2013 ANNUAL BIOLOGICAL MONITORING REPORT
FORMER FORT ORD, CALIFORNIA

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

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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
DGM	Digital Geophysical Mapping
DD&A	Denise Duffy & Associates, Inc.
FONR	Fort Ord Natural Reserve
ft	foot
ITSI Gilbane	ITSI Gilbane Company
GIS	Geographic Information System
GPS	Global Positioning System
HA	Historical Area
HMP	Habitat Management Plan
HRP	Habitat Restoration Plan
m	meters
MEC	Munitions and Explosives of Concern
MOUT	Military Operations in Urban Terrain
OU	Operable Unit
OUCTP	Operable Unit Carbon Tetrachloride Plume
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 was prepared by Denise Duffy & Associates (DD&A) as a subcontractor to ITSI Gilbane Company (ITSI Gilbane) under the Worldwide Environmental Remediation Services (WERS) No. W912DY-10-D-0024. This report contains results of the 2013 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). The U.S. Department of the Army's (Army's) decision to close and dispose of the Fort Ord military base was considered a major federal action that could affect listed species under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) issued a Final Biological Opinion on the disposal and reuse of former Fort Ord requiring that a HMP be developed and implemented to reduce the incidental take of listed species and loss of habitat that supports these species. The HMP was prepared to assess impacts on vegetation and wildlife resources and provide mitigation for their loss associated with the disposal and reuse of former Fort Ord (USACE, 1997).

1.1 Background

The HMP establishes guidelines for the conservation and management of species and habitats on former Fort Ord lands by identifying lands that are available for development, lands that have some restrictions with development, and habitat reserve areas. The intent of the plan is to establish large, contiguous habitat conservation areas and corridors to compensate for future development in other areas of the former base. The HMP identifies what type of activities can occur on each parcel at former Fort Ord. The HMP sets the standards to assure the long-term viability of former Fort Ord's biological resources in the context of base reuse, so that no further mitigation should be necessary for impacts to species and habitats considered in the HMP. This plan has been approved by the USFWS; the HMP, deed restrictions, and Memoranda of Agreement between the Army and various land recipients provide the legal mechanism to assure HMP implementation. It is a legally binding document, and all recipients of former Fort Ord lands are required to abide by its management requirements and procedures.

In addition to the HMP, four Biological Opinions and one amendment have been issued by the USFWS, 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 (USFWS, 1999, 2002, 2005, 2007 [amendment], and 2011).

Habitat types identified in the HMP and Biological Opinions are:

- Central maritime chaparral
- Wetlands and vernal ponds
- 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 forb)

Special-status species listed in the HMP and Biological Opinions are:

- Sand gilia (*Gilia tenuiflora arenaria*)
- Monterey spineflower (*Chorizanthe pungens pungens*)
- Seaside bird's-beak (*Cordylanthus rigidus littoralis*)
- 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*)
- Yadon's piperia (*Piperia yadonii*)
- Contra Costa goldfields (*Lasthenia conjugens*)
- California Black Legless Lizard (*Anniella pulchra nigra*; BLL)
- California tiger salamander (*Ambystoma californiense*; CTS)
- California linderiella (*Linderiella occidentalis*)

Sand gilia, Monterey spineflower, and Seaside bird's-beak are annual herb species that may occur within maritime chaparral, coastal scrub, grasslands, or disturbed areas. Hooker's manzanita, sandmat manzanita, Monterey manzanita, Monterey ceanothus, Eastwood's goldenbush are perennial shrub species that typically occur in maritime chaparral, but individuals may also be found mixed with oak woodland or coastal scrub habitats. Yadon's piperia is a perennial herb that is typically found in maritime chaparral and Monterey pine habitats. The BLL is an HMP-recognized rare variety of the California legless lizard (*A. pulchra*) that inhabits areas with sandy soils on the former Fort Ord. The CTS, California linderiella, and Contra Costa goldfields are typically found in vernal or seasonal ponds on the former Fort Ord. The CTS may also be found aestivating in small mammal burrows or under logs in upland areas within two kilometers of vernal ponds.

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 also requires monitoring consistent with existing Biological Opinions during and after completion of the cleanup operations to avoid and minimize impacts, and 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.

1.2 Report Content

This report includes the results of biological monitoring performed by ITSI Gilbane in 2013 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.

ITSI Gilbane was tasked by USACE to conduct follow-up biological surveys at the following sites:

- **OUCTP System 2B:** A fourth year of follow-up after well installation and groundwater remediation activities on the University of California's Fort Ord Nature Reserve (FONR)-North was conducted only for sand gilia, based on the results of the surveys conducted in 2012
- **OUCTP Upper/Lower (U/L) 180-ft Aquifers.** This was the third year of follow-up vegetation surveys for one well location, underground pipeline, and associated staging areas on the University of California's FONR-South.

In addition to annual monitoring, this report describes mitigation and avoidance measures that were implemented during work conducted by ITSI Gilbane in 2013 at the following sites:

- **Soil remediation sites:** Former Historical Ranges HA 28, 34, 37, and 38.
- **Munitions remediation:** Units 1, 2, 3, 4, 5a, 6, 7, 9, 10, 11, 12, and 33; the Watkins Gate Burn Area unburned areas and 100-foot buffer area; the Military Operations in Urban Terrain (MOUT) site buffer; the Bureau of Land Management (BLM) Headquarters south buffer (within Units 18 and 22); and the Phase C fuel breaks.

2.0 Plant Survey Reference Plots

2.1 Reference Plots - Introduction

Three reference plots (Reference Plots 1-3) 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 meter configurations) were set up in areas that had high sand gilia and Monterey spineflower abundance in 2010. In addition to these plots, two small areas (Reference Plots 4 and 5) within the OUCTP Pilot Study Survey Area are monitored annually to provide additional 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 continue to be monitored annually as long as they remain undisturbed. The location of all reference plots are shown in Figure 2-1.

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 17 and 18, 2013. The results will be used to interpret the monitoring data for HMP species on the Carbon Tetrachloride Plume (CTP) and other habitat reserve project sites.

2.2 Reference Plots - Results

The results of the 2013 monitoring for sand gilia are shown below in Table 2-1 with a comparison to the results of monitoring in previous years. Figure 2-1 shows the location of the plots and numbers of sand gilia plants in relation the surrounding site. Data was not collected in the Monterey spineflower reference plot in 2013.

Table 2-1. 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
2013	**77**	**317**	**53^**	**99**	**590**

*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.

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

^Please note that several footprints were observed within this plot, and the low number of individuals may be a result of increased foot traffic.

2.3 Reference Plots - Discussion

The results of the 2013 monitoring show an increase in the number of sand gilia individuals in all plots except for Plot 3 when compared with the 2012 data. Plot 3 is located in the middle of a trail that appears to be utilized by local residents, as several footprints were observed within the plot. The low number of individuals in Plot 3 is possibly a result of this increased foot traffic and the data collected in 2013 within Plot 3 is not useful as a reference population.

The observed increase in the number of sand gilia individuals within the reference plots is potentially a result of local weather patterns. During the 2012/2013 rainy season (September-March), slightly more precipitation was observed than during the 2011/2012 rainy season, although both seasons were below average (Naval Postgraduate School, 2014). Additionally, during November and December 2012, precipitation was well above average, which could potentially have resulted in a higher germination rate than in 2011/2012, where precipitation in these months was below average. Sand gilia increases germination rates with higher rainfall and temperature (Fox et al., 2006), but other stochastic factors, such as level of herbivory, may affect the vital rates of this species as well (Fox, 2007).

The observed sand gilia reference populations in 2013 are within the range observed previously, with the exception of Plot 3, described above, and Plot 2, where it was the highest since 2010. The data demonstrates that sand gilia populations can very substantially, both temporally and spatially, even in areas that have not received any treatment.

3.0 OUCTP System 2B (Groundwater) – Fourth Year Follow-Up Biological Monitoring Survey

3.1 OUCTP System 2B - Introduction

Vegetation monitoring was conducted within the FONR where 16 wells were installed between January and March 2010 (Figure 3-1). The wells were installed as part of the ongoing groundwater remediation of the CTP within the A 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, 2009a).

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; however, additional monitoring may be necessary if success criteria are not met within three years. Success criteria are identified in the letter from the Army to the USFWS regarding reinitiating formal consultation to address impacts to Contra Costa goldfields associated with OE removal actions and sand gilia and Monterey spineflower associated with remediation of contaminated groundwater plumes (Army, 1998). The letter states that "If after three years of monitoring shows that sand gilia or Monterey spineflower populations are declining as a result of road use during the growing season, a restoration plan will be implemented." This report summarizes results of the fourth year follow-up monitoring for the OUCTP System 2B area. The baseline, first, second, and third year of follow-up monitoring surveys are presented in the 2009, 2010, 2011, and 2012 *Annual Biological Monitoring Reports* (USACE, 2010a, 2011, 2012, 2013), 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 was necessary in 2013. A decline in sand gilia in the area was observed in 2012, but the 2012 Annual Monitoring Report (USACE, 2012) identified that this was likely due to variations in rainfall and temperature patterns not use of the adjacent road. However, to be conservative, one additional year of monitoring for this species was recommended within the OUCTP System 2B area. The 2013 data presented here will be used for comparison with reference data presented in Section 2.

3.2 OUCTP System 2B - Methods

Methods used for the 2013 survey 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, 2009b, and 2010a, 2011, 2012).

Sand gilia populations were surveyed on April 18, 2013 to capture the peak bloom. The survey was conducted prior to the mowing of fuel breaks in the System 2B area[1]. Sand gilia populations and individuals were mapped using a Global Positioning System (GPS), and the total number of plants was recorded for each population.

3.3 OUCTP System 2B - Results and Discussion

The results of the 2013 monitoring for sand gilia are shown below in Table 2-1 with a comparison to the results of monitoring from 2009 to 2012. A total of 596 sand gilia individuals were observed within an area of approximately 0.01 acre. The location and total area of sand gilia observed during the survey are shown in Figure 3-2, 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 3-1. OUCTP System 2B Sand Gilia Survey Results

Sand Gilia	*2009*	*2010*	*2011*	*2012*	***2013***
Total Area	0.06	0.10	0.10	0.03	**0.01**
Total Number of Plants	213	1,836	771	256	**596**

The area covered decreased from that observed in 2013; however, the number of individual plants more than doubled. In comparison to the baseline data collected in 2009, however, the number of individual plants has greatly increased, but the total area has decreased by more than 80%. 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 weather patterns over the monitoring period, as described above in Section 2.3. However, the cause of the decrease in area of sand gilia is unknown. It is possible that historic weather events had a permanent or long-lasting impact on the population or that natural succession is occurring within the habitat that limits the amount of space available for sand gilia. Although grass density data was not collected in the System 2B area in 2013, there was no observable increase in annual grasses within the area, and it is unlikely that annual grass encroachment is the cause of the decline in most of the areas where sand gilia occurs. Further, the increase in number of individuals but decrease in area observed within the System 2B area is consistent with sand gilia counts in the reference populations and other survey areas of the former Fort Ord (please refer to survey results in Sections 2.2 and 4.3.1). Therefore, although the area of sand gilia has decreased within the System 2B area, the number of individuals has increased and the population trends do not appear to be project-related. As such, the success criteria have been met and no future monitoring for this species within the OUCTP System 2B area is necessary.

[1] 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.

4.0 OUCTP Upper/Lower 180-ft Aquifer Area (Groundwater) – Third Year Follow-Up Monitoring Survey

4.1 OUCTP U/L 180-ft Aquifer Area - 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 4-1). The well was installed in June 2010, while the underground pipeline was installed in January 2011. Groundwater remediation activity and sampling continued through 2013. 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).

As identified above in Section 2.1, three years of follow-up monitoring after project completion is required for sites in HMP-designated habitat areas where groundwater remediation takes place (Army, 1998). This report summarizes results of the third year follow-up monitoring for the OUCTP Upper/Lower (U/L) 180-foot Aquifer area. The baseline, first, and second year monitoring surveys are presented in the 2010, 2011, and 2012 *Annual Biological Monitoring Reports* (USACE, 2011, 2012, and 2013), respectively. The 2013 data presented here will be used for comparison along with reference data presented in Section 2.

4.2 OUCTP U/L 180-ft Aquifer Area - Methods

Methods used for the 2013 surveys were the same as those used for vegetation surveys at FONR completed previously by Hydrogeologic, Inc. with DD&A; and Shaw (USACE, 2008, 2009b, and 2010a, 2011, 2012).

Sand gilia populations were surveyed on April 17 and 18, 2013 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 10, 2013 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 10, 2013 by hand onto aerial photo maps in the field and were later digitized into 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%

The biological survey area showing the well locations, access routes, and underground pipeline route is shown in Figure 4-1. This area is the same as that shown in the 2012 annual report but 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 in 2010 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 it was reported 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 and 2013, USACE requested that ITSI Gilbane conduct biological surveys for the area disturbed during installation of both the ITSI Gilbane- and Ahtna-installed wells – this is the area shown in Figure 4-1.

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 2012/2013 survey area, as shown in Tables 4-1 through 4-3. 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 2012/2013 survey area. Some of the larger areas of sand gilia observed in 2010 and 2011 extended past the boundary of the 2012/2013 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 2012/2013 survey area.

4.3 OUCTP U/L 180-ft Aquifer Area - 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.

4.3.1 Sand Gilia Survey

The results of the 2013 monitoring for sand gilia are shown below in Table 4-1 with a comparison to the results of monitoring in 2012, 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 4-1 below are not the same as those reported in previous reports, but instead they reflect a re-evaluation of the historic data (see Section 4.2 above). The location and total area of sand gilia observed during the survey in 2013 are shown in Figure 4-2, 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 4.4, were employed in order to minimize impacts to this species and other rare plant habitat.

Table 4-1. OUCTP U/L 180-ft Aquifer Area Sand Gilia Survey Results

Sand Gilia	*2010*	*2011*	*2012*	***2013***
Total Area	0.11	0.05	0.04	**0.03**
Total Number of Plants	1,868	591	431	**672**

The number of individual sand gilia plants increased by approximately 55% from that observed in 2012 but is still approximately 64% less than that observed during the 2010 baseline surveys. The overall area only decreased slightly from that observed in 2012 but has decreased by approximately 72% from the 2010 baseline. However, because most of the sand gilia areas were outside the actual work zones, the overall trend in abundance of sand gilia individuals is probably most influenced by the variation in weather patterns over the monitoring period, as it is consistent with trends observed within the reference populations (please refer to Sections 2.2 and 2.3). However, the cause of the decrease in area of sand gilia is unknown. It is possible that historic weather events had a permanent or long-lasting impact on the population or that natural succession is occurring within the habitat that limits the amount of space available for sand gilia. However, it should be noted that 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 area, so it is unlikely that any observed decrease in the area of sand gilia is due to an increased density of non-native annual grasses. Further, the increase in number of individuals but decrease in area observed within the OUCTP U/L 180-ft Aquifer area is consistent with sand gilia counts in other survey areas of the former Fort Ord (please refer to survey results in Section 3.2). Therefore, although the area of sand gilia has decreased within the OUCTP U/L 180-ft Aquifer area, the number of individuals has increased and the population trends do not appear to be project-related. As such the success criteria have been met, and no future monitoring for this species within the OUCTP U/L 180-ft Aquifer area is necessary.

4.3.2 Monterey Spineflower Survey

The results of the 2013 monitoring for Monterey spineflower are shown below in Table 4-2 with a comparison to the results of monitoring in 2012, 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 4-2 below are not the same as those reported in previous reports, but instead they reflect a re-evaluation of the historic data (see Section 4.2 above). The total distribution of Monterey spineflower within the survey area is shown in Figures 4-3a and 4-3b. This figure also shows that the access routes for the wells were close to the Monterey spineflower patches. Areas with a cover of Monterey spineflower greater than very sparse (i.e. >3% cover) are shown in Figures 4-4a and 4-4b. Avoidance measures, as identified below in Section 4.4, were employed in order to minimize impacts to this species and other rare plant habitat.

Table 4-2. OUCTP U/L 180-ft Aquifer Area Monterey Spineflower Survey Results

Cover Class	**Area (acres) of Monterey Spineflower**			
	2010	*2011*	*2012*	***2013***
Very Sparse (<3%)	2.34	1.80	0.39	**0.00**
Sparse (3-25%)	0.15	0.10	0.74	**0.61**
Medium-Low (26-50%)	0.10	0.25	0.69	**0.62**
Medium (51-75%)	0.12	0.01	0.001	**0.00**
Medium High (76-97%)	0.00	0.00	0.00	**0.07**
High (98-100%)	0.00	0.00	0.00	**0.00**
Total Area:	2.71	2.16	1.82	**1.30**

The total area of Monterey spineflower within the OUCTP U/L 180-ft Aquifer area decreased by approximately 29% from that observed in 2012, and by approximately 52% from the 2010 baseline. The cause of the decrease in area of Monterey spineflower is unknown. Because most of the Monterey spineflower areas were outside the actual work zones, the population has likely been mostly influenced by the variation and the timing in weather patterns over the monitoring period or natural habitat succession. It is possible that historic weather events had a permanent or long-lasting impact on the population or that natural succession is occurring within the habitat that limits the amount of space available for Monterey spineflower. 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 area, 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.

The OUCTP U/L 180-ft Aquifer Area is adjacent to residential areas, and although technically not open to the public, receives a considerable amount of foot traffic, as well as service vehicle traffic from the local agencies. As such, it is difficult to separate the effects of those impacts from the effects of well and pipeline construction.

The area of sparse and medium-low densities of spineflower have increased by over 300% or more and an area of medium high density was observed for the first time in 2013. These data show an increasing trend in the density of spineflower and suggest there are no adverse effects to this species due to groundwater remediation activities at OUCTP U/L 180-ft Aquifer Area.

4.3.3 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.

4.3.4 Annual Grass Survey

The results of the 2013 monitoring for annual grasses are shown below in Table 4-3 with a comparison to the results of monitoring in 2012, 2011, and 2010. The locations and densities of annual grasses are shown in Figure 4-4a&b.

Table 4-3. OUCTP U/L 180-ft Aquifer Area Annual Grass Survey Results:

Cover Class	**Area (acres) of Non-Native Annual Grasses**			
	2010	*2011*	*2012*	***2013***
Very Low (<5%)	2.99	2.95*	5.20	**5.49**
Low (6-25%)	2.12	2.19	2.03	**1.39**
Medium (26-50%)	1.74	1.60	0.95	**1.10**
High (51-75%)	0.28	0.11	0.08	**0.22**
Very High (>75%)	0.00	0.00	0.00	**0.00**
Total Area:	7.13	6.85	8.26	**8.20**

*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 data from the other years, 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 decreased by a slight 0.7% compared to that in 2012; however, the overall cover is approximately 15% greater than the 2010 baseline. The greatest change in 2013 was in the high cover class, which increased by approximately 175% compared to that in 2012. However, this cover class constitutes only a very small area and is still smaller than the 2010 baseline measurement. Although a larger area of annual grasses may be detrimental to annual HMP plant species, the trend towards the very low cover class 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 grasses 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. Therefore, the success criteria have been met, and no future monitoring of annual grasses within the OUCTP U/L 180-ft Aquifer area is necessary.

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

4.4.1 Black Legless Lizard Encounters

BLL were not encountered during the work conducted by ITSI Gilbane in 2013 at the OUCTP U/L 180-ft Aquifer area. 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.

4.4.2 California Tiger Salamander Encounters

CTS were not encountered on site during ITSI Gilbane work in 2013 at the OUCTP U/L 180-ft Aquifer area. Appropriate upland aestivation habitat is present within the site and CTS had the potential to be encountered during dispersal. 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 were required to be reported immediately to both the ITSI Gilbane Biologist and the BRAC Environmental Coordinator. The USFWS permits only these persons to properly handle and relocate CTS, if necessary.

4.4.3 Maritime Chaparral and Other HMP Plant Species

There were no additional work impacts to the maritime chaparral habitat or other HMP plant species in 2013.

5.0 Site 39 - Soil Remediation Activities

5.1 Baseline Vegetation Monitoring

There are several former ranges on the former Fort Ord, referred to as Historical Areas (HAs), where soil remediation for lead or munitions-related contamination is necessary. To protect sensitive habitats and rare, threatened, or endangered species that could be impacted by these activities, baseline monitoring surveys are conducted prior to remediation. 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 2013 work was only conducted in HAs where baseline vegetation data has been collected in previous years, and no additional baseline vegetation monitoring was required. 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 follow-up monitoring for 2013 post-remediation of HAs will be conducted by another Army contractor in order to document the recovery of HMP species and habitat. As such, the results of the monitoring are being submitted by that Army contractor under a separate report.

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

During 2013, soil remediation activities were conducted at four of the Site 39 ranges: HAs 28, 34, 37, and 38 (Figures 5-1 through 5-5). 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 28, 34, and 37 included site re-contouring and erosion control. Avoidance and minimization measures were implemented in order to reduce impacts to HMP species and sensitive habitats. 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, 2006). These measures are summarized as follows:

- Only previously established access routes and staging areas were used at each site to minimize impacts to surrounding habitats and HMP species to the greatest extent feasible. 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.
- Oak trees outside of remediation areas were avoided. As necessary to allow access, some pruning of branches was conducted using best management practices to create clean cuts.

- CTS avoidance and minimization 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 that the field staff followed the protocols for CTS avoidance and reporting. The CTS encounters in 2013 are described below in Section 6.2.1.
- CTS exclusion fencing was installed around a portion of Pond 10 in May 2011 and was repaired in December 2012. The exclusion fencing remained in place during work conducted at HA 37 in 2013 to discourage any CTS from entering the remediation area.
- Work was stopped and excavation areas were surveyed by the ITSI Gilbane 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 Gilbane biologist and the search crew determined that no CTS had dispersed into the area. Workers were also encouraged to conduct morning inspections for CTS under equipment following all rain events.
- Excavation areas and soil stockpiles were protected from erosion using appropriate erosion control materials (straw wattles and silt fencing).
- Erosion problems within areas of HAs 28 and 34 were treated by a combination of light grading and use of straw wattles and loose straw. Woven coir fabric and rip-rap were also used in portions of HA 34.
- HA 37 was treated for erosion control and preparation for future plant restoration. The excavation area was re-contoured using heavy equipment to grade the excavation edges into the surrounding area and direct the flow of stormwater through the site. Erosion control at HA 37 is ongoing and includes planting with sterile barley and crimping straw into the soil. Planting and seeding with native plants will also be implemented by another Army contractor to restore the habitat. 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 Site 39 Munitions Remediation Activities - HMP Species Mitigation and Avoidance

During 2013, munitions and explosives of concern (MEC) remediation activities within the Fort Ord Impact Area were conducted within Units 1, 2, 3, 4, 5a, 6, 7, 9, 10, 11, 12, and 33; the Watkins Gate Burn Area unburned areas and 100-foot buffer area; the MOUT site buffer; the BLM Headquarters south buffer (within Units 18 and 22); and the Phase C fuel breaks (Figure 6-1). Activities within these areas included mastication and pruning of vegetation, surface MEC removal, digital geophysical mapping (DGM), subsurface MEC removal where necessary, and vehicle use to support these activities. Mitigation measures to reduce impacts to protected species and sensitive habitats during MEC remedial actions are described in the HMP (USACE, 1997) and four Biological Opinions provided by the USFWS to address Army clean-up activities (USFWS, 1999, 2002, 2005, 2007 (amendment), and 2011). Mitigation and other environmental protection measures that were implemented during this project are summarized here:

- *Minimize Disturbance Associated with OE Removal*: Disturbances were limited to those required for the above-mentioned activities. As required by the HMP, existing roads were used with the exception of where it was necessary to traverse the site using tracked vehicles in order to access excavation sites, remove piles of debris, remove vegetation, and conduct the DGM portion of the MEC removal process. Access roads, staging areas, and other appurtenant facilities were sited to avoid impacts to HMP plant and wildlife species. However, populations of Monterey spineflower were identified within Units 2, 3, 4, 7, 9, 10, 11, 12, the MOUT site buffer, the Watkins Gate Burn Area unburned areas, and the BLM Headquarters south buffer. While MEC removal and DGM activities were necessary within the Monterey spineflower population areas, no equipment or personnel were permitted within these areas from approximately March (approximate time of germination) through June (approximate time of seed-set). No subsurface MEC removal was conducted within the Monterey spineflower population areas.
- *Avoid Disturbance of Sand Gilia and Seaside Bird's-Beak Populations*: Seaside' bird's-beak was not observed within the sites during baseline surveys. However, populations of sand gilia were identified within Units 3, 10, 12, the MOUT site buffer, the Watkins Gate Burn Area unburned areas and the BLM Headquarters south buffer. While MEC removal and DGM activities were necessary within the sand gilia population areas, no equipment or personnel were permitted within these areas from approximately March (approximate time of germination) through June (approximate time of seed-set). No subsurface MEC removal was conducted within the sand gilia population areas.

- *Conduct Employee Education Program*: Natural resource protection training for all supervisors and field personnel was conducted by the ITSI Gilbane Biologist. Any new personnel also received natural resource protection training prior to working on the site. Please refer to Section 6.3 for an outline of the content of the Employee Education Program. In addition to the training, a Habitat Checklist was prepared by the Project Biologist prior to each activity that outlined specific avoidance and minimization measures, which were communicated to the project supervisors prior to work initiation in preparatory meetings.
- *Minimize and Compensate for Impacts to California Linderiella, California Tiger Salamander, and Red-legged frog*: Supervisors and field personnel were trained during the Employee Education Program to identify CTS and California red-legged frog, and they were informed of the potential for these species to occur within the project site and the established protocol if any individuals were encountered. Please refer to Section 6.2.1 for a description of all CTS encounters in 2013. Additionally, work within the vernal pool areas was only permitted during the dry season. No excavation was necessary within the vernal pool areas, and therefore, no restoration of habitat for these three species was necessary.
- *Minimize Impacts to Black Legless Lizard*: Supervisors and field personnel were trained during the Employee Education Program to identify BLL, and they were informed of the potential for this species to occur within the project site and the established protocol if any individuals were encountered. Please refer to Section 6.2.2 for a description of all BLL encounters in 2013.
- *Invasive Weed Control*: In order to reduce the spread of invasive weeds, existing roads were used to the greatest extent feasible. Please refer to Section 6.3 below for an overview of measures implemented to reduce the spread of invasive weeds.
- *Erosion Control*: To reduce erosion concerns on bare mineral soils, normal vehicle access was restricted to existing roads and established access routes. Tracked vehicles were used to conduct vegetation removal and DGM surveys over the site. ITSI Gilbane monitored the work sites for potential erosion problems, and a final inspection was conducted at the conclusion of work at each site by the Project Biologist.

6.2 HMP Species Encounters

6.2.1 California Tiger Salamander Encounters

There were two CTS encounters by ITSI Gilbane on the former Fort Ord in 2013. One individual CTS was encountered inside one of the buildings at the ITSI Gilbane Company compound, and a second individual CTS was encountered during excavation for erosion control at HA 37. A Field Report Form for CTS was completed for each encounter and provided to the BRAC Natural Resources Manager. The following summarizes the encounters.

On May 13, 2013 an adult CTS was found alive and uninjured inside one of the buildings at the ITSI Gilbane Company compound. The individual was found by Dan Nohrden at approximately 05:30 and was allowed to walk into a small, clean bucket, which was kept in a cool, dark location until the ITSI Gilbane biologist arrived at 08:30. The animal was not handled by any unpermitted ITSI Gilbane staff. The encounter was documented by ITSI Gilbane's biologist, Jami Davis, who weighed, measured, and photographed the individual. The individual did not display any characteristics that could be used to identify the sex of the animal. The CTS was then relocated to a small mammal burrow located in the oak savannah habitat immediately adjacent to the ITSI Gilbane compound. Chenega wildlife biologist, Bart Kowalski, representing BRAC, was present during the measurements and release of the CTS. The report was submitted to the BRAC office on May 14, 2013.

On December 10, 2013 an adult male CTS was encountered at the HA 37 remediation site during erosion control activities. The individual was found by Equipment Operator Christian Hartley while spotting during excavation near the drainpipe that flows to the adjacent pond. When uncovered, the crew stopped work, and the animal crawled under a dirt clod and remained there until the ITSI Gilbane biologist, Jami Davis, arrived approximately 45 minutes later. Ms. Davis measured and photographed the individual, then released it into a small mammal burrow in grass/low chaparral habitat on the opposite side of the pond from the work area. Chenega wildlife biologist, Bart Kowalski, representing BRAC, was present during the measurements and release of the CTS. The report was submitted to the BRAC office on December 12, 2013.

6.2.2 Black Legless Lizard Encounters

One BLL was encountered during ITSI Gilbane work in 2013. The individual was found by Howard Mutton at the OU2 Landfill after transportation of soil from the HA 38 stockpile. The animal was alive but moving slowly and missing the tip of its tail. The encounter was documented by ITSI Gilbane's biologist, Jami Davis, who measured and photographed the individual before transporting the animal back to HA 38 and releasing it into the duff at the edge of the adjacent coast live oak habitat.

6.3 Employee Education

New ITSI Gilbane employees and subcontract workers receive a training on Fort Ord natural resource protection prior to starting work. In 2013, ITSI Gilbane provided training to 27 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 in the training include maritime chaparral, vernal ponds, and wetlands. Species covered include CTS, California linderiella, BLL, sand gilia, Monterey spineflower, Seaside bird's-beak, Yadon's piperia, Contra Costa goldfields, Monterey manzanita, sandmat manzanita, Hooker's manzanita, Eastwood's goldenbush, and Monterey ceanothus. Additional HMP species occurring within the dune habitats on Fort Ord are not included in the training, since work has been completed in these areas and these species will not be impacted by work in the inland ranges.
- Specific guidance for CTS protection, including the ability to recognize the species, the protocol for reporting all encounters to the ITSI Gilbane or Army biologists (who are permitted by USFWS to handle and relocate CTS), placing escape ramps or covering open trenches, and checking equipment and excavations for CTS during migration seasons.
- Instructions for minimizing all work impacts and work footprints, and for avoidance of areas flagged for sensitive species or habitats 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.

6.4 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 are 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 and straw 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 is evaluated for the presence of invasive species, and the appropriate avoidance and minimization measures are identified prior to work initiation.

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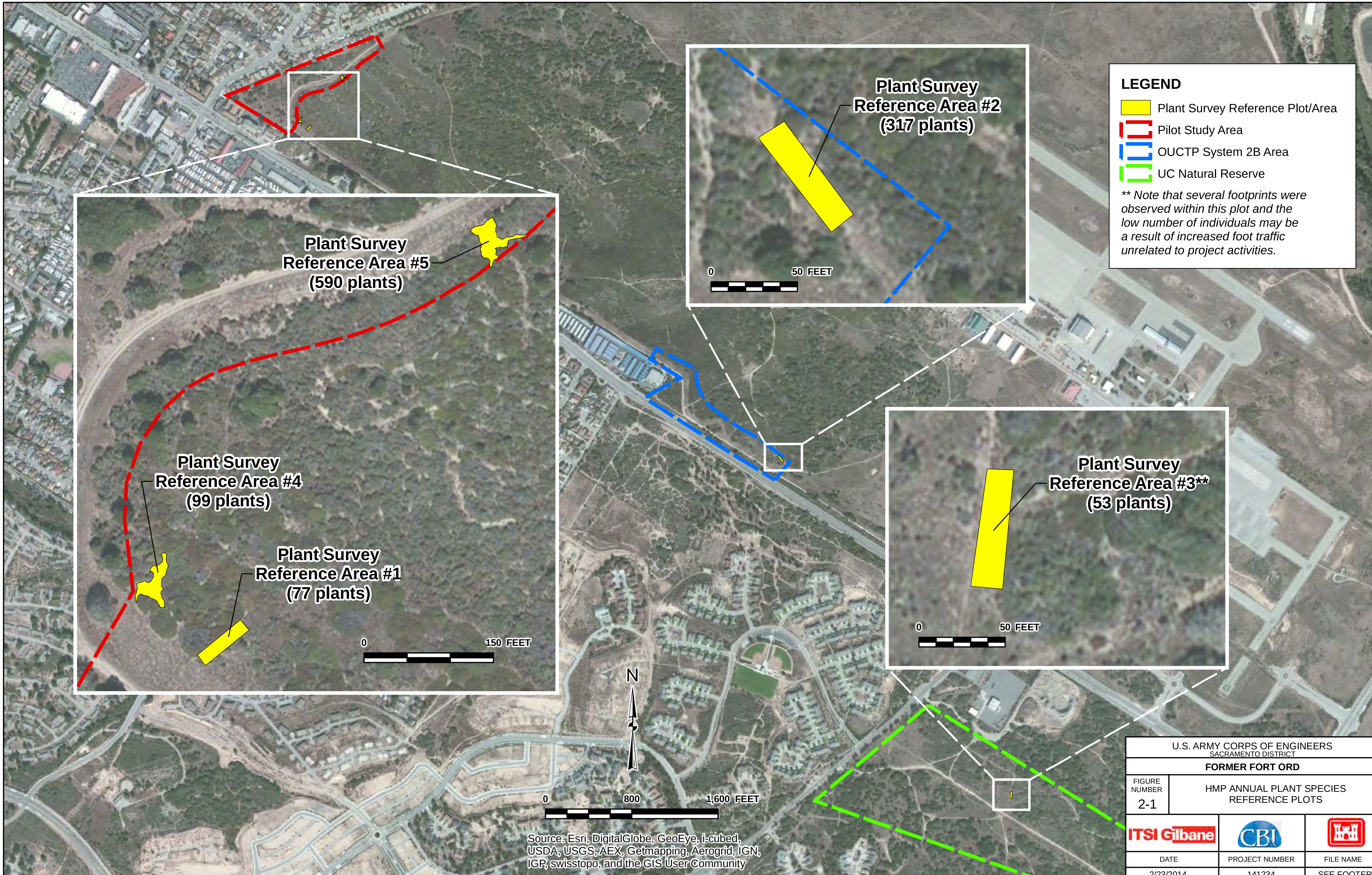
Figures

List of Figures



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FORMER FORT ORD		
FIGURE NUMBER 2-1	HMP ANNUAL PLANT SPECIES REFERENCE PLOTS	
ITSI Gilbane	CBI	
DATE	PROJECT NUMBER	FILE NAME
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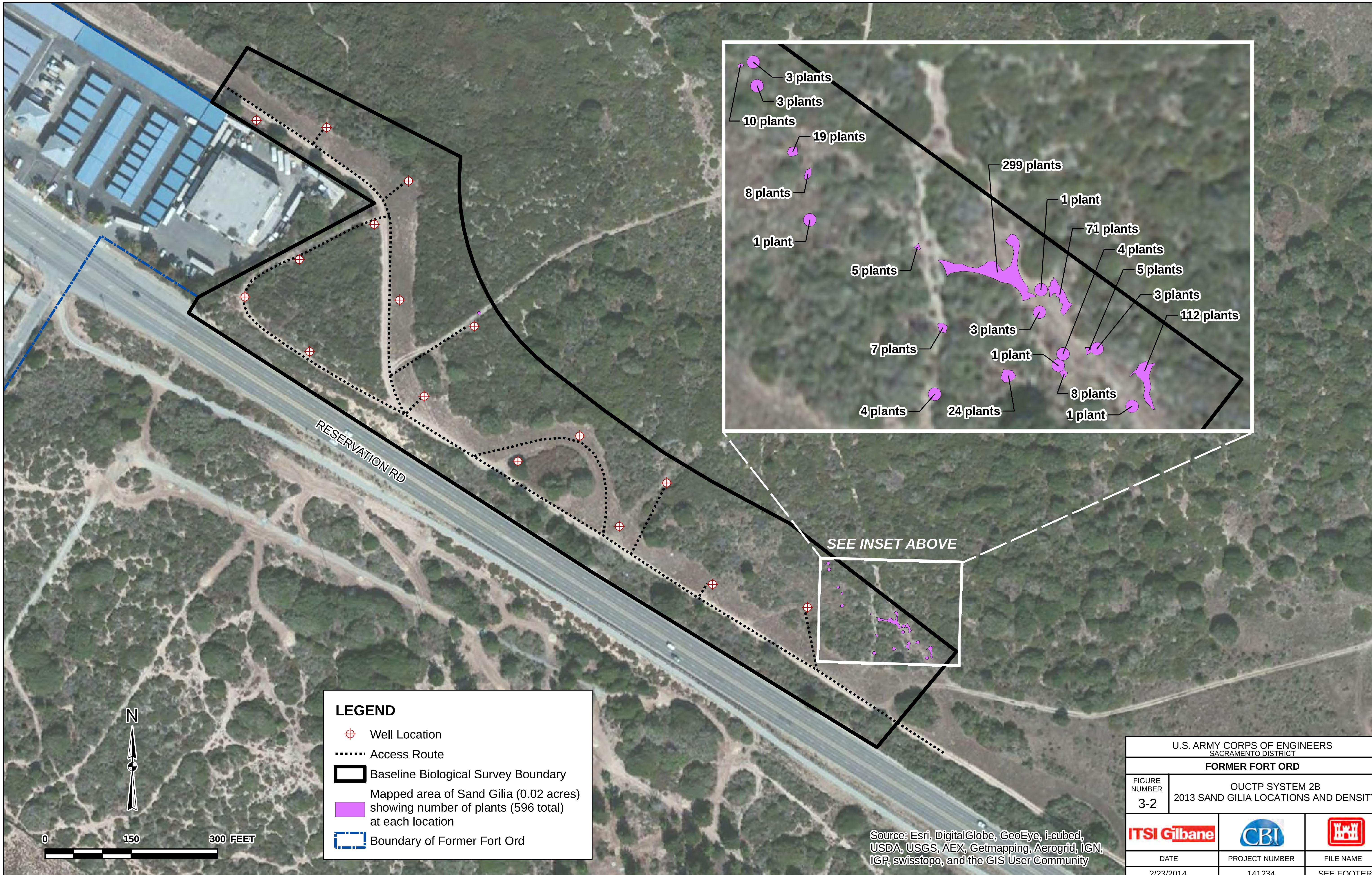

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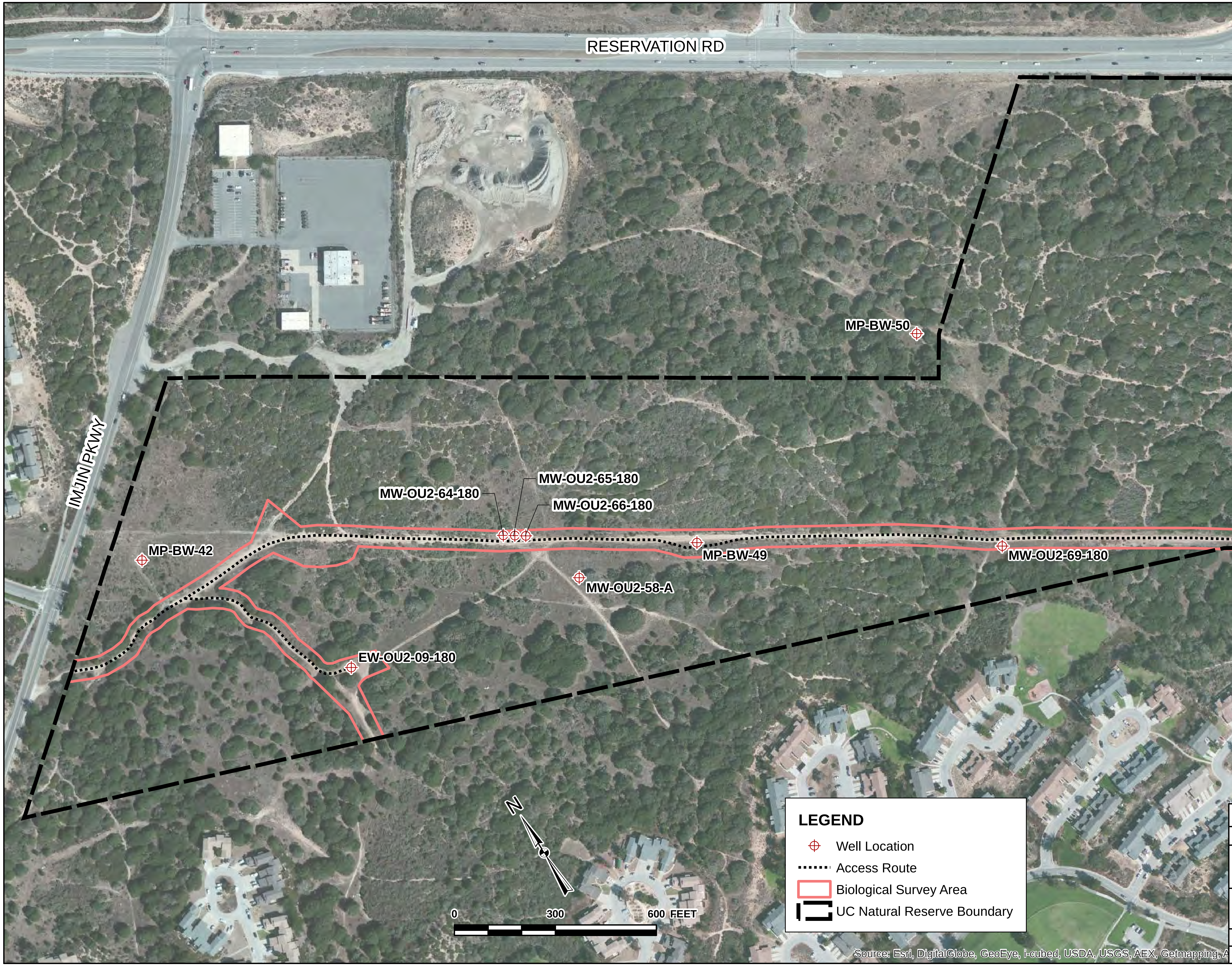

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SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	
4-1	OUCTP LOWER 180-FT AQUIFER AREA LOCATION OF SITE AND WELLS

ITSI Gilbane | CBI

DATE	PROJECT NUMBER	FILE NAME
2/23/2014	141234	SEE FOOTER

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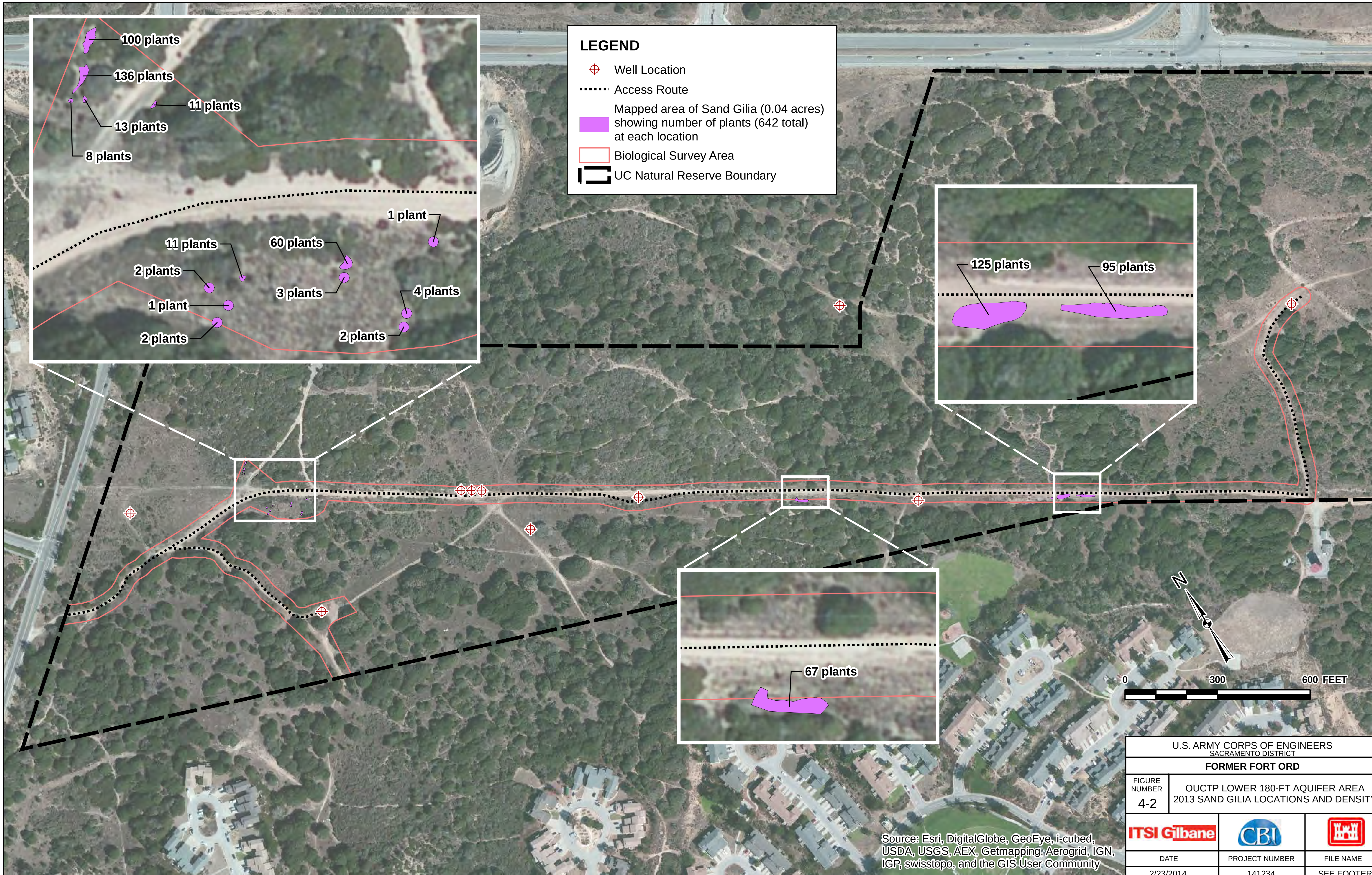

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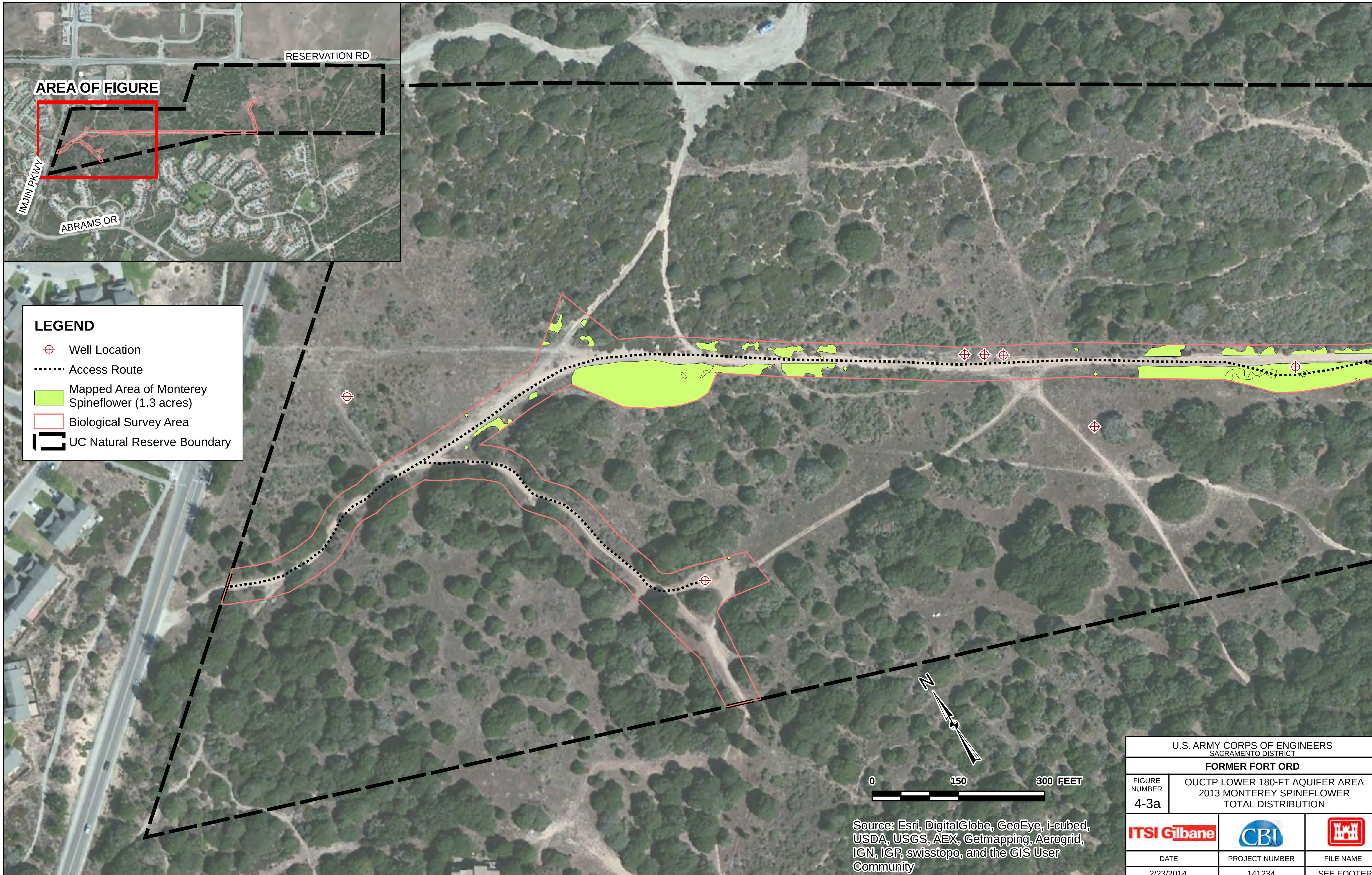

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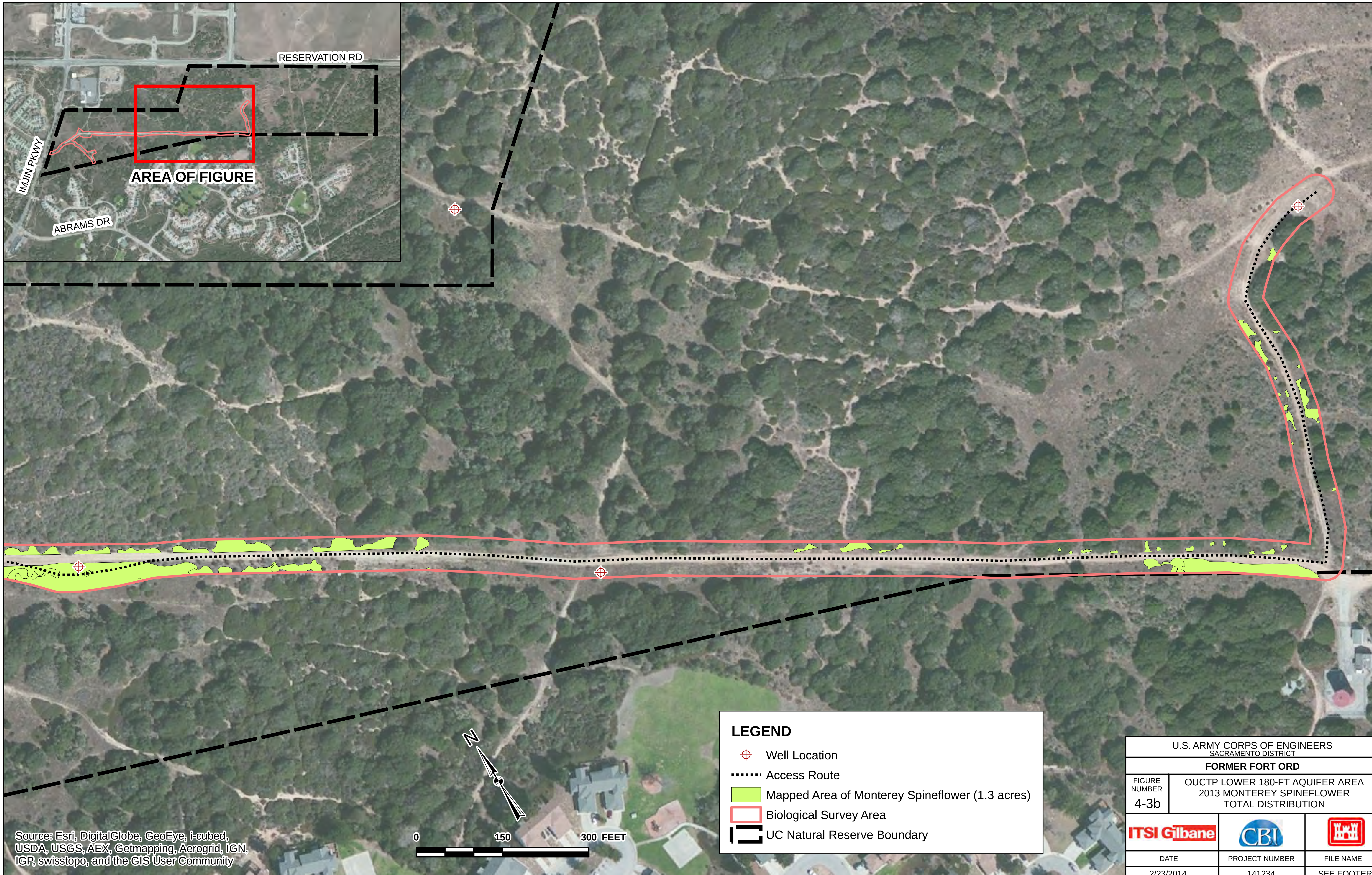
FORMER FORT ORD

FIGURE NUMBER	
4-3a	OUCTP LOWER 180-FT AQUIFER AREA 2013 MONTEREY SPINEFLOWER TOTAL DISTRIBUTION

ITSI Gilbane

DATE	PROJECT NUMBER	FILE NAME
2/23/2014	141234	SEE FOOTER



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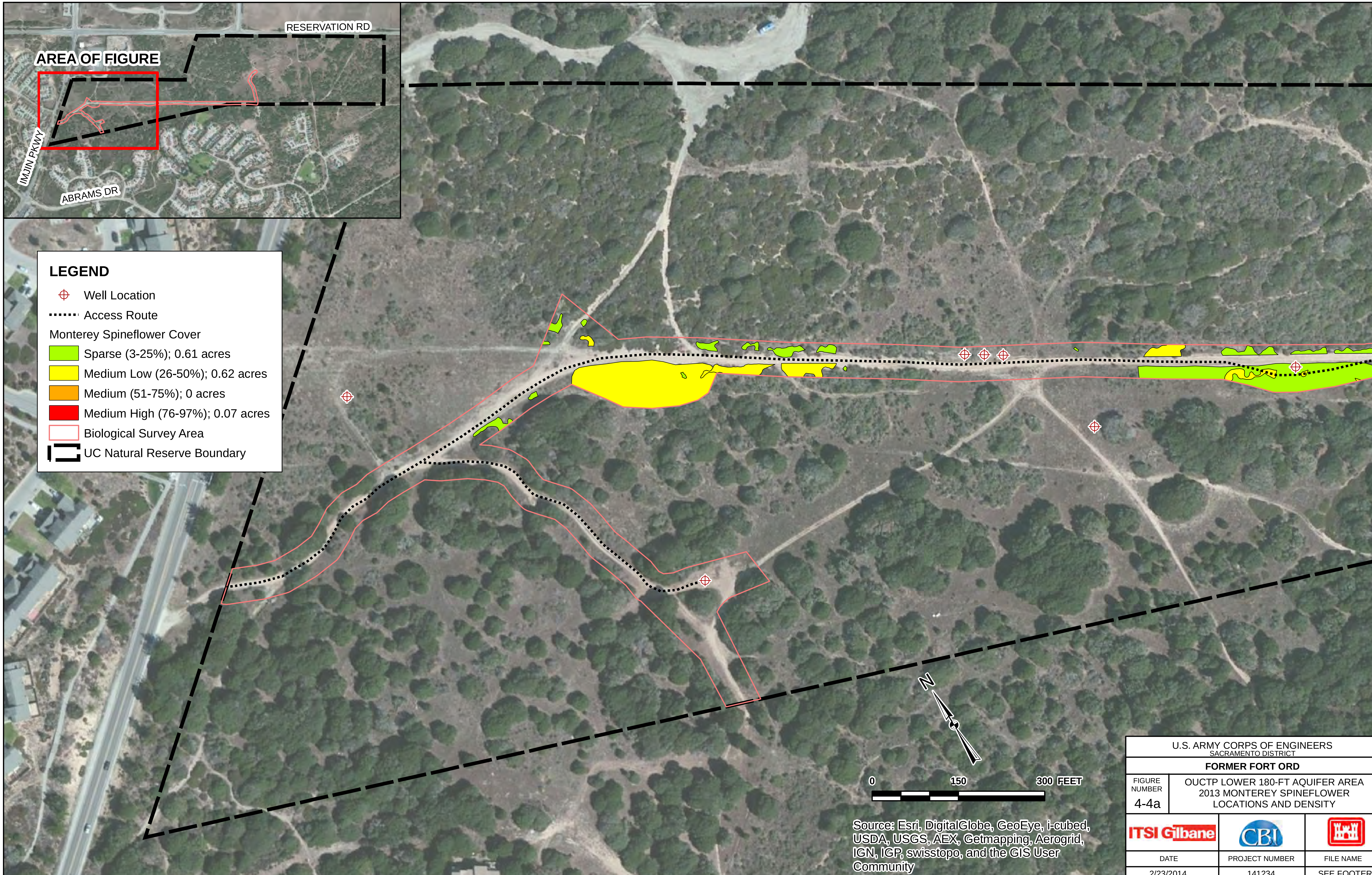

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FORMER FORT ORD

FIGURE NUMBER	
4-4a	OUCTP LOWER 180-FT AQUIFER AREA 2013 MONTEREY SPINEFLOWER LOCATIONS AND DENSITY

ITSI Gilbane | CBI

DATE	PROJECT NUMBER	FILE NAME
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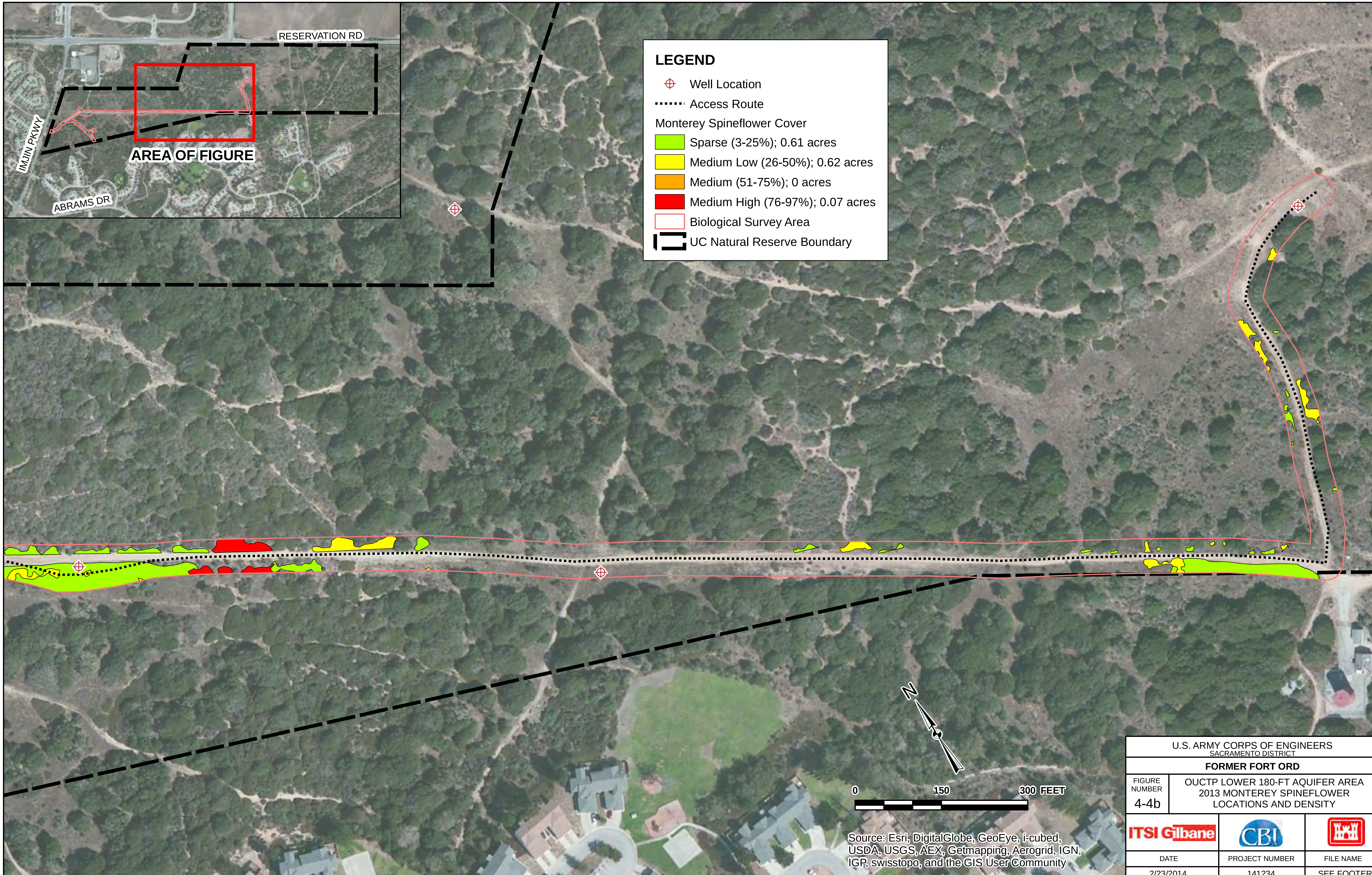

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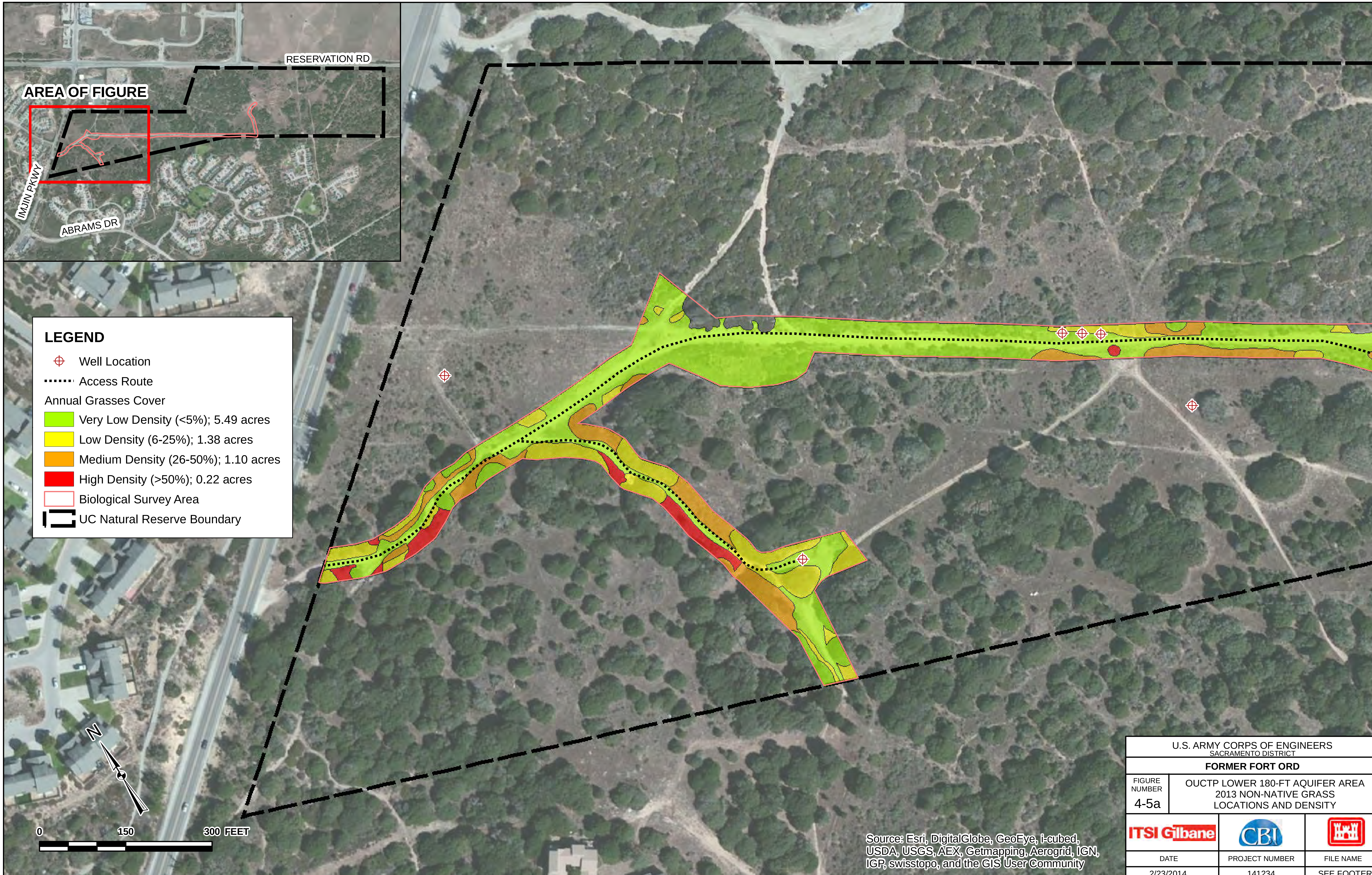

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FORMER FORT ORD

FIGURE NUMBER 4-5a

OUCTP LOWER 180-FT AQUIFER AREA
2013 NON-NATIVE GRASS
LOCATIONS AND DENSITY

ITSI Gilbane | CBI

DATE	PROJECT NUMBER	FILE NAME
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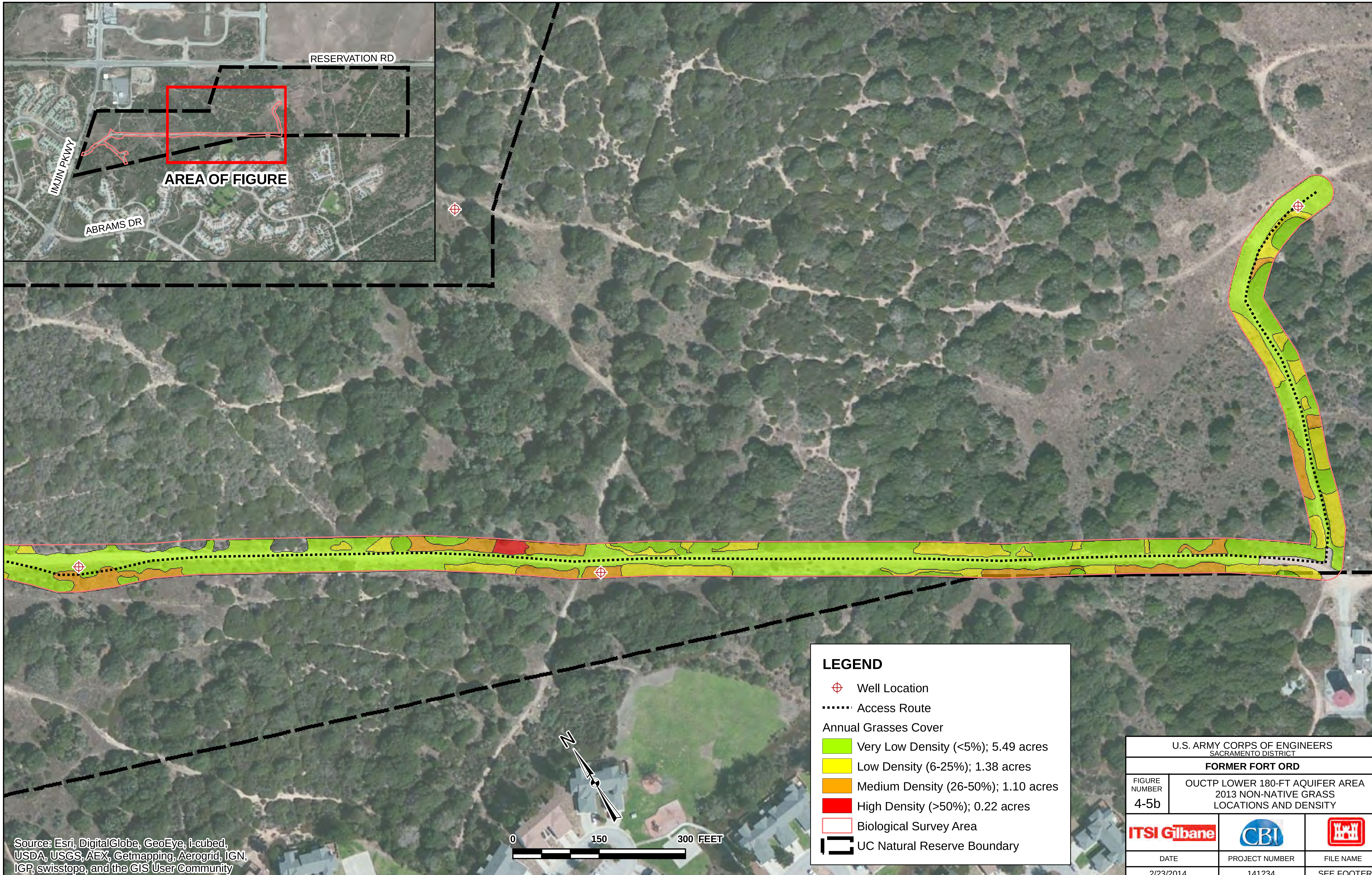

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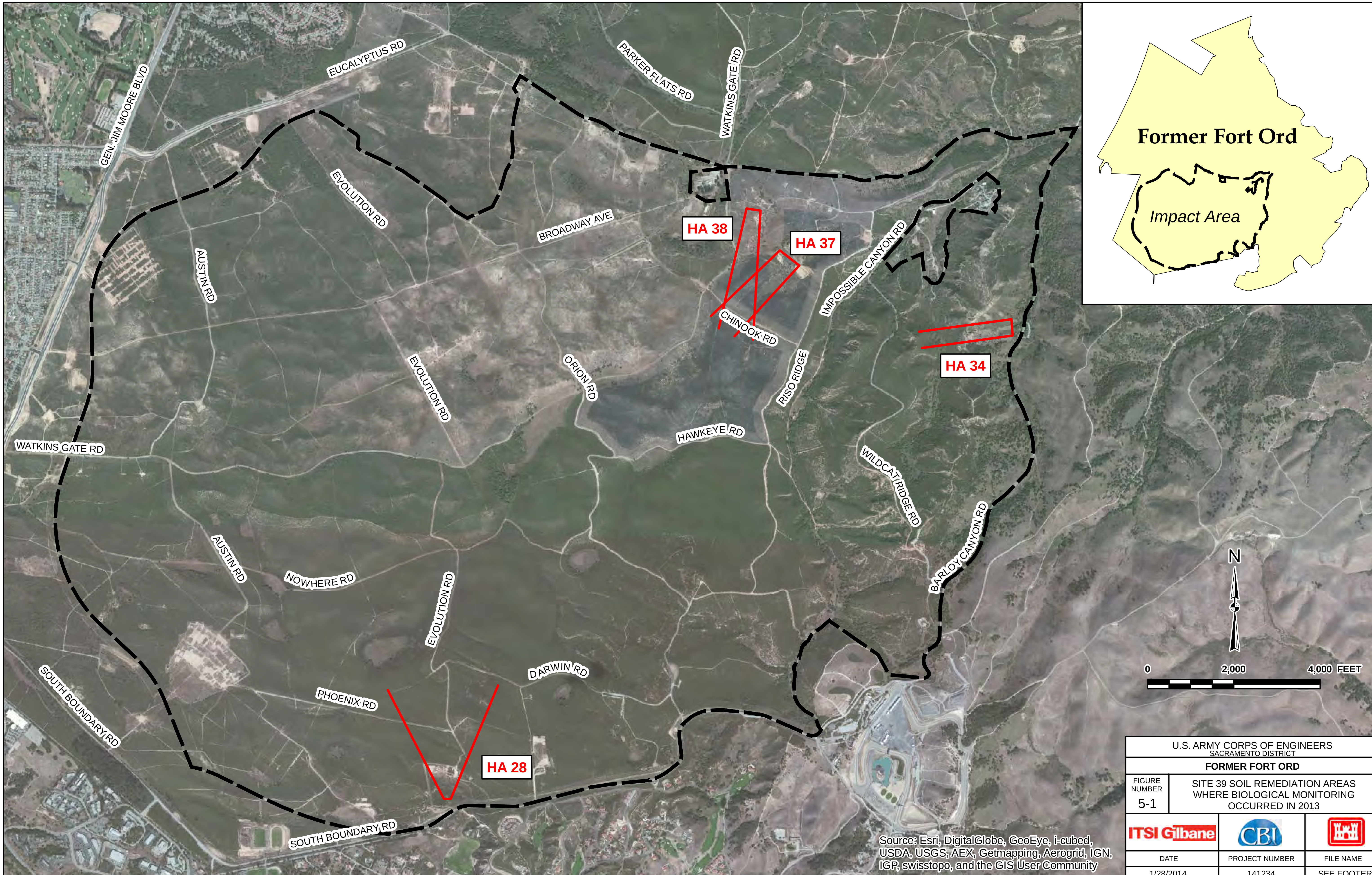

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SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER	
5-1	SITE 39 SOIL REMEDIATION AREAS WHERE BIOLOGICAL MONITORING OCCURRED IN 2013

ITSI Gilbane | CBI

DATE	PROJECT NUMBER	FILE NAME
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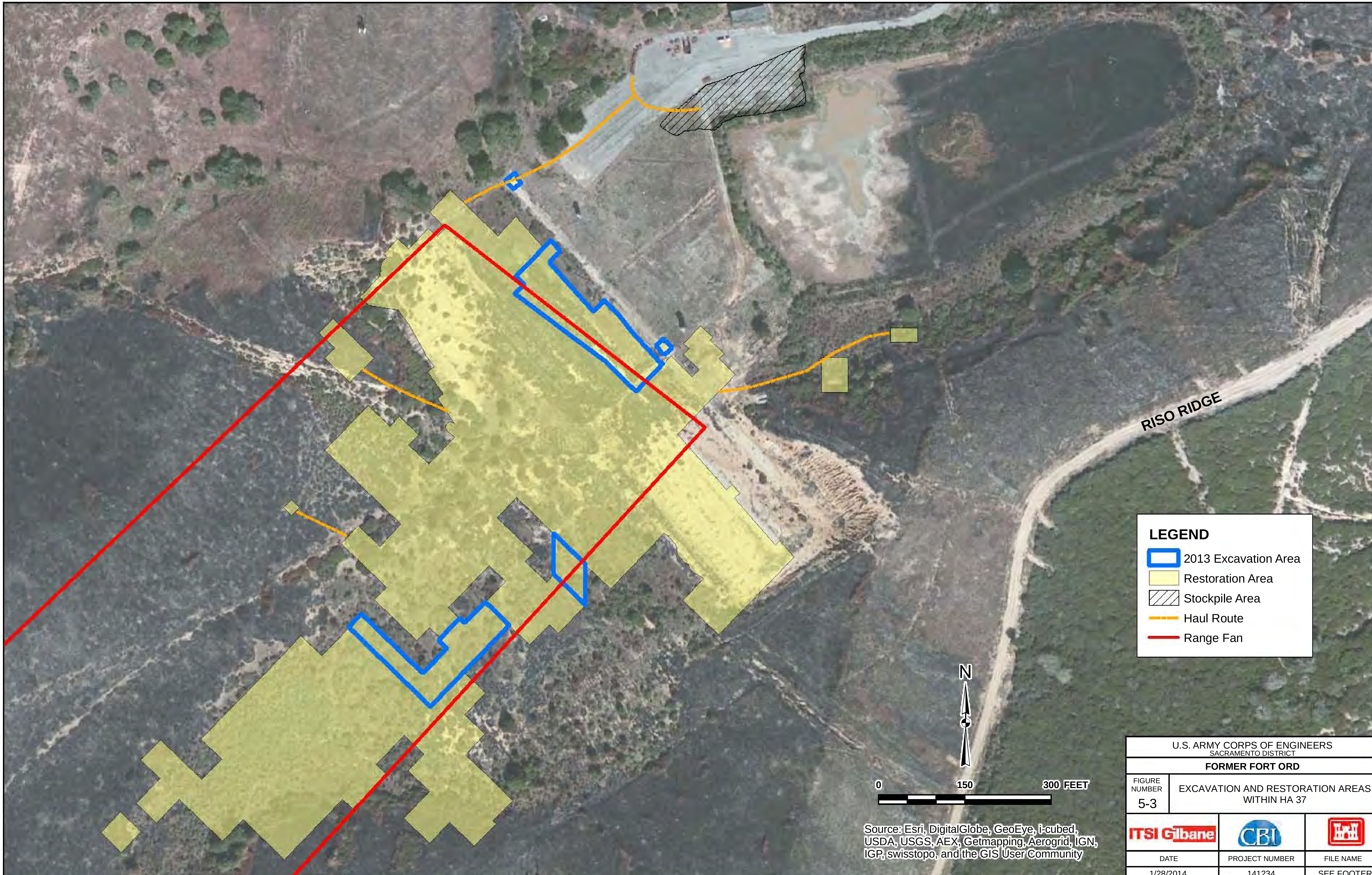

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FORMER FORT ORD

FIGURE NUMBER	EXCAVATION AND RESTORATION AREAS WITHIN HA 37
5-3	

DATE	PROJECT NUMBER	FILE NAME
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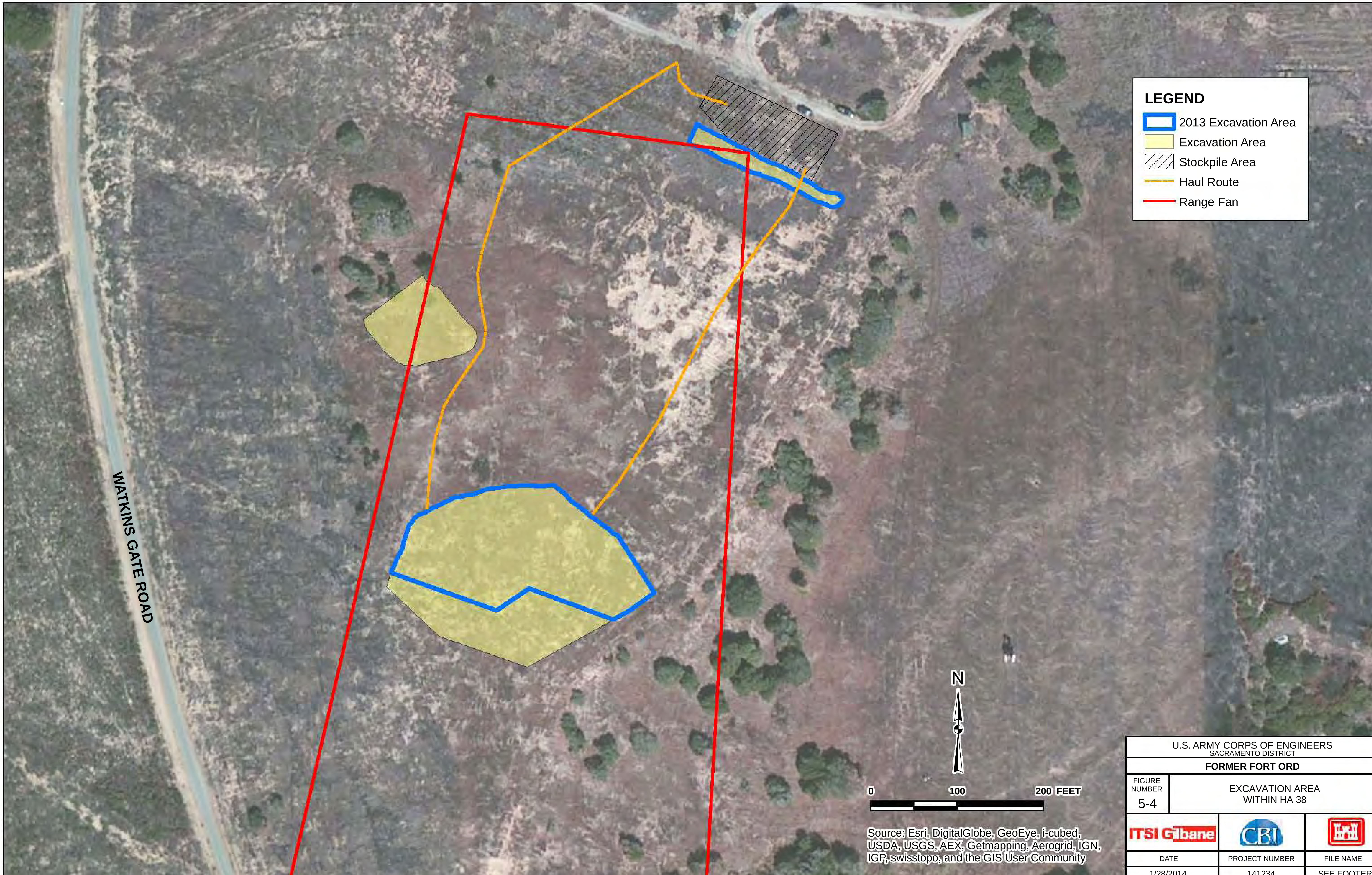

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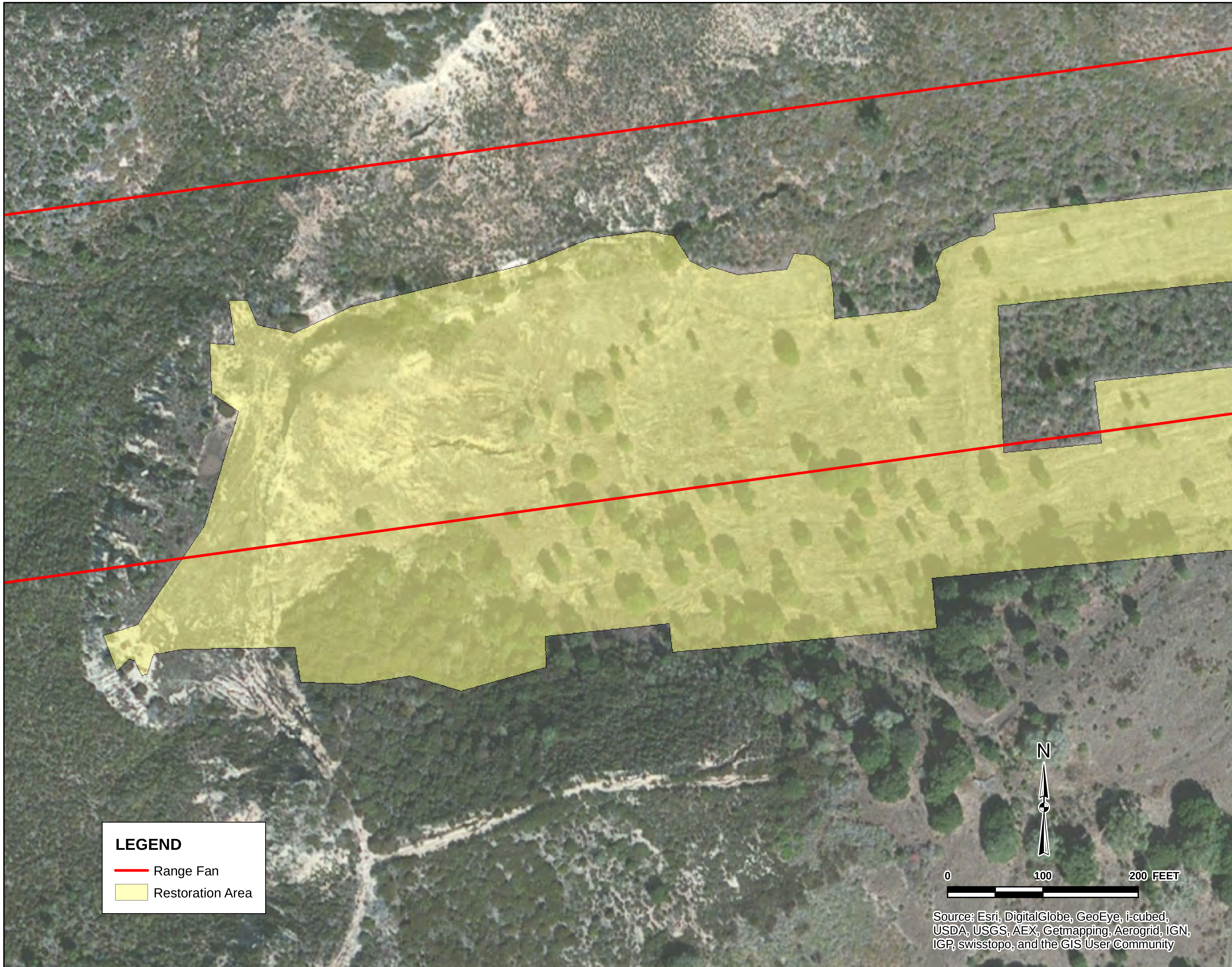

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SACRAMENTO DISTRICT

FORMER FORT ORD

FIGURE NUMBER 5-5

RESTORATION AREA WITHIN HA 34

ITSI Gilbane | CBI

DATE	PROJECT NUMBER	FILE NAME
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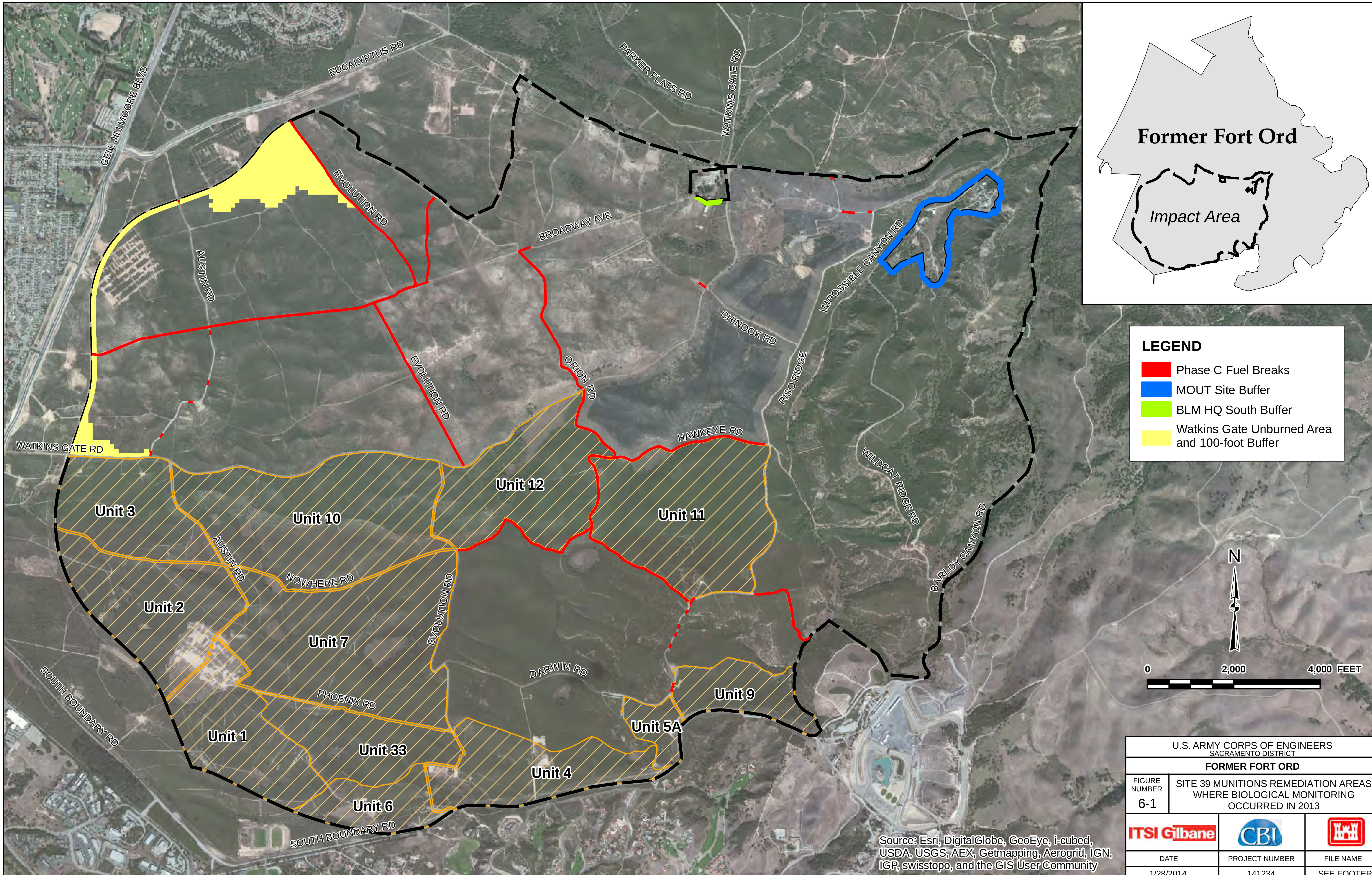

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