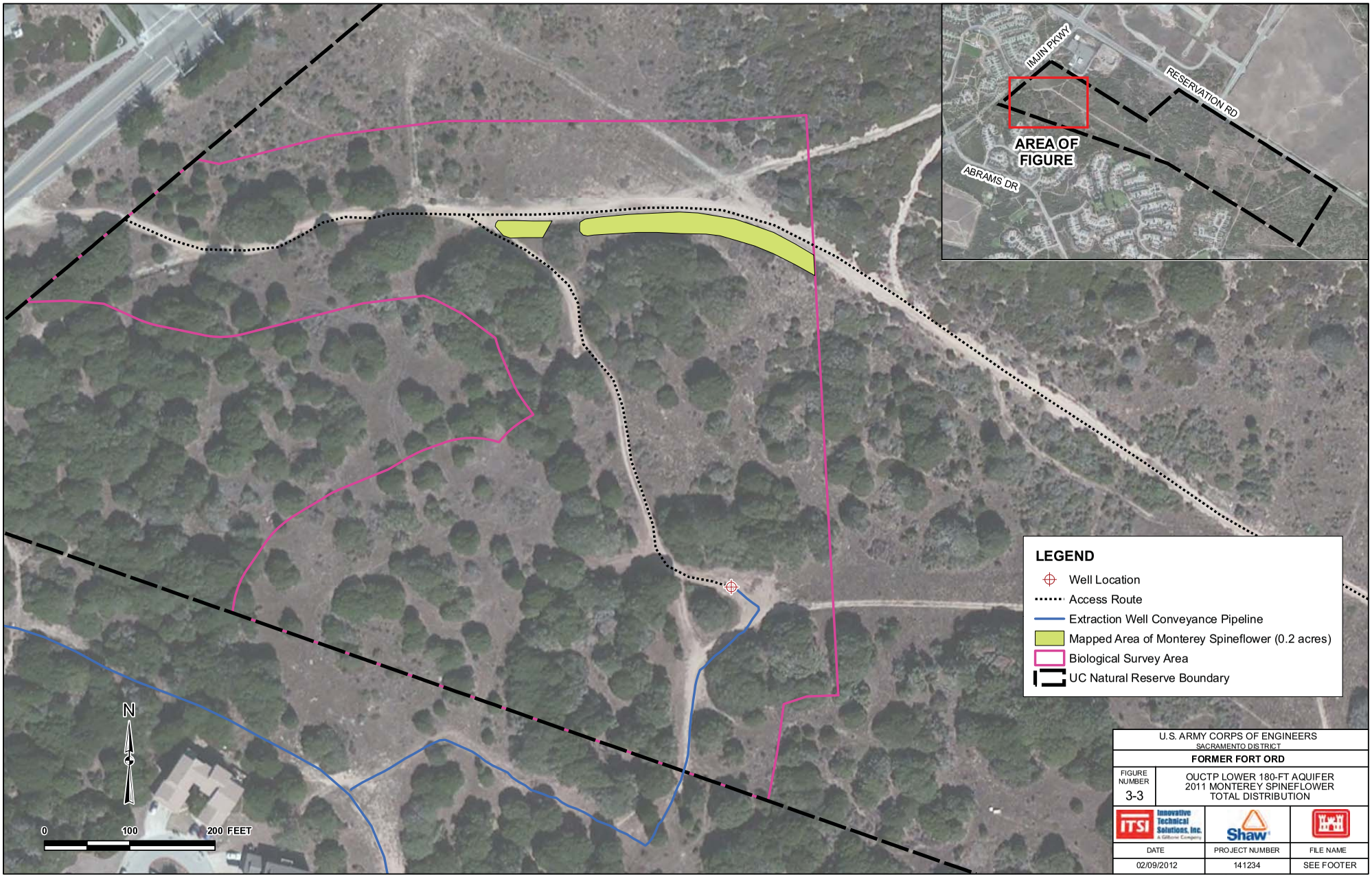

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FIGURE NUMBER 3-3	OUCTP LOWER 180-FT AQUIFER 2011 MONTEREY SPINEFLOWER TOTAL DISTRIBUTION	
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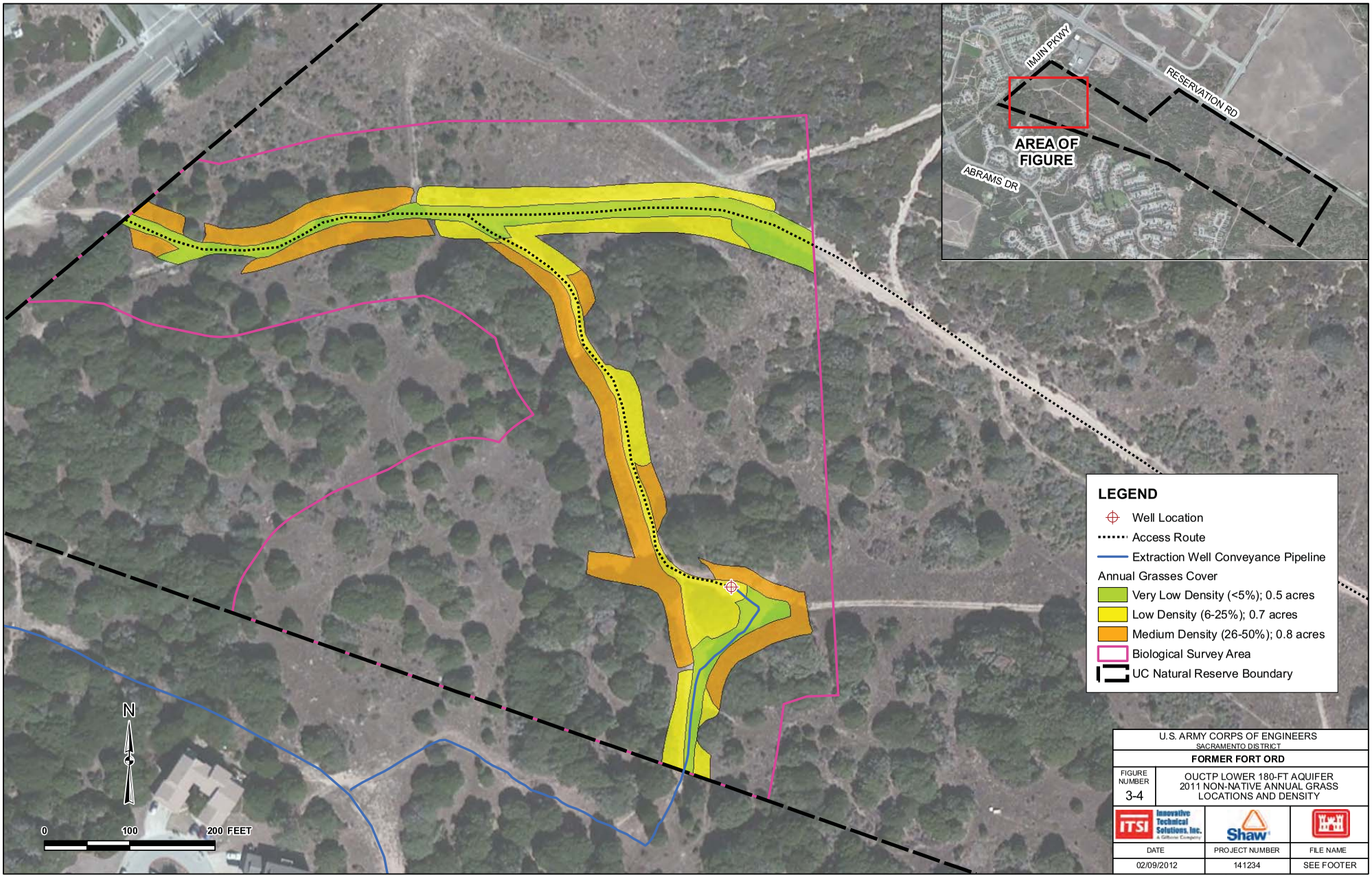
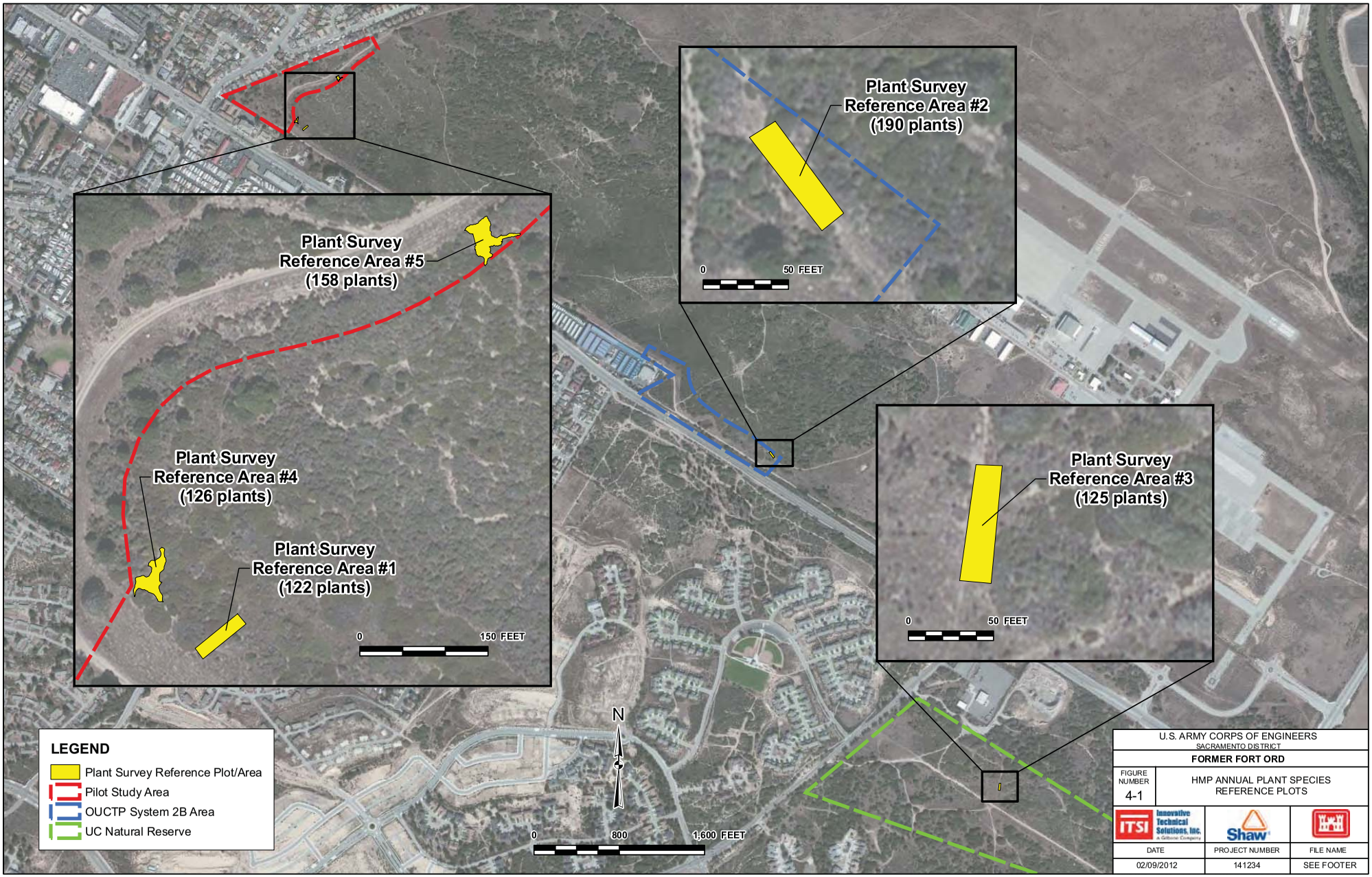


U.S. ARMY CORPS OF ENGINEERS SACRAMENTO DISTRICT		
FORMER FORT ORD		
FIGURE NUMBER 3-4	OUCTP LOWER 180-FT AQUIFER 2011 NON-NATIVE ANNUAL GRASS LOCATIONS AND DENSITY	
ITSI Innovative Technical Solutions, Inc.	Shaw	
DATE	PROJECT NUMBER	FILE NAME
02/09/2012	141234	SEE FOOTER

File Path:C:\GIS\Fort_Ord_GIS\2011_Biology\GIS_Documents\RESERVE_grass2011.mxd • Date: 02/28/12



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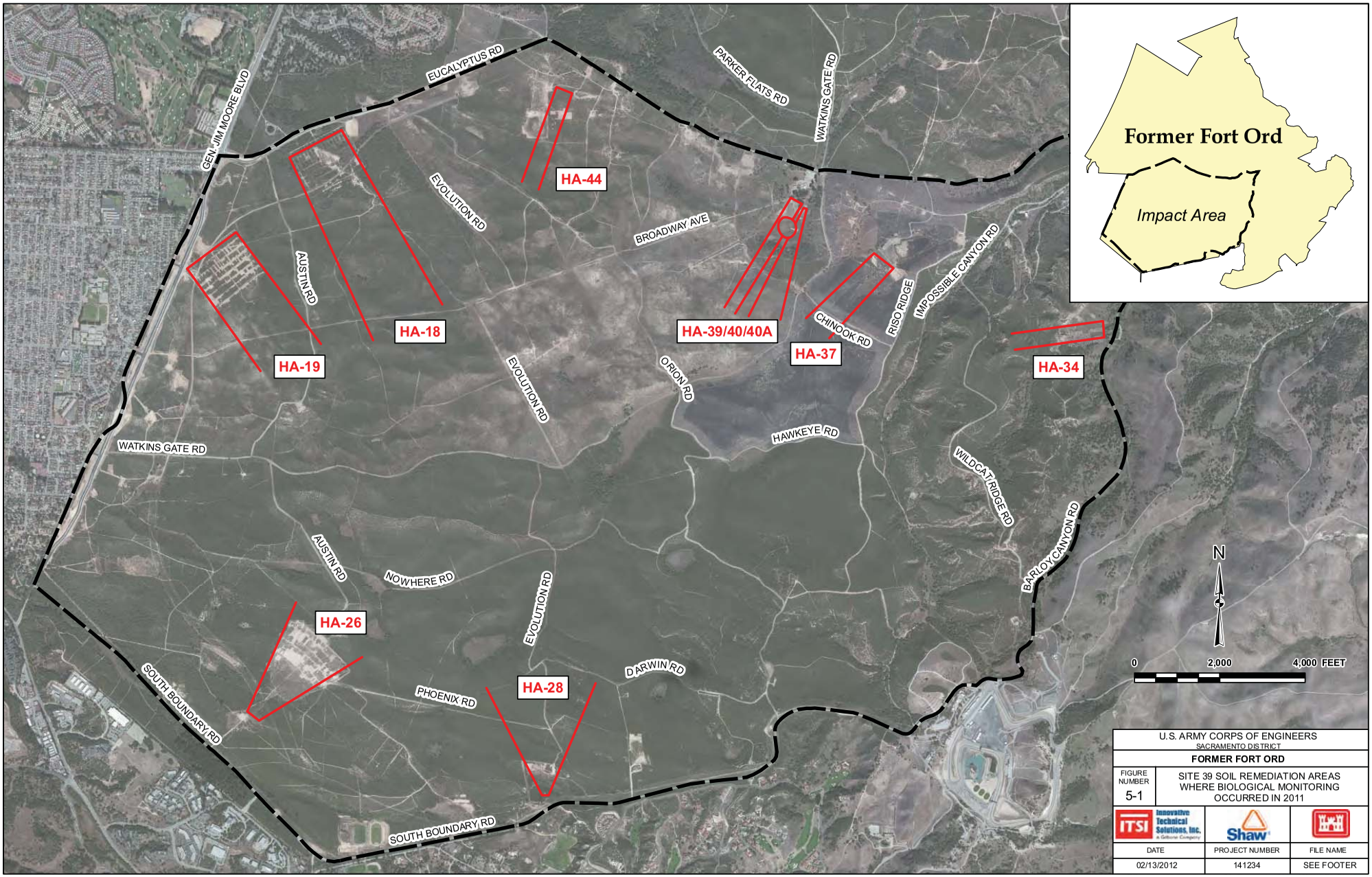

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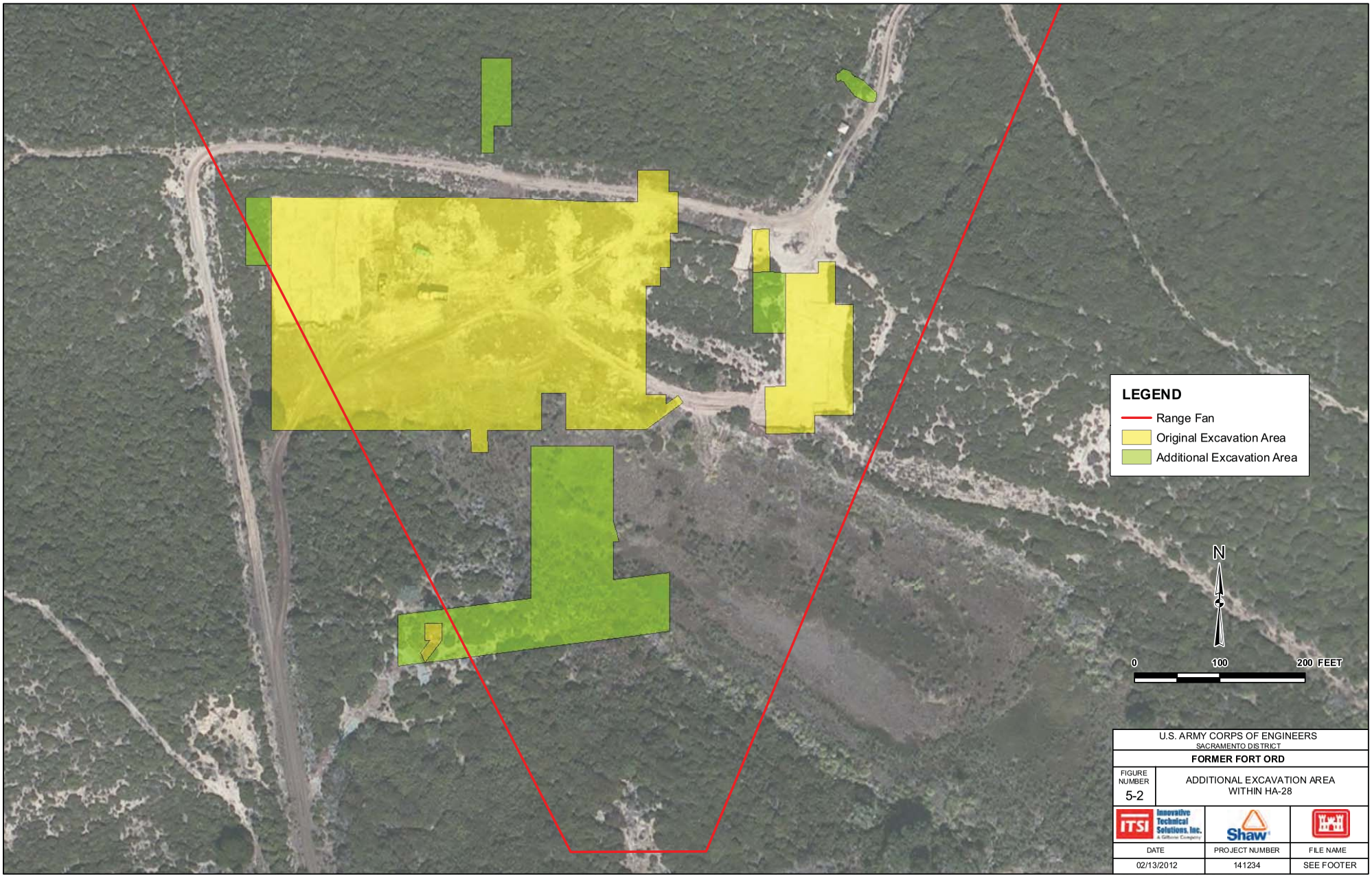
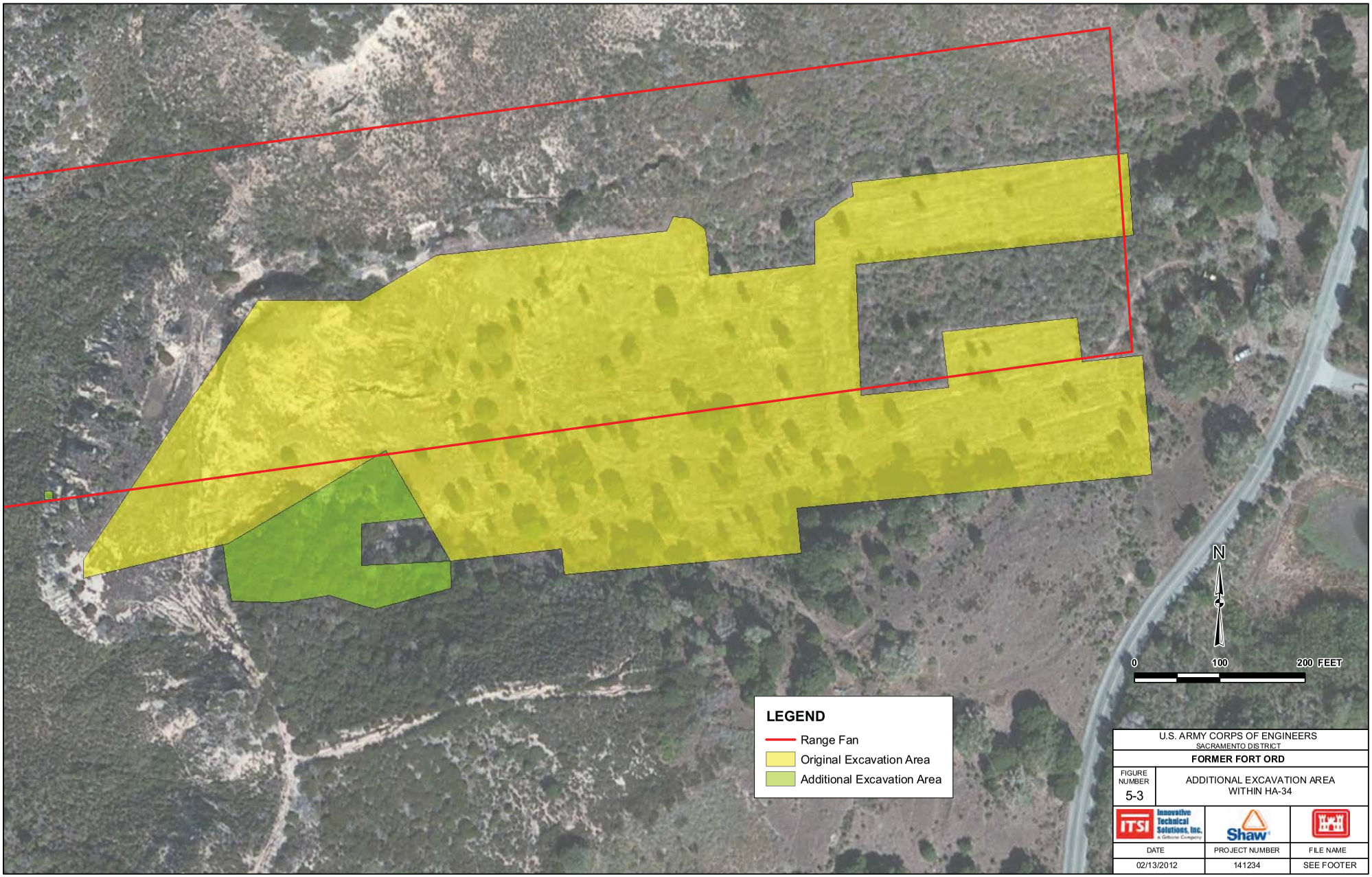


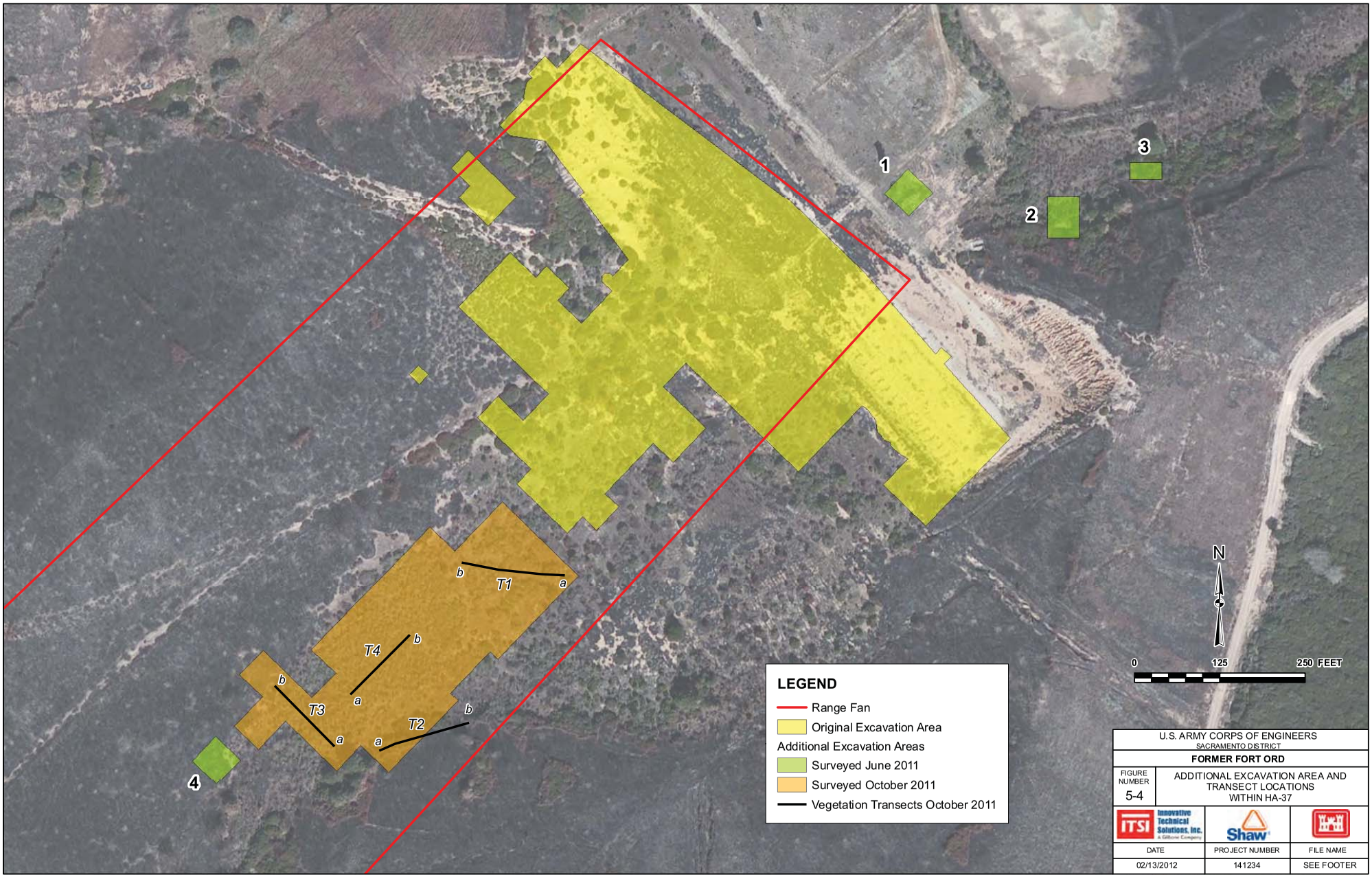
U.S. ARMY CORPS OF ENGINEERS SACRAMENTO DISTRICT		
FORMER FORT ORD		
FIGURE NUMBER 5-2	ADDITIONAL EXCAVATION AREA WITHIN HA-28	
ITSI Innovative Technical Solutions, Inc.	Shaw	
DATE	PROJECT NUMBER	FILE NAME
02/13/2012	141234	SEE FOOTER

File Path:C:\GIS\Fort_Ord_GIS\2011_Biology\GIS_Documents\HA28_2011.mxd • Date: 02/28/12



U.S. ARMY CORPS OF ENGINEERS SACRAMENTO DISTRICT		
FORMER FORT ORD		
FIGURE NUMBER 5-3	ADDITIONAL EXCAVATION AREA WITHIN HA-34	
ITSI Innovative Technical Solutions, Inc. a Gibbons Company	Shaw	
DATE	PROJECT NUMBER	FILE NAME
02/13/2012	141234	SEE FOOTER

File Path:C:\GIS\Fort_Ord_GIS\2011_Biology\GIS_Documents\HA34_2011.mxd • Date: 02/28/12



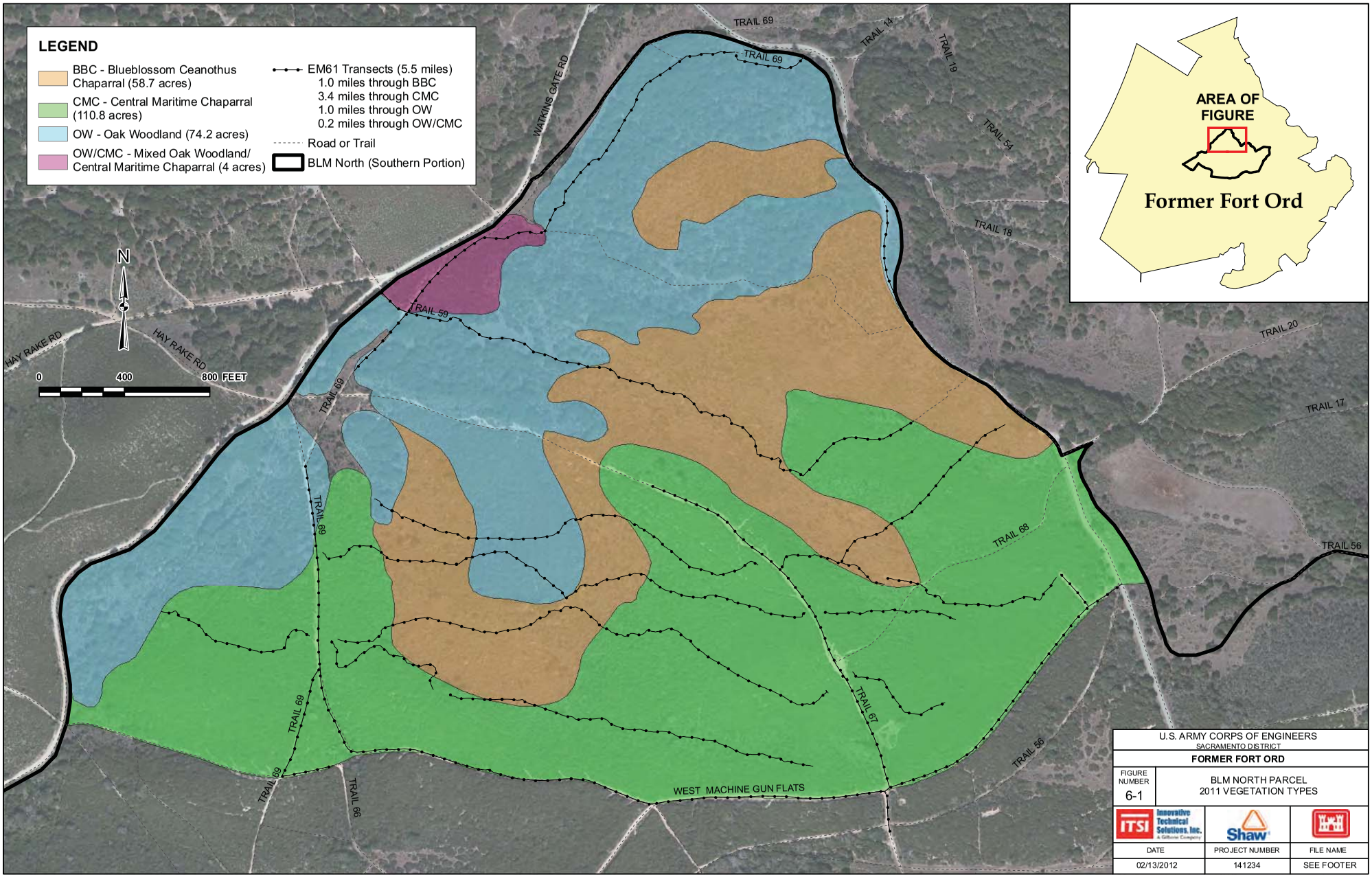
U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	ADDITIONAL EXCAVATION AREA AND TRANSECT LOCATIONS WITHIN HA-37
5-4	

DATE	PROJECT NUMBER	FILE NAME
02/13/2012	141234	SEE FOOTER

File Path:C:\GIS\Fort_Ord_GIS\2011_Biology\GIS_Documents\HA37_2011.mxd • Date: 02/28/12



File Path:C:\GIS\Fort_Ord_GIS\2011_Biology\GIS_Documents\BLM_VegTypes2011.mxd • Date: 02/28/12

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			Percent Cover					
Sp./Cover Code	**Scientific Name**	**Common Name**	**T1**	**T2**	**T3**	**T4**	**Range % Cover**	**Average % Cover**
ACLA	*Acacia longifolia*	golden wattle	0.0%	0.0%	11.1%	0.0%	0-11%	**2.8%**
ARMO	*Arctostaphylos montereyensis*	Monterey manzanita	23.6%	0.0%	0.0%	0.0%	0-23.6%	**5.9%**
ARPU	*Arctostaphylos pumila*	sandmat manzanita	18.5%	0.0%	17.2%	0.0%	0-18.5%	**8.9%**
ARTO	*Arctostaphylos tomentosa* ssp. *tomentosa*	shaggy barked manzanita	34.6%	0.0%	17.5%	0.0%	0-34.6%	**13.0%**
BAPI	*Baccharis pilularis*	coyote brush	0.0%	16.6%	5.5%	36.4%	0-36.4%	**14.6%**
CAED	*Carpobortus edulis*	iceplant (live)	0.0%	3.9%	0.0%	2.3%	0-3.9%	**1.5%**
CAED	*Carpobortus edulis*	iceplant (dead)	0.0%	0.0%	0.0%	24.1%	0-24.1%	**6.0%**
JUBA	*Juncus balticus*	baltic rush	0.0%	0.0%	0.0%	4.0%	0-4%	**1.0%**
MIAU	*Mimulus aurantiacus*	sticky monkey flower	0.0%	4.4%	0.0%	0.0%	0-4.4%	**1.1%**
RUAR	*Rubus ursinus*	California blackberry	0.0%	0.4%	0.0%	4.9%	0-4.9%	**1.3%**
TODI	*Toxicodendron diversilobum*	poison oak	0.0%	10.0%	0.0%	11.4%	0-4.4%	**5.4%**
Herb		herbaceous species	2.8%	57.1%	0.0%	13.4%	0-11.4%	**18.3%**
BG		bare ground	3.5%	0.8%	15.0%	0.0%	0-57.1%	**4.8%**
LL		Leaf litter	17.1%	6.8%	6.8%	0.0%	0-15%	**7.6%**
PLL		pampas grass litter	0.0%	0.0%	27.0%	3.5%	0-17.1%	**7.6%**
		Total Vegetation Cover	**79.4%**	**92.5%**	**51.3%**	**96.5%**		

Table 5-2: HA-28 Transect #2 Quadrat Data

Sp./Cover Code	Scientific Name	Percent Cover						
		Q1	Q2	Q3	Q4	Q5	Q6	Q7
BG	bare ground	1			1	1		
LL	leaf litter							3
JUBA	*Juncus balticus*	20	3	1	<1	2		
CABR	*Carex brevicaulis*				15			
RUAC	*Rumex acetosella*	<1				2	<1	4
HYGL	*Hypochaeris glabra*	<1		<1	<<1			
HYRA	*Hypochaeris radicata*	<1						
ACMI	*Achillea millefolium*	<<1			<<1	<1		
DISP	*Distichlis spicata*	15	5	2	<<1			
JUPH	*Juncus phaeocephalus*						<<1	
	Geranium sp.	<<1	<1	<1				
	Solidago sp.				<<1			
	Unidentified grasses		15	23	<<1	24	25	22
	Unknown forb					1	<1	3
	Moss	1						

Table 5-3: HA-28 Species List

Scientific Name	Common Name	Non-native
Perennial Species		
Acacia longifolia	golden wattle	
Arctostaphylos hookeri	Hooker's manzanita	
Arctostaphylos montereyensis	Monterey manzanita	
Arctostaphylos pumila	sandmat manzanita	
Arctostaphylos tomentosa ssp. *tomentosa*	shaggy-barked manzanita	
Baccharis pilularis	coyote brush	
Carpobortus edulis	iceplant	
Ceanothus cuneatus ssp. *rigidus*	Monterey ceanothus	
Cortaderia jubata	pampas grass	
Eriophyllum confertiflorum	golden yarrow	
Genista monspessulana	French broom	x
Juncus balticus	baltic rush	
Juncus patens	spreading rush	
Juncus phaeocephalus	brown-headed rush	
Lotus scoparius	deerweed	
Mimulus aurantiacus	sticky monkey flower	
Quercus agrifolia	coast live oak	
Rubus ursinus	California blackberry	
Toxicodendron diversilobum	poison oak	
Annual Species		
Achillea millefolium	white yarrow	
Artemisia douglasiana	mugwort	
Carex brevicaulis	short-stemmed sedge	
Claytonia perfoliata	miner's lettuce	
Cryptantha sp.	popcorn flower	
Distichlis spicata	saltgrass	
Erodium botrys	long-beaked filaree	x
Erodium cicutarium	red-stemmed filaree	x
Galium californicum	California bedstraw	
Geranium sp.	Geranium	
Gnaphalium californicum	California everlasting	
Heliantimum scoparium	rush rose	
Horkelia cuneatus	wedge-leaved Horkelia	
Hypochaeris glabra	smooth cat's ear	x
Hypochaeris radicata	hairy cat's ear	x
Nemophila menziesii	baby blue eyes	
Rumex acetosella	sheep sorrel	x
Satureja douglasii	yerba buena	
Solidago sp.	goldenrod	

Table 5-4: HA-37 Species List from June 2011 Survey

Scientific Name	Common Name	Non-native
Perennial Species		
Adenostoma fasciculatum	chamise	
Arctostaphylos hookeri	Hooker's manzanita	
Arctostaphylos tomentosa ssp. *tomentosa*	shaggy-barked manzanita	
Baccharis pilularis	coyote brush	
Ceanothus cuneatus ssp. *rigidus*	Monterey ceanothus	
Ceanothus thyrsiflorus	blue blossom	
Garrya eliptica	coast silk tassel	
Juncus bufonius	common toad rush	
Lepechinia calycina	pitcher sage	
Lotus heermannii var. *orbicularis*	wooly lotus	
Lotus scoparius	deerweed	
Pentagramma triangularis	gold-back fern	
Piperia sp.	rein orchid	
Rubus ursinus	California blackberry	
Symphoricarpos mollis	snowberry	
Toxicodendron diversilobum	poison oak	
Annual Species		
Aira caryophyllea	silvery-hair grass	x
Agoseris grandiflora	large-flowered agoseris	
Agrostisexarata car. *Pacifica*	western bent-grass	
Anagallis arvensis	scarlet pimpernel	x
Avena sp.	wild oat	x
Bromus carinatus	California brome	
Bromus diandrus	rip-gut brome	x
Bromus madritensis	Spanish brome	x
Bromus racemosus	smooth-flowered soft cheat	x
Carex brevicaulis	short-stemmed sedge	
Centaurea melitensis	tocalote	
Cerastium glo,eratum	mouse-eared chickweed	x
Chorizanthe diffusa	diffuse spineflower	
Cirsium occidentale var. *occidentale*	cobweb thistle	
Conyza canadensis	horseweed	
Cryptantha leiocarpa	coast cryptantha	
Cryptantha sp.	popcorn flower	
Croton californica	California croton	
Daucus pusillus	rattlesnake weed	
Deiandra corymbosa ssp. *corymbosa*	coast tarweed	
Dichelostemma capitatum	blue dicks	
Elymus glaucus	blue wild rye	
Erechtites sp.	fireweed	x
Erodium cicutarium	red-stemmed filaree	x
Filago gallica	narrow-leaved filago	x

Scientific Name	Common Name	Non-native
Galium porrigens	climbing Bedstraw	
Galium californicum	California bedstraw	
Gnaphalium californicum	California everlasting	
Gnaphalium purpureum	purple cudweed	
Gnaphalium stramineum	cotton-batting plant	
Heliantimum scoparium	rush rose	
Horkelia cuneatus	wedge-leaved Horkelia	
Hypochaeris glabra	smooth cat's ear	x
Lactuca serriola	prickly lettuce	x
Linaria canadensis	blue toad-flax	
Lomatium californicum	California lomatium	
Lupinus bicolor	Lindley's annual lupine	
Lupinus nanus	sky lupine	
Luzula comosa	common wood rush	
Madia sativa	coast tarweed	
Madia exigua	small tarweed	
Navarretia hamata	hooked navarretia	
Navarretia mellita	honey-scented navarretia	
Plagiobothrys sp.	popcorn flower	
Plantago coronopus	cut-leaved plantain	x
Plantago sp.	plantain	
Polygla californica	California milkwort	
Potentilla glandulosa	sticky cinqufoil	
Rumex acetosella	sheep sorrel	x
Satureja douglasii	yerba buena	
Senecio sp.	butterweed	
Silene multinerva	many-nerved catchfly	
Trifolium microcephalum	maiden clover	
Trifolium wildenovii	tomcat clover	
Trodanis biflora	Venus' looking glass	
Vulpia octoflora	Slender fescue	
Zeltnera sp.	centaury	

Table 5-5: HA-37 Transect Survey Data

			Percent Cover					
Sp./Cover Code	**Scientific Name**	**Common Name**	**T1**	**T2**	**T3**	**T4**	**Range % Cover**	**Average % Cover**
ADFA	*Adenostoma fasciculatum*	chamise	0.0%	2.6%	0.0%	0.0%	0-2.6%	**0.7%**
ARTO	*Arctostaphylos tomentosa* ssp. *tomentosa*	shaggy barked manzanita	0.0%	3.2%	1.0%	0.0%	0-6.4%	**1.1%**
BAPI	*Baccharis pilularis*	coyote brush	2.2%	0.6%	2.8%	3.8%	0.6-3.9%	**2.4%**
CEDE	*Ceanothus dentatus*	dwarf ceanothus	0.0%	0.0%	1.0%	0.0%	0-1%	**0.3%**
HESC	*Heliantimum scoparium*	rush rose	0.0%	0.0%	2.8%	0.0%	0-2.8%	**0.7%**
LUAR	*Lupinus arboreus*	yellow bush lupine	0.0%	0.0%	0.0%	1.1%	0-1.2%	**0.3%**
QUAG	*Quercus agrifolia*	coast live oak	0.0%	0.0%	0.8%	0.0%	0-0.8%	**0.2%**
RISP	*Ribes speciosum*	fuschia-flowering gooseberry	0.0%	0.0%	1.6%	0.6%	0-1.6%	**0.5%**
RUAR	*Rubus ursinus*	California blackberry	0.0%	0.0%	0.4%	0.0%	0-0.4%	**0.1%**
SYMO	*Symphoricarpos mollis*	snowberry	0.0%	0.0%	0.4%	0.0%	0-0.4%	**0.1%**
MIAU	*Mimulus aurantiacus*	sticky monkey flower	0.0%	0.0%	0.0%	1.9%	0-1.9%	**0.5%**
TODI	*Toxicodendron diversilobum*	poison oak	0.4%	1.8%	1.4%	0.2%	0.2-1.8%	**0.9%**
Herb		herbaceous species	59.4%	2.0%	0.0%	8.4%	0-59.4%	**17.4%**
BG		bare ground	12.4%	49.8%	39.5%	6.3%	0-49.8%	**27.0%**
LL		Leaf litter	0.0%	0.0%	48.3%	51.3%	0-51.6%	**24.9%**
WL		woody litter	25.7%	40.0%	0.0%	26.2%	0-40%	**23.0%**
		Total Vegetation Cover	**62.0%**	**10.2%**	**12.2%**	**16.1%**		

Table 5-6: HA-37 Species List from October 2011 Survey

Scientific Name	Common Name	Non-native
Perennial Species		
Adenostoma fasciculatum	chamise	
Arctostaphylos tomentosa ssp. *tomentosa*	shaggy-barked manzanita	
Baccharis pilularis	coyote brush	
Ceanothus dentatus	dwarf ceanothus	
Ceanothus cuneatus ssp. *rigidus*	Monterey ceanothus	
Eriophyllum confertiflorum	golden yarrow	
Genista monspessulana	French broom	x
Juncus patens	spreading rush	
Lotus scoparius	deerweed	
Lupinus arboreus	yellow bush lupine	
Mimulus aurantiacus	sticky monkey flower	
Quercus agrifolia	coast live oak	
Ribes speciosum	fuschia-flowering gooseberry	
Rubus ursinus	California blackberry	
Symphoricarpos mollis	snowberry	
Toxicodendron diversilobum	poison oak	
Annual Species		
Achillea millefolium	white yarrow	
Anagallis arvensis	scarlet pimpernel	x
Aster radulinus	rough-leaved aster	
Bromus hordeaceus	soft chess	x
Carex brevicaulis	short-stemmed sedge	
Conyza canadensis	horseweed	
Corythogyne (Lessingia) filaginifolia	California aster	
Croton californica	California croton	
Danthonia californica	California oat-grass	
Daucus pusillus	rattlesnake weed	
Deiandra corymbosa ssp. *corymbosa*	coast tarweed	
Elymus glaucus	blue wild rye	
Epilobium sp.	willowherb	
Erechtites sp.	fireweed	x
Erodium botrys	long-beaked filaree	x
Galium porrigens	climbing Bedstraw	
Galium californicum	California bedstraw	
Gnaphalium californicum	California everlasting	
Heliantimum scoparium	rush rose	
Heterotheca grandiflora	telegraph weed	
Horkelia cuneatus	wedge-leaved Horkelia	
Hypochaeris glabra	smooth cat's ear	x
Madia sativa	coast tarweed	
Potentilla glandulosa	sticky cinqufoil	
Rumex acetosella	sheep sorrel	x

Scientific Name	Common Name	Non-native
Satureja douglasii	yerba buena	
Stachys bullata	California hedge nettle/wood mint	