2012 ANNUAL BIOLOGICAL MONITORING REPORT
FORMER FORT ORD, CALIFORNIA

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

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ITSI Gilbane

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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	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
IGC	ITSI Gilbane Company
m	meters
MOUT	Military Operations in Urban Terrain
OU	Operable Unit
OUCTP	Operable Unit Carbon Tetrachloride Plume
Shaw	Shaw Environmental, Inc.
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 2012 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 Denise Duffy & Associates (DD&A) as a subcontractor to ITSI Gilbane Company (IGC) under the Worldwide Environmental Remediation Services (WERS) No. W912DY-10-D-0024. 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 U.S. Department of the Army (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 IGC in 2012 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 Army's cleanup activities significantly impact protected species or habitats. These cleanup activities include munitions remediation, 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 monitoring consistent with existing Biological Opinions 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.

2012 Biological Monitoring Sites Included in this Report

For the 2012 monitoring season, IGC was tasked by USACE to conduct the following follow-up biological surveys:

- **OUCTP System 2B:** Third 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:** Second year of follow-up vegetation survey for one well location, underground pipeline, and associated staging areas on the University of California's FONR-South.

Other Activities in 2012 Included in this Report

In addition to annual monitoring, this report describes mitigation and avoidance measures that were implemented during work conducted by IGC in 2012 on the following sites:

- **Soil remediation sites:** Former Historical Ranges HA 34, 37, and 38 within the Impact Area.
- **Munitions remediation:** Units 2, 3, 4, 6, 10, 11, 12, and 15; the Military Operations in Urban Terrain (MOUT) site; and Phase B and C fuel breaks within the Impact Area.

2.0 OUCTP System 2B (Groundwater) – Third 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 recirculation continued until March 22, 2012, and the pipeline system and trailer were removed on July 25, 2012. Groundwater monitoring is ongoing. 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 third year follow-up monitoring for the OUCTP System 2B area. The baseline and first and second year of follow-up monitoring surveys are presented in the 2009, 2010, and 2011 *Annual Biological Monitoring Reports* (USACE, 2010, 2011, 2012), respectively. Success criteria were met in 2012 for Monterey spineflower and annual grass populations within the OUCTP System 2B area, and no further monitoring for these species is necessary (see Section 2.3.2 and 2.3.4. below). However, due to the recent decline in sand gilia in the area (see Section 2.3.1 below), one additional year of monitoring for this species is scheduled within the OUCTP System 2B area. The 2012 data presented here will be used for comparison along with reference data presented in Section 4.

2.2 OUCTP System 2B - Methods

Methods used for the 2012 surveys were the same as those used for vegetation surveys at FONR completed previously by Hydrogeologic, Inc. with Denise Duffy and Associates, Inc. (DD&A); and Shaw Environmental Inc. (Shaw) (USACE, 2008, 2009a, and 2010a, 2011, 2012).

Sand gilia populations were surveyed on April 27, 2012 to capture the peak bloom. Sand gilia populations and individuals were mapped using a Global Positioning System (GPS), and the total number of plants was recorded for each population.

The Monterey spineflower survey was conducted on May 21 and 22, 2012 to capture peak densities as measured by percent ground cover. Monterey spineflower populations and individuals were mapped using a combination of GPS and hand drawing on aerial photo maps in the field; all data taken was later digitized into a Geographic Information System (GIS). 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 was visible but not yet in bloom. Peak bloom for census was in late August.

Non-native annual grass areas were mapped on May 21 and 22, 2012 by hand onto aerial photo maps in the field, and later digitized into a GIS. The following density cover classes were used for annual grasses:

Very Low = <5%
Low = 6-25%
Medium = 26-50%
High = 51-75%
Very High = >75%

All surveys were conducted prior to the mowing of fuel breaks in the System 2B area. The fuel breaks are a requirement by the local fire department for several areas within the FONR and are unrelated to the System 2B work. The Army conducted the mowing to avoid impacts to the temporary aboveground piping which was in place as part of the remediation project.

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.

2.3.1 Sand Gilia Survey

The results of the 2012 monitoring for sand gilia are shown below in Table 2-1 with a comparison to the results of monitoring from 2009 to 2011. A total of 256 sand gilia individuals were observed within an area of approximately 0.03 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

	Area (acres) of Sand Gilia			
	2009	*2010*	*2011*	***2012***
Total Area	0.06	0.1	0.1	**0.03**
Total Number of Plants	213	1,836	771	**256**

The number of plants and area covered decreased significantly from that observed in 2011. In comparison to the baseline data collected in 2009, however, the number of individual plants has increased, but the total area has decreased by 50%. Because most of the sand gilia areas were outside the actual work zones, the overall trends in abundance of sand gilia are probably most influenced by the variation and the timing in rainfall and temperature patterns over the monitoring period. During the 2011-2012 rainy period, there was a low amount of precipitation in the area early in the season, which may have contributed to a low sand gilia germination rate. This trend is consistent with other sand gilia counts in the reference populations and other survey areas of the former Fort Ord where population decreases were also observed (please refer to survey results in Sections 3.3.1 and 4.2). Further, it does not appear that annual grass encroachment is the cause of the decline in most of the areas where sand gilia occurs within OUCTP System 2B area, except in one area where an increase in annual grasses from the very low to low cover class may have precluded sand gilia germination. In this area approximately 17 individuals were observed in 2011, but none were observed in 2012. However, it is unlikely that this increase in grass density is related to project disturbance, as described below in Section 2.3.4. Although the population trends appear to be mostly related to variation in weather patterns, one additional year of monitoring is scheduled to document any further changes in the sand gilia population and verify that the changes are not project related.

2.3.2 Monterey Spineflower Survey

The results of the 2012 monitoring for Monterey spineflower are shown below in Table 2-2 with a comparison to the results of monitoring from 2009 to 2011. The total area of Monterey spineflower observed within the OUCTP System 2B area was 2.1 acres, as shown in Figure 2-3. Approximately 57% of occupied spineflower habitat was in the very sparse cover category. The remaining 43% of the mapped area consisted of patches of sparse and medium-low density Monterey spineflower. Areas with cover greater than very sparse (i.e. >3% cover) are shown in Figure 2-4.

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

Cover Class	Area (acres) of Monterey Spineflower			
	2009	*2010*	*2011*	***2012***
Very Sparse (<3%)	1.6	1.56	1.92	**1.2**
Sparse (3-25%)	0.13	0.05	0.10	**0.14**
Medium-Low (26-50%)	0.01	0.12	0.11	**0.76**
Medium (51-75%)	0	0.05	0.07	**0**
Medium High (76-97%)	0	0.02	0	**0**
High (98-100%)	0	0	0	**0**
Total Area:	1.74	1.8	2.2	**2.1**

The total area of Monterey spineflower within the OUCTP System 2B area has decreased very slightly since 2011, but has increased from the 2009 baseline. The majority of the area inhabited remains within the very sparse cover class; however, there was a measureable increase in the area of medium-low density cover class in 2012. Distribution of the highest cover classes of Monterey spineflower was concentrated within two to five feet of shrub edges where non-native grass cover tended to be low, similar to previous years. However, unlike previous years, very sparse densities of Monterey spineflower were present throughout most of the mowed fuel breaks greater than four to six feet from the shrub edges. This data suggests that the Monterey spineflower population is recovering well from the disturbance, the success criteria have been met, and future monitoring for this species within the OUCTP System 2B area is not necessary.

2.3.3 Seaside Bird's-Beak Survey

No Seaside bird's-beak plants were encountered during the 2012 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 2012 monitoring for annual grasses are shown below in Table 2-3 with a comparison to the results of monitoring from 2009 to 2011. 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**			
	2009	*2010*	*2011*	***2012***
Very Low (<5%)	7.7	7.8	7.8	**7.9**
Low (6-25%)	0	0.3	0.8	**0.9**
Medium (26-50%)	1.9	1.7	1.0	**0.9**
High (>50%)	0	0	0.2	0
Total Area:	**9.75**	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 2009-2011 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 or low to very low cover. Additionally, there was a measurable decrease in the area of high density grass to lower density classes. These trends in decreasing areas of the higher cover classes and a nearly immeasurable change in the overall area from the baseline indicate that the disturbance resulting from the project has not had a significant impact on the annual grass population within the OUCTP System 2B area. As such, the success criteria have been met, and future monitoring of annual grasses within the OUCTP System 2B area is not necessary.

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 2012 at the OUCTP 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 IGC 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 2012 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 IGC 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 2012 and will continue to be monitored during future follow-up survey(s).

2.4.4 Other Site Impacts

There were no additional work impacts to the maritime chaparral habitat or HMP plant species in 2012. The site was accessed via the established access routes during the monitoring activities and removal of the aboveground pipeline and associated sampling trailer. Additionally, during removal of the aboveground pipeline and sampling trailer, 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. During installation of the wells in 2010 minor damage was caused to the main access road. As such, Sean McStay, the Reserve Steward, requested repairs be made after removal of the system was completed. The main access road was repaired on October 11, 2012, prior to the rainy season.

3.0 OUCTP Upper/Lower 180-ft Aquifer (Groundwater) – Second 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 2012. 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 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 second year follow-up monitoring for the OUCTP Upper/Lower (U/L) 180-foot Aquifer area. The baseline monitoring and first year follow-up surveys are presented in the 2010 and 2011 *Annual Biological Monitoring Reports* (USACE, 2011 and 2012), respectively. The area will be subject to one more year of follow-up monitoring to document any change in HMP annual plant populations within the impacted area. The 2012 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 2012 surveys within the OUCTP U/L 180-ft Aquifer area were the same as those described in Section 2.2 above. The surveys were conducted for sand gilia on April 27 and 30, 2012, and for Monterey spineflower and non-native annual grasses on May 21 and 22, 2012, at the peak bloom times for each species. Seaside bird's-beak was also searched for during Monterey spineflower surveys when the species was visible but not yet in bloom. Although the well was installed in 2010, this was the second 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 locations, access routes, and underground pipeline route is shown in Figure 3-1. Please note that this area is different than those shown in the 2010 and 2011 annual reports. In 2010, the survey area was larger because the actual location of the wells had not yet been determined (USACE, 2011). However, the area where data was actually collected was similar to the 2012 survey area. In 2011, the survey area identified in the annual report was reduced to include only the area and access route associated with the EW-OU2-09-180 extraction well, which was installed. The remaining area was also surveyed in

2011; however, the data was not reported in the 2011 annual report, but instead in a monitoring report prepared by Ahtna Engineering, as they had been responsible for the installation of the other wells in the area (MP-BW-49 and MP-BW-50). In 2012, USACE requested that IGC conduct biological surveys for the area disturbed during installation of both the IGC- and Ahtna-installed wells – this is the area shown in Figure 3-1.

Due to this updated survey area, the 2010 and 2011 data were re-analyzed to determine the areas/number of individuals observed during those years that occurred within the 2012 survey area, as shown in Tables 3-1 through 3-3. For the 2011 data, this included combining the 2011 annual report data with the Ahtna report data, while the 2010 data were simply cropped to fit the 2012 survey area. However, it should be noted that some of the larger areas of sand gilia observed in 2010 and 2011 extended past the boundary of the 2012 survey area. In these cases, the total number of individuals and the total area of the polygon were included in the calculations, because it is not possible to determine how many individuals within those mapped areas occurred within the 2012 survey area.

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.

3.3.1 Sand Gilia Survey

The results of the 2012 monitoring for sand gilia are shown below in Table 3-1 with a comparison to the results of monitoring in 2011 and 2010. Please note that due to differences in the survey area each year, the 2010 and 2011 numbers for sand gilia reported in Table 3-1 below are not the same as those reported in previous reports, but instead reflect a re-evaluation of the historic data (see Section 3.2 above). The location and total area of sand gilia observed in 2012 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 wells 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

	Area (acres) of Sand Gilia		
	2010	*2011*	***2012***
Total Area	0.11	0.05	**0.04**
Total Number of Plants	1868	591	**431**

The number of individual plants decreased by approximately 27% from that observed in 2011 and approximately 77% from the 2010 baseline. The overall area only decreased slightly from that observed in 2011, but has decreased by approximately 66% from the 2010 baseline. However, because most of the sand gilia areas were outside the actual work zones, the overall trends in abundance of sand gilia are probably most influenced by the variation and the timing in rainfall and temperature patterns over the monitoring period. During the 2011-2012 rainy period, there was a low amount of precipitation in the area early in the season, which may have contributed to a low sand gilia germination rate. This trend is consistent with other sand gilia counts in the reference populations and other survey areas of the former Fort Ord where population decreases were also observed (please refer to survey results in Sections 2.3.1 and 4.2). Further, there have not been increases in the density of annual grass in the areas that support sand gilia within the OUCTP U/L 180-ft Aquifer, so it is unlikely that any observed decrease in the sand gilia population is due to an increased density of non-native annual grasses. One additional year of monitoring is scheduled to document any project-related impacts in the sand gilia population.

3.3.2 Monterey Spineflower Survey

The results of the 2012 monitoring for Monterey spineflower are shown below in Table 3-2 with a comparison to the results of monitoring in 2011 and 2010. Please note that due to differences in the survey area each year, the 2010 and 2011 areas of Monterey spineflower reported in Table 3-2 below are not the same as those reported in previous reports, but instead reflect a re-evaluation of the historic data (see Section 3.2 above). 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 wells 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**		
	2010	*2011*	***2012***
Very Sparse (<3%)	2.34	1.80	**0.39**
Sparse (3-25%)	0.15	0.10	**0.74**
Medium-Low (26-50%)	0.10	0.25	**0.69**
Medium (51-75%)	0.12	0.01	**0.001**
Medium High (76-97%)	0.00	0.00	**0.00**
High (98-100%)	0.00	0.00	**0.00**
Total Area:	2.71	2.16	**1.82**

The total area of Monterey spineflower within the OUCTP U/L 180-ft Aquifer area decreased by approximately 16% from that observed in 2011, and by approximately 33% from the 2010 baseline. The area of the very sparse cover class decreased significantly from that observed in 2010 and 2011; however, the area of sparse and medium-low cover classes was four times greater in 2012 than in 2011. This increase in the higher cover classes shows a positive trend in the Monterey spineflower population within the OUCTP U/L 180-ft Aquifer area, despite the decrease in overall area. There have not been increases in the density of annual grass in the areas that support Monterey spineflower within the OUCTP U/L 180-ft Aquifer, so it is unlikely that any observed decrease in the area of Monterey spineflower is due to an increased density of non-native annual grasses. Further, because most of the Monterey spineflower areas were outside the actual work zones, the overall trends in abundance of Monterey spineflower are probably most influenced by the variation and the timing in rainfall and temperature patterns over the monitoring period. During the 2011-2012 rainy period, there was a low amount of precipitation in the area early in the season, which may have contributed to a somewhat lower Monterey spineflower germination rate. The Monterey spineflower population appears to be recovering well from the disturbance; however, one additional year of monitoring is scheduled to document any project-related changes in the population.

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 survey of this work site.

3.3.4 Annual Grass Survey

The results of the 2012 monitoring for annual grasses are shown below in Table 3-3 with a comparison to the results of monitoring in 2011 and 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**		
	2010	*2011*	***2012***
Very Low (<5%)	2.99	2.95*	**5.2**
Low (6-25%)	2.12	2.19	**2.03**
Medium (26-50%)	1.74	1.6	**0.95**
High (51-75%)	0.28	0.11	**0.08**
Very High (>75%)	0.00	0.00	**0.00**
Total Area:	7.13	6.85	**8.26**

*The 2011 Ahtna data does not include mapping of grasses within the access route. This skews the data to indicate a lower cover of annual grasses than what may have actually been present. Approximately 1.4 acres of the roadway was not included in the data. Based on the 2010 and 2012 data, it can be assumed that most or all of this would have fallen into the very low cover class. As such, 1.4 acres was added to the very low cover class and the total area calculations so that a comparison could be made between the three years of data.

Overall cover of annual grasses within the OUCTP U/L 180-ft Aquifer area increased by approximately 17% compared to that in 2011, but only by 14% compared to the 2010 baseline. The greatest change was in the very low cover class, which increased by approximately 43% compared to that in 2011 and 2010. However, there is also a measureable decrease of annual grasses in the higher cover classes. Although a larger area of annual grasses may be detrimental to annual HMP plant species, the trend towards the lower cover classes may be beneficial as these species are known to co-occur with annual grasses at low densities. Further, there have not been increases in the density of annual grass in the areas that support the HMP annual species within the OUCTP U/L 180-ft Aquifer area, so it is unlikely that any observed decreases in annual plant populations are due to the increased cover of non-native annual grasses. This area will continue to be monitored to determine whether there is significant encroachment of non-native annual grasses as a result of project activities 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 IGC in 2012. 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 IGC work in 2012. 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 IGC 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

There were no additional work impacts to the maritime chaparral habitat or HMP plant species in 2012.

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 (m) 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 27 and 30, 2012. 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 2012 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***
2007	N/A	N/A	N/A	93	52
2008	N/A	N/A	N/A	14	33
2009	N/A	N/A	N/A	248	1000
2010	130	100**	120	455	1645
2011	122	190	125	126*	158
2012	15	113	76	10	104

*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 2012 monitoring for Monterey spineflower are shown below in Table 4-2 with a comparison to the results of monitoring in 2010 and 2011.

Table 4-2. Reference Plot 2 Monterey Spineflower Results

Cover Class	**Area (sqm) of Monterey Spineflower**		
	2010	*2011*	***2012***
Very Sparse (<3%)	0.0	50.5	**0.0**
Sparse (3-25%)	0.0	56.7	**82.8**
Medium-Low (26-50%)	71.5	1.5	**0.0**
Medium (51-75%)	0.0	0.0	**0.0**
Medium High (76-97%)	0.0	0.0	**0.0**
High (98-100%)	0.0	0.0	**0.0**
Total Area:	*71.5*	*108.7*	***82.8***

5.0 Site 39 - Soil Remediation Activities

5.1 Baseline Vegetation Monitoring

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 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.

In 2012, no baseline vegetation monitoring was required for the work within the HAs, as work was only conducted in HAs where baseline vegetation data has been collected in previous years. Some additional excavation areas were identified within HA 37; however, these areas were within contiguous habitat and additional surveys were not necessary. Habitat restoration and monitoring results for 2012 post-remediation of HAs are being submitted under a separate report.

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

During 2012, soil remediation activities were conducted at three of the Site 39 ranges: HAs 34, 37, and 38 (Figures 5-1 through 5-4). Activities at HAs 37 and 38 included excavation of lead-contaminated soil, staging and soil stockpiling, site re-contouring, and erosion control. Activities at HA 34 included site re-contouring, erosion control, and hydroseeding. Measures were taken to reduce impacts to HMP species and habitat. 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. Flagging was placed around known populations of HMP annual species adjacent to access roads to prevent accidental disturbance. 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 2012 are described below in Section 6.1.1.
- CTS exclusion fencing was installed in May 2011 and repaired in December 2012 around a portion of Pond 10 to discourage any CTS from entering the HA 37 excavation area.
- Work was stopped and excavation areas were surveyed by the IGC 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 IGC 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.
- HA 34 and portions of HA 37 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).

6.0 Other Biological Support Activities in 2012

6.1 HMP Species Reports

6.1.1 California Tiger Salamander Encounters

In 2012, there was one CTS encounter by IGC on Fort Ord. This individual was encountered within the stockpile of soil excavated from HA 37. A Field Report Form for CTS was completed for the encounter and provided to the BRAC Natural Resources Manager. The following summarizes the encounter.

On September 19, 2012, an adult CTS was found alive and uninjured by a UXO technician in the HA 37 soil stockpile during soil excavation for lead remediation. The encounter was documented by IGC's biologist, Jami Davis, who relocated the individual to a small mammal burrow on the southeast side of Pond 10, a known CTS breeding pond, approximately 700 feet from the soil stockpile. The report was submitted to the BRAC office on the September 20, 2012.

6.1.2 Black Legless Lizard Encounters

No BLL was encountered during IGC work in 2012.

6.2 Employee Education

New IGC employees and subcontract workers receive a natural resources training on Fort Ord natural resource protection prior to starting work. In 2012, IGC provided training to 19 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 IGC 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.

- How to reduce erosion problems and spread of invasive species.

6.3 Invasive Species Control

Several invasive plant species are known to occur on the former Fort Ord, including iceplant (*Carpobrotus sp.*), French broom (*Genista monspessulana*), and jubata grass (*Cortaderia jubata*). These species spread rapidly and can severely degrade native habitats if measures are not taken to control their spread. The Army has reviewed the California Invasive Plant Council's (CIPC's) *Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers* and has identified appropriate Best Management Practices (BMPs) that can be implemented during cleanup activities. Specifically, BMPs that will be employed to the greatest extent practicable include: washing all vehicles and equipment that come from off of Fort Ord, including those of subcontractors; finding weed-free sources for fill and road base materials that are imported from off-site; only using on-site sources for fill and road base materials that come from areas without invasive plant infestations; planning any off-road haul routes to avoid invasive plant populations; and cleaning boots, equipment, and vehicles that have been used in high infestation areas prior to moving to sites where invasive species populations are low or have not been identified. Additionally each new work area will be evaluated for the presence of invasive species and the appropriate avoidance and minimization measures will be identified prior to work initiation.

7.0 References

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Figures

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	
2-1	OUCTP SYSTEM 2B LOCATION OF SITE AND WELLS

ITSI Gilbane | Shaw

DATE	PROJECT NUMBER	FILE NAME
12/31/2012	141234	SEE FOOTER

File Path:C:\GIS\Fort_Ord_GIS\2012_Biology\GIS_Documents\OUCTP_baseline_area2012.mxd • Date: 12/31/12

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	
2-2	OUCTP SYSTEM 2B 2012 SAND GILIA LOCATIONS AND DENSITY

ITSI Gilbane | Shaw

DATE	PROJECT NUMBER	FILE NAME
12/31/2012	141234	SEE FOOTER

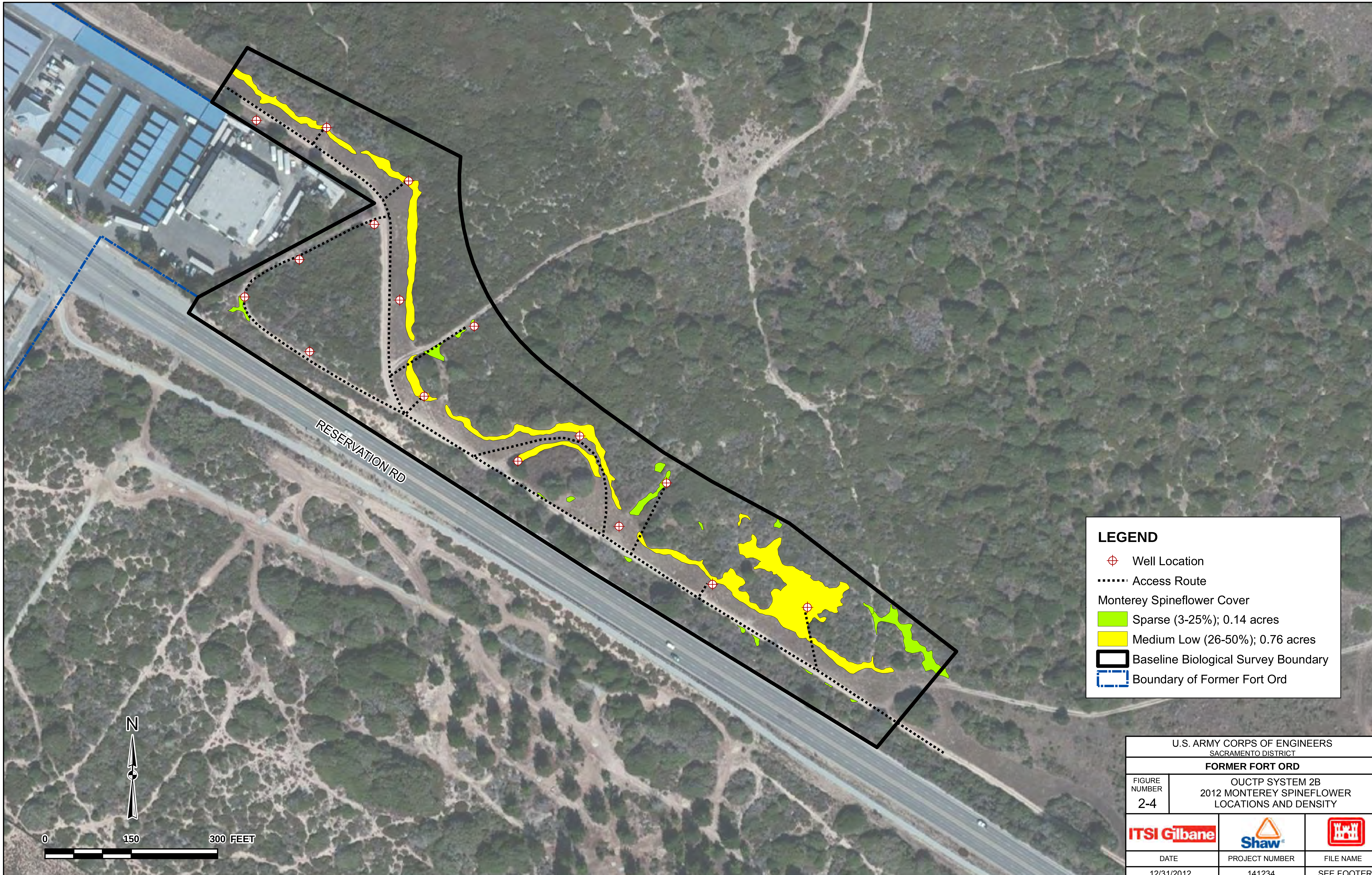
U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	OUCTP SYSTEM 2B 2012 MONTEREY SPINEFLOWER TOTAL DISTRIBUTION
2-3	

ITSI Gilbane | Shaw

DATE	PROJECT NUMBER	FILE NAME
12/31/2012	141234	SEE FOOTER



U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	OUCTP SYSTEM 2B 2012 MONTEREY SPINEFLOWER LOCATIONS AND DENSITY
2-4	

ITSI Gilbane | Shaw | USACE

DATE	PROJECT NUMBER	FILE NAME
12/31/2012	141234	SEE FOOTER

File Path:C:\GIS\Fort_Ord_GIS\2012_Biology\GIS_Documents\OUCTP_SFdensity2012.mxd • Date: 12/31/12

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SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER 2-5	OUCTP SYSTEM 2B 2012 NON-NATIVE ANNUAL GRASS DISTRIBUTION	
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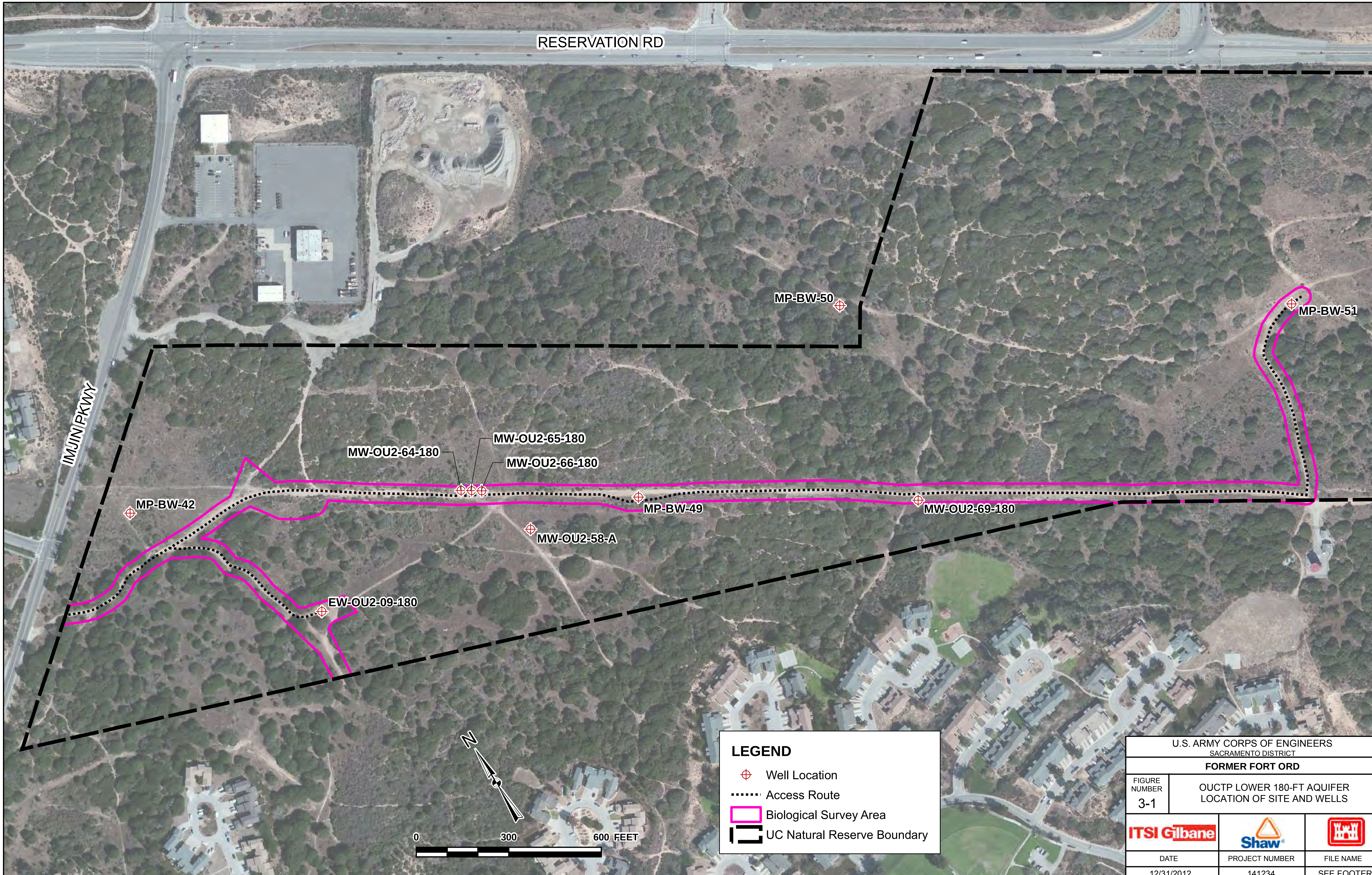

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER 3-1	OUCTP LOWER 180-FT AQUIFER LOCATION OF SITE AND WELLS	
ITSI Gilbane	Shaw	
DATE	PROJECT NUMBER	FILE NAME
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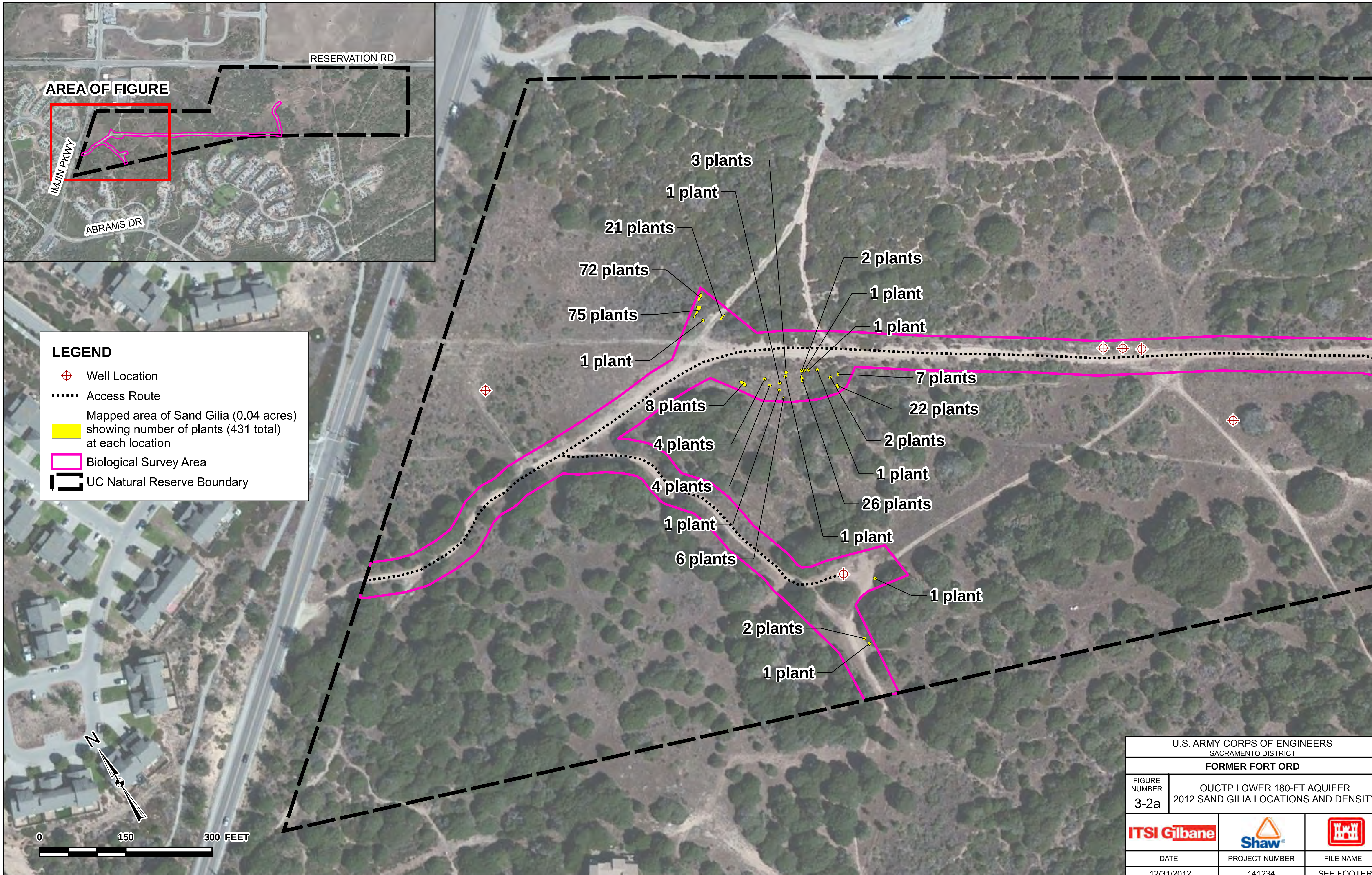

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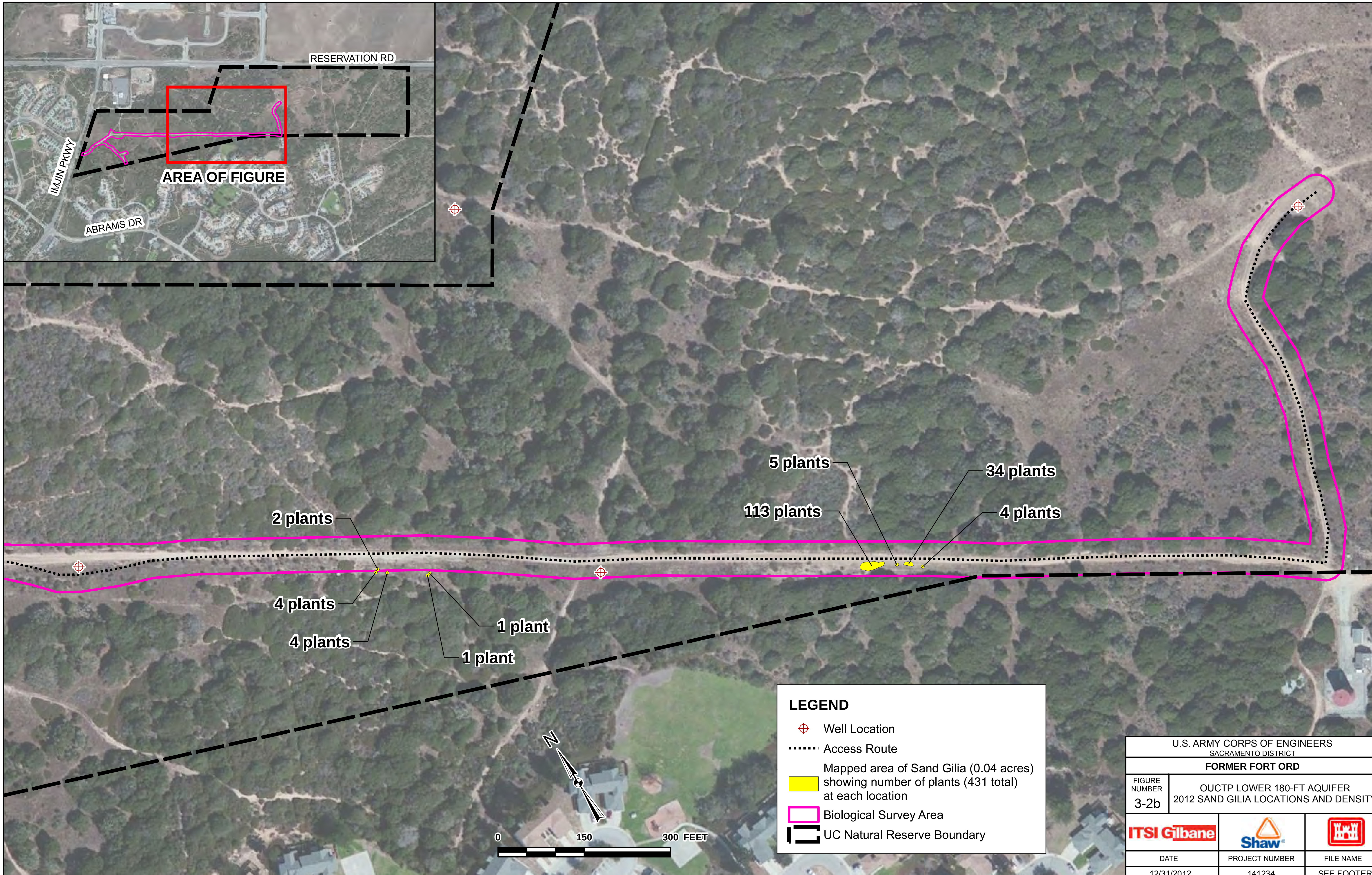

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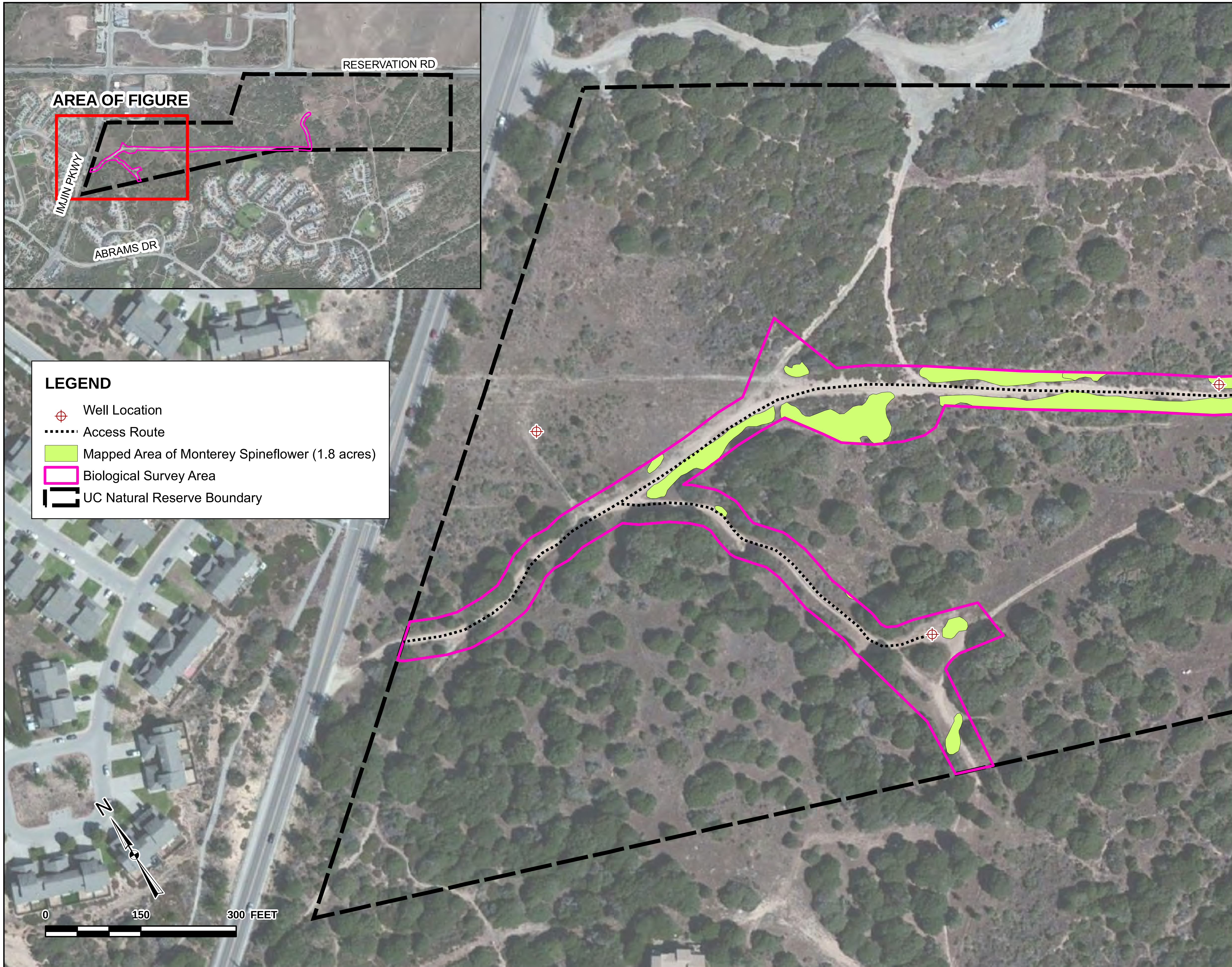

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SACRAMENTO DISTRICT

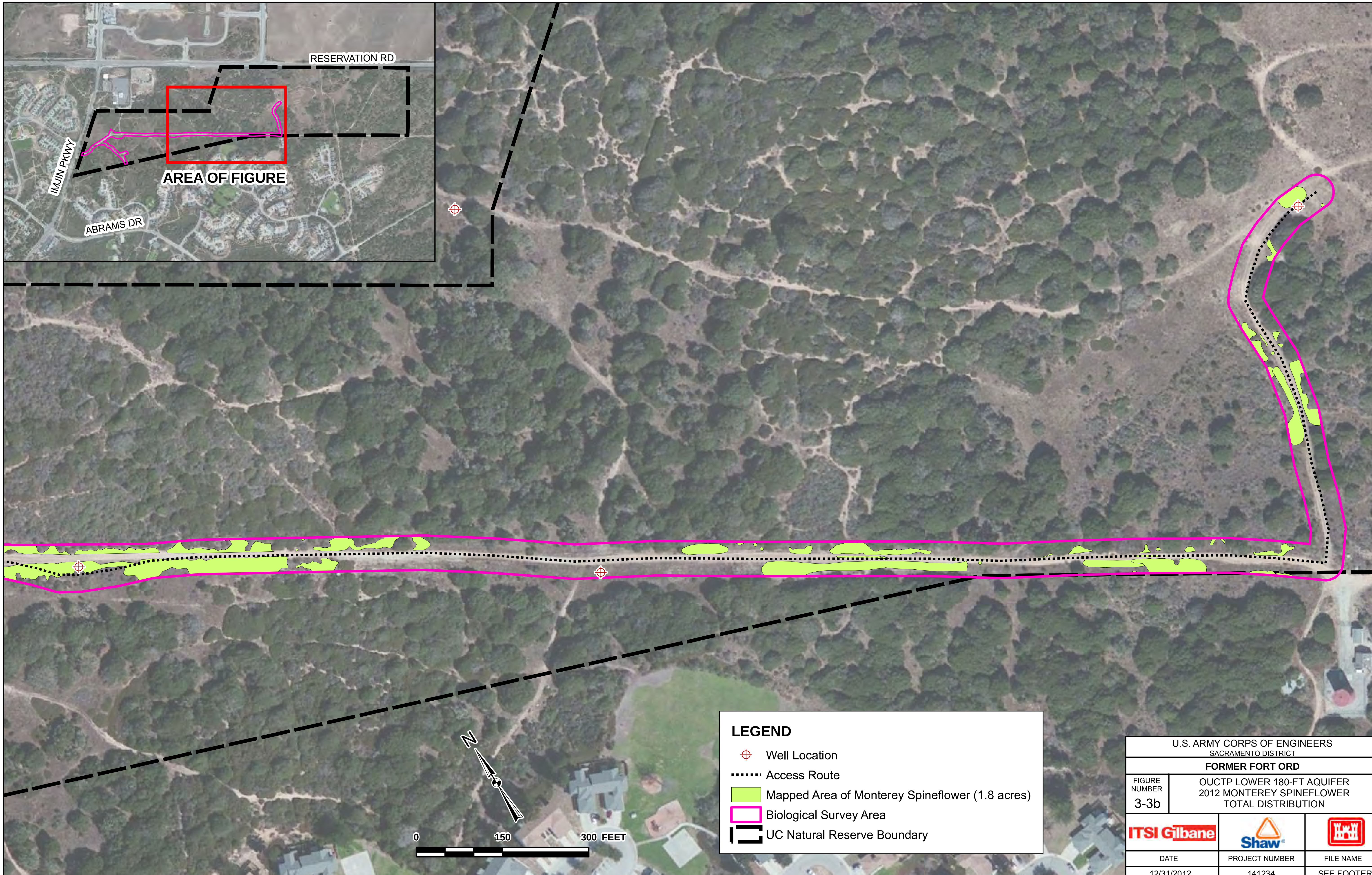
FORMER FORT ORD

FIGURE NUMBER	OUCTP LOWER 180-FT AQUIFER 2012 MONTEREY SPINEFLOWER TOTAL DISTRIBUTION
3-3a	

ITSI Gilbane | Shaw

DATE	PROJECT NUMBER	FILE NAME
12/31/2012	141234	SEE FOOTER

File Path:C:\GIS\Fort_Ord_GIS\2012_Biology\GIS_Documents\RESERVEa_spineflower2012.mxd • Date: 01/03/13



LEGEND

- Well Location
- Access Route
- Mapped Area of Monterey Spineflower (1.8 acres)
- Biological Survey Area
- UC Natural Reserve Boundary

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FORMER FORT ORD

FIGURE NUMBER	OUCTP LOWER 180-FT AQUIFER 2012 MONTEREY SPINEFLOWER TOTAL DISTRIBUTION
3-3b	

ITSI Gilbane | Shaw

DATE	PROJECT NUMBER	FILE NAME
12/31/2012	141234	SEE FOOTER

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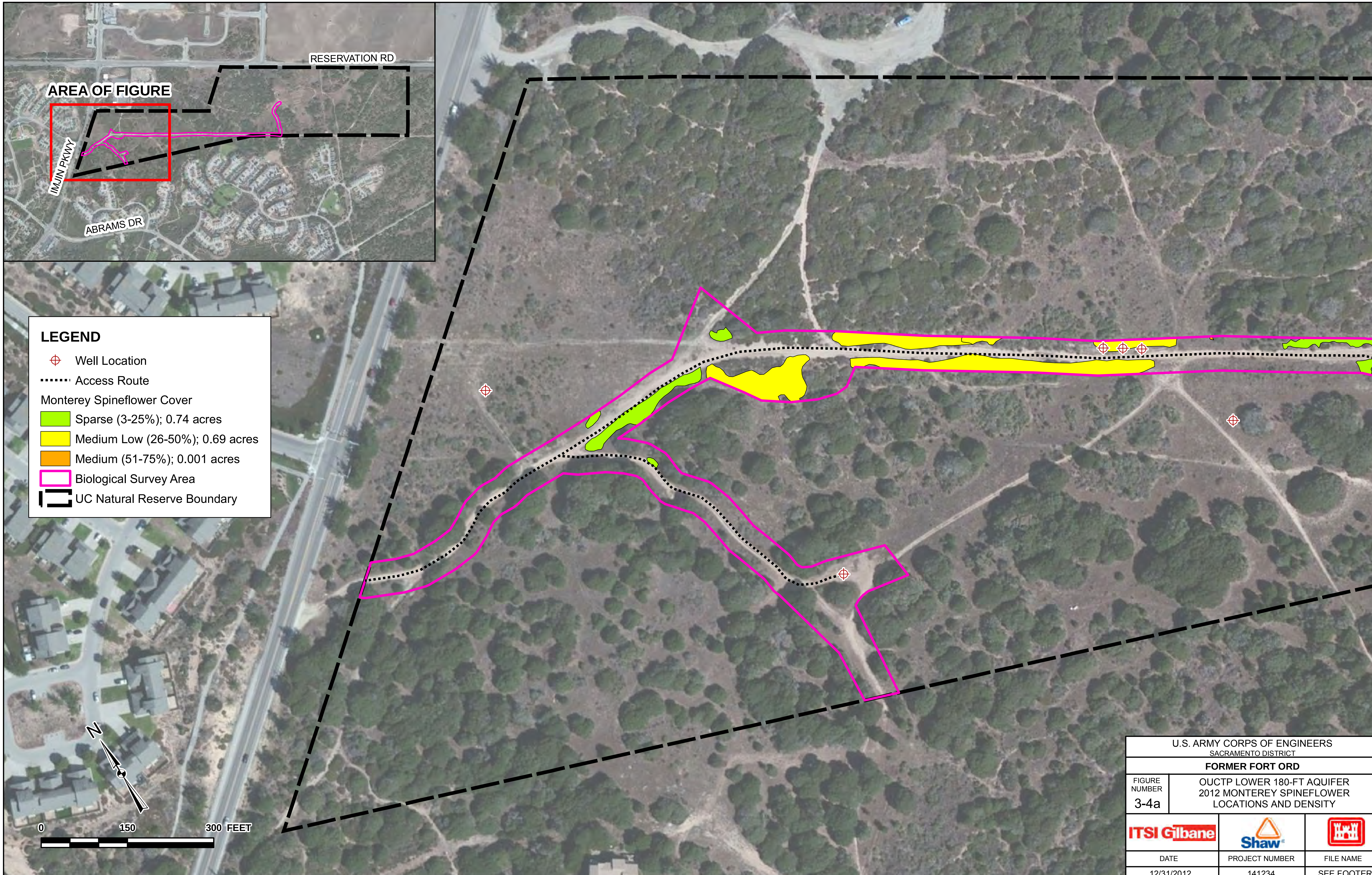

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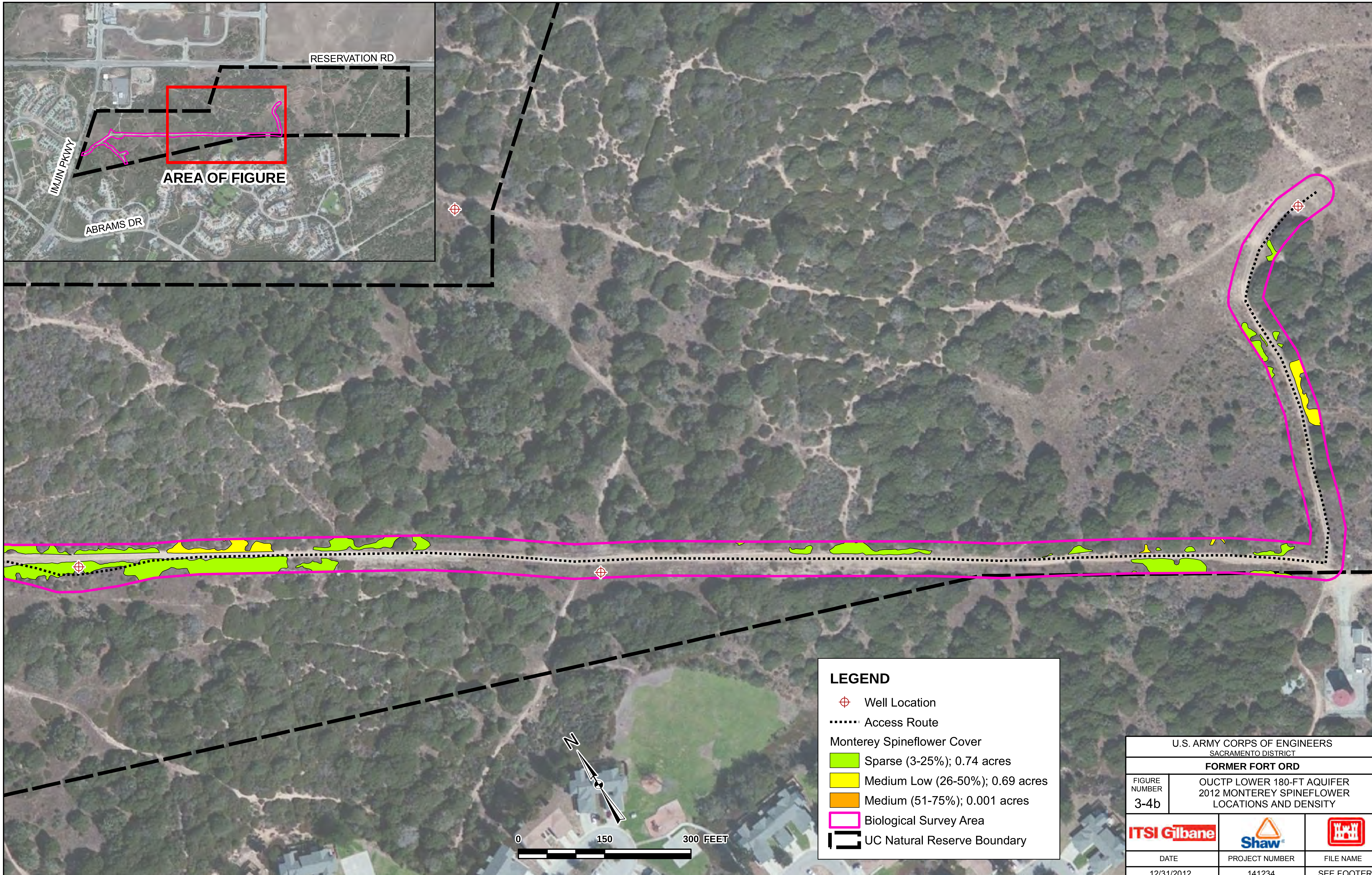

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SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	
3-4b	OUCTP LOWER 180-FT AQUIFER 2012 MONTEREY SPINEFLOWER LOCATIONS AND DENSITY

ITSI Gilbane | Shaw

DATE	PROJECT NUMBER	FILE NAME
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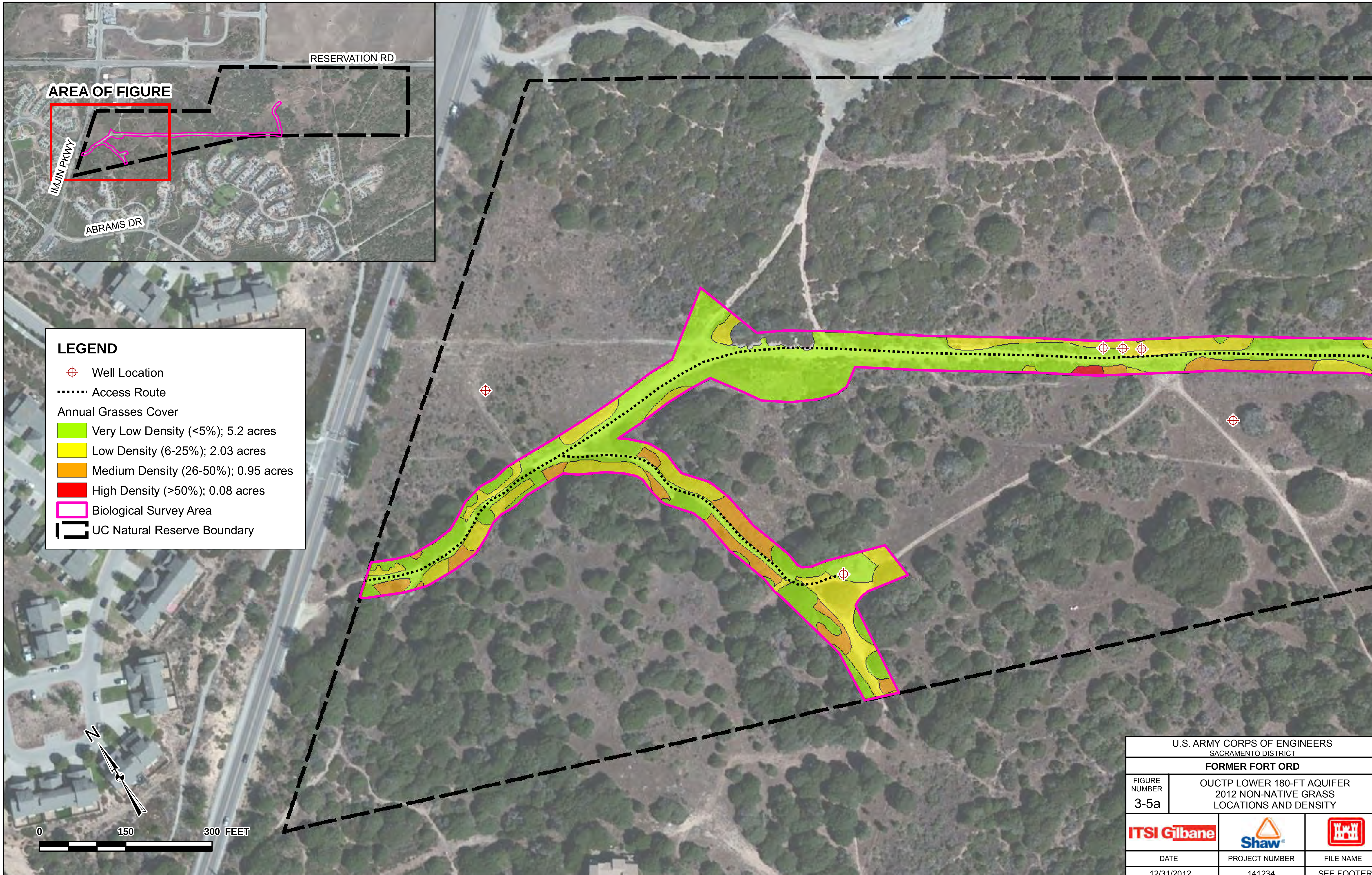

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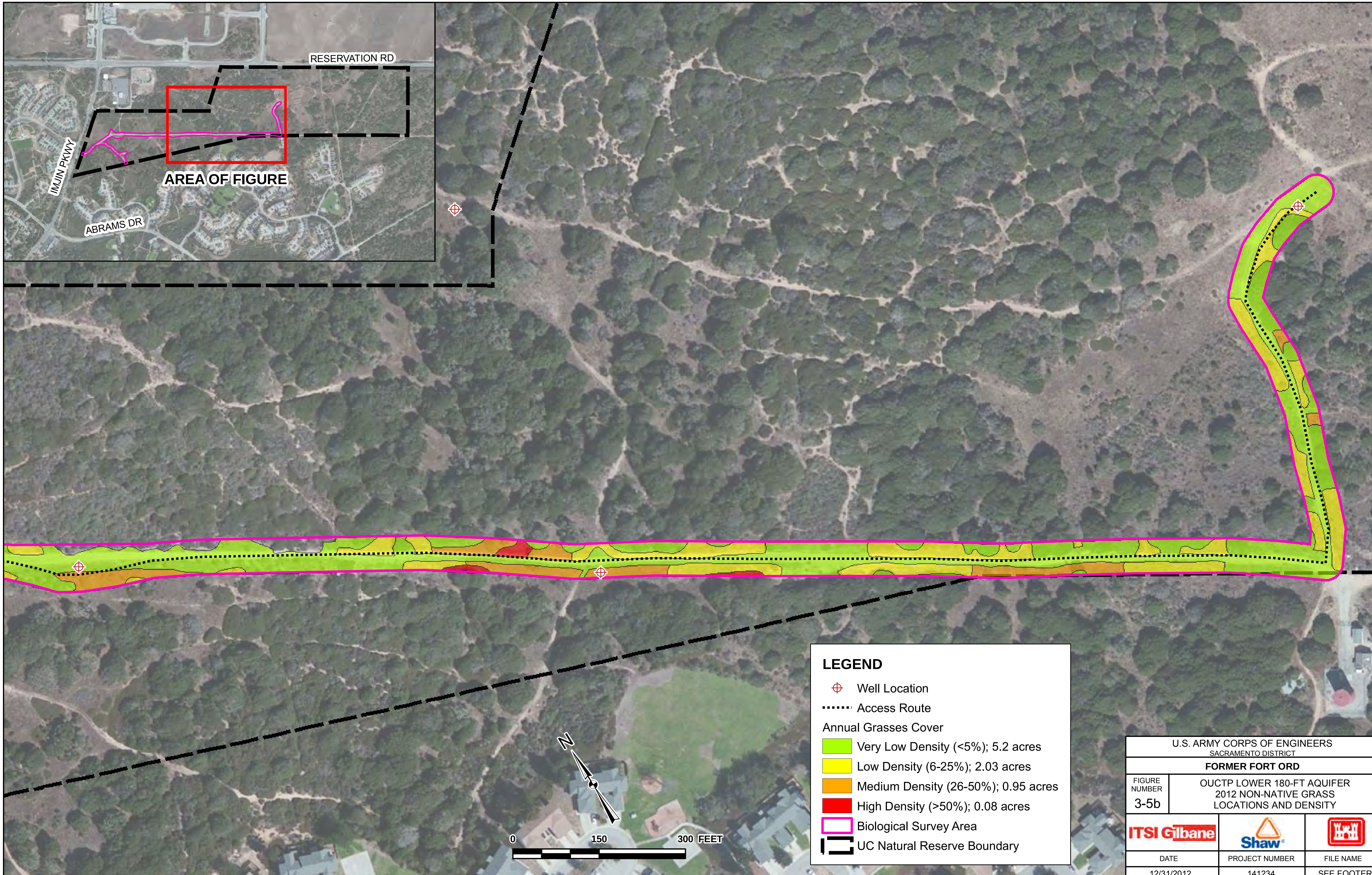

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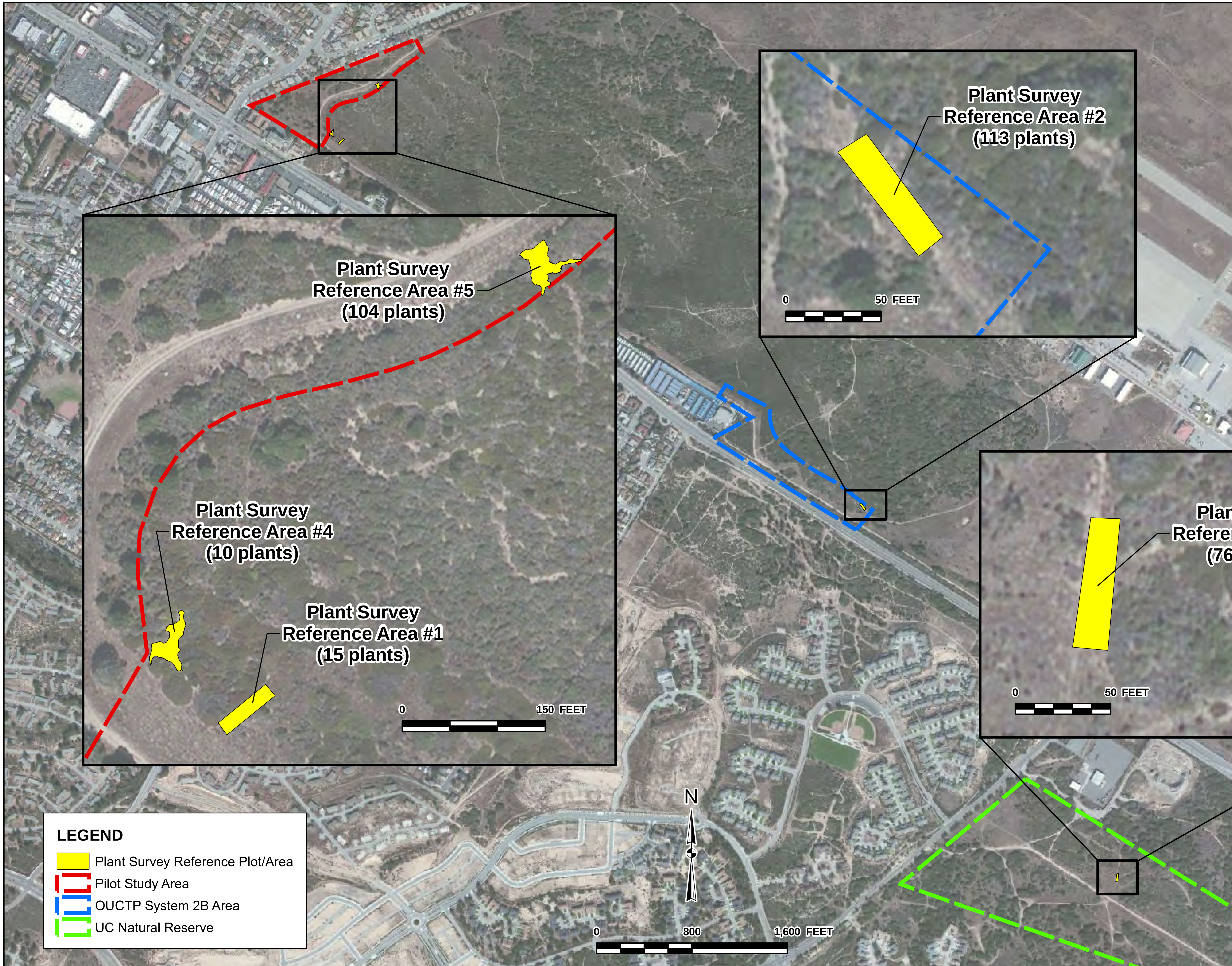

U.S. ARMY CORPS OF ENGINEERS SACRAMENTO DISTRICT		
FORMER FORT ORD		
FIGURE NUMBER 4-1	HMP ANNUAL PLANT SPECIES REFERENCE PLOTS	
ITSI Gilbane	Shaw	
DATE	PROJECT NUMBER	FILE NAME
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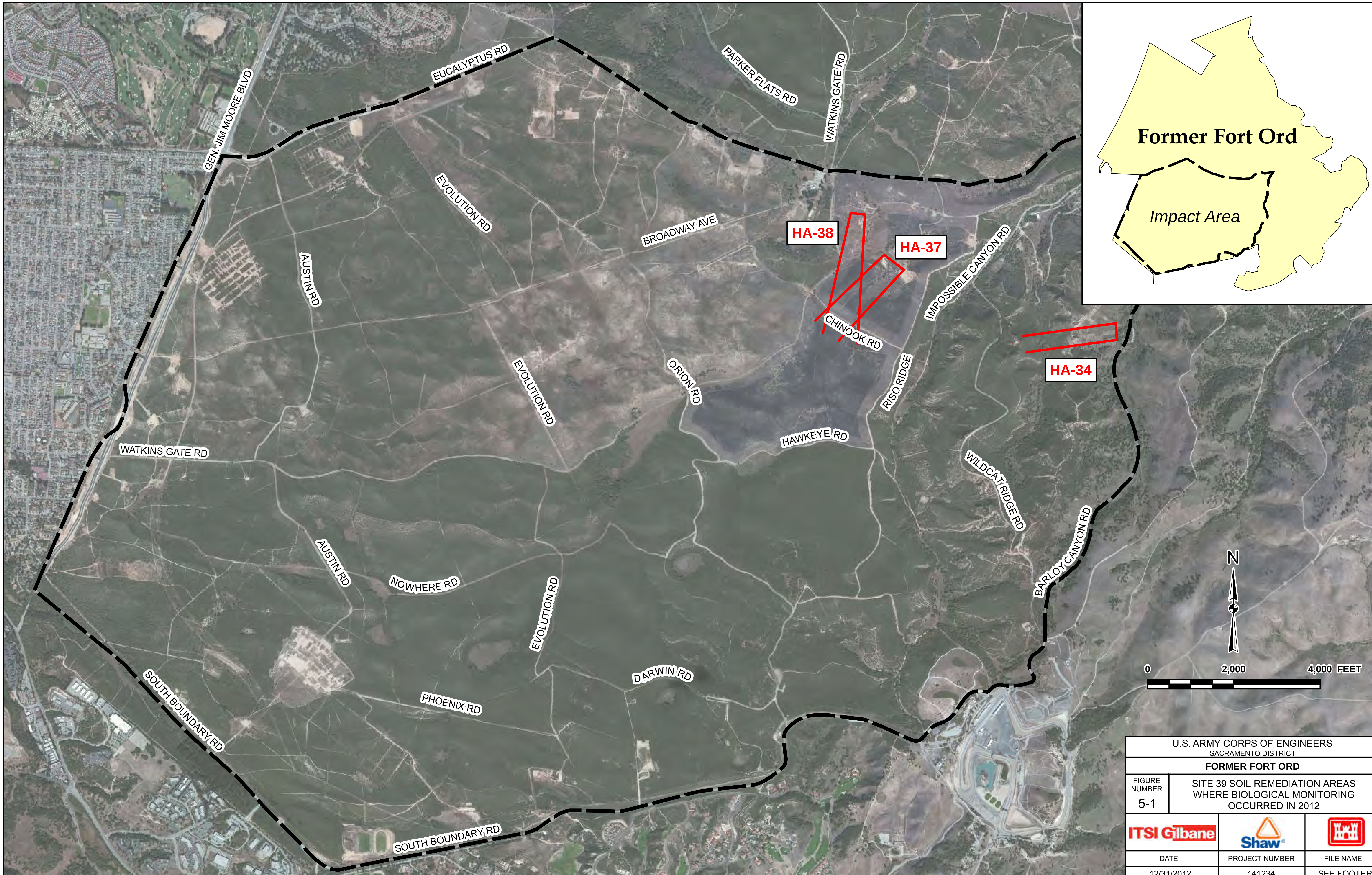
File Path:C:\GIS\Fort_Ord_GIS\2012_Biology\GIS_Documents\Reference_plots2012.mxd • Date: 12/31/12



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FORMER FORT ORD

FIGURE NUMBER	SITE 39 SOIL REMEDIATION AREAS WHERE BIOLOGICAL MONITORING OCCURRED IN 2012
5-1	

ITSI Gilbane | Shaw

DATE	PROJECT NUMBER	FILE NAME
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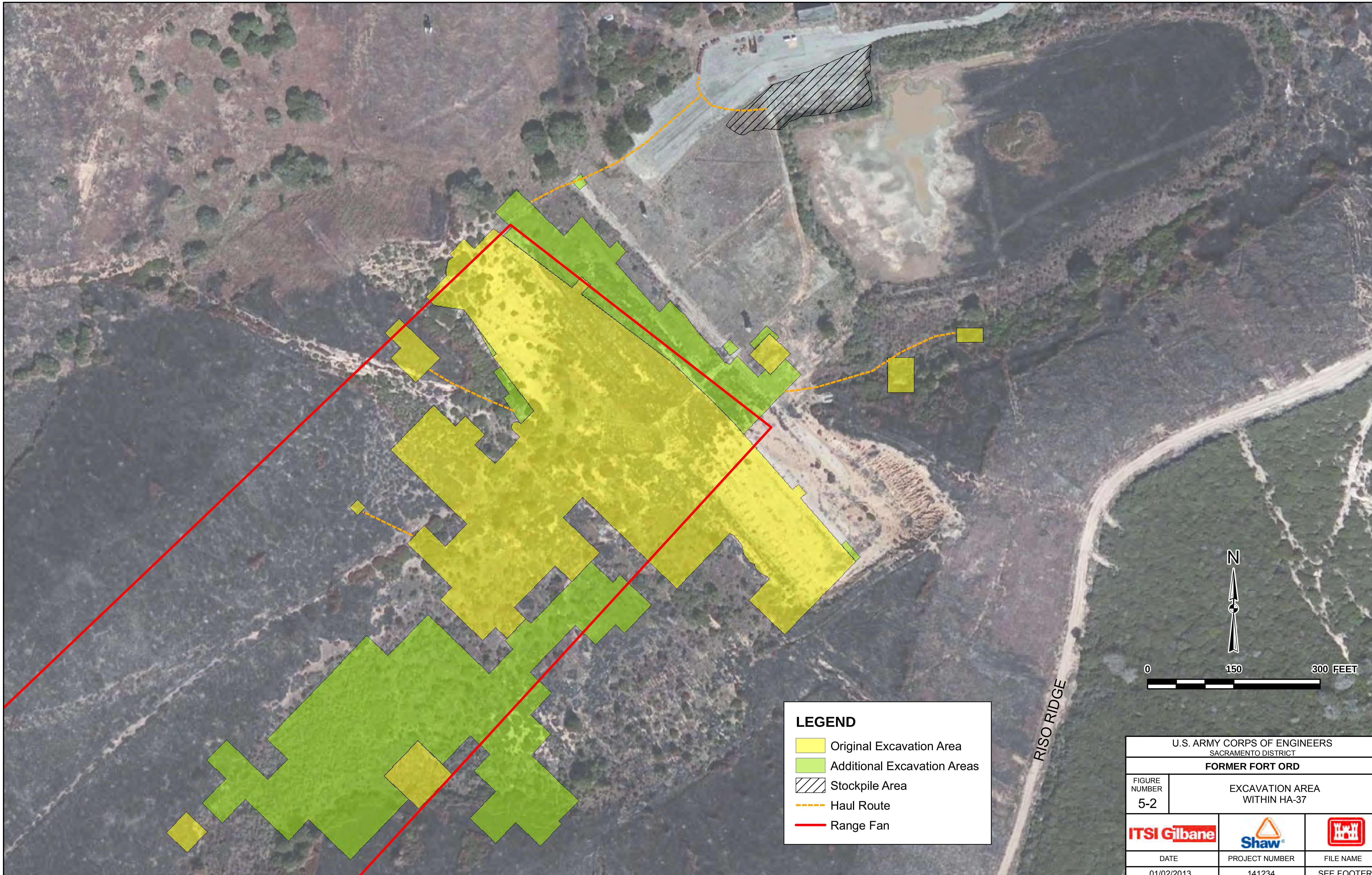

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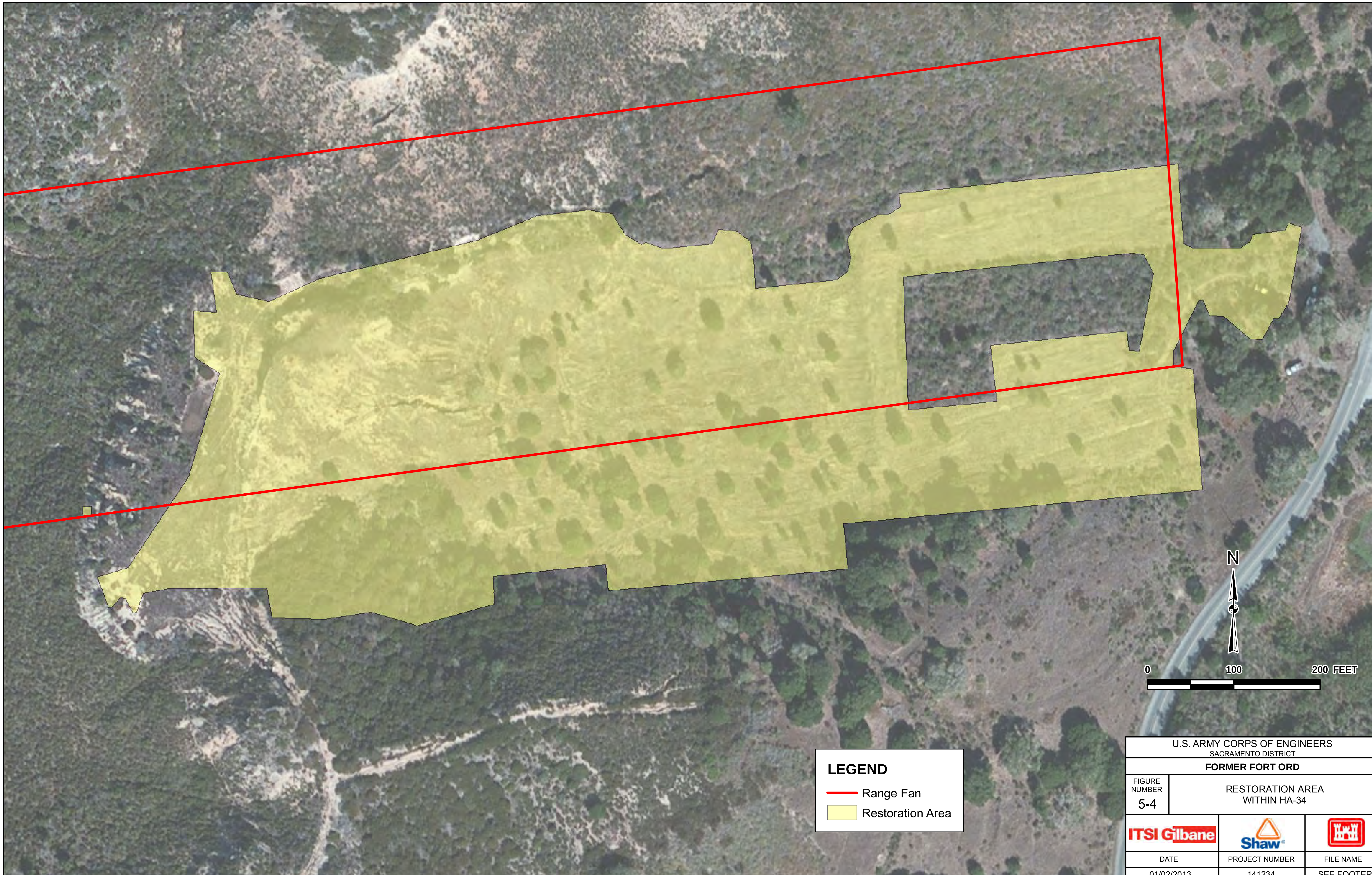

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