
2016 ANNUAL RARE PLANT SURVEY &
BIOLOGICAL MONITORING REPORT
FOR THE
AHTNA MONITORING WELL INSTALLATION &
DEVELOPMENT
AND
ENHANCED IN SITU BIOREMEDIATION (EISB)
DEPLOYMENT AREA CONSTRUCTION
AT THE
OPERABLE UNIT CARBON TETRACHLORIDE
PLUME (OUCTP)

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Attachment C 2016 EISB Deployment Area Baseline Rare Plant Survey Results Map
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Attachment E EISB Deployment Area- 2016 Construction Phase Biological Monitoring Log
Attachment F EISB Deployment Area- Photo Journal

1 INTRODUCTION

Denise Duffy and Associates, Inc. (DD&A) was contracted by Ahtna Environmental, Inc. (Ahtna) to conduct baseline surveys, provide construction phase biological monitoring, and complete annual follow-up surveys within the University of California Fort Ord Natural Reserve (FONR) in support of the 2015 monitoring well installation effort and the 2016 Enhanced In Situ Bioremediation (EISB) Deployment Area construction. This task required part-time and on-call environmental monitoring of construction activities to advise the Ahtna Field Supervisor on avoidance of special-status plant and wildlife species, and provide guidance on minimizing habitat impacts in response to requests from the construction field staff. Following the installation of wells and support facilities, in accordance with the governing documents, DD&A was scheduled to conduct three annual follow-up surveys for three annual special-status plant species: Monterey spineflower (*Chorizanthe pungens* var. *pungens*), Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*), and Yadon's piperia (*Piperia yadonii*). This report details the results of the first annual follow-up survey (annual survey) for the 2015 monitoring well installation and compares the results to the 2015 baseline survey.¹ Additionally, this report details the results of the baseline survey and construction monitoring conducted in 2016 for the construction of an EISB Deployment Area.

1.1 BACKGROUND AND PROJECT INITIATION

FONR is located on the former Fort Ord, Marina, California and is adjacent to the Marina Municipal Airport (the former Fort Ord Fritzsche Army Airfield). A portion of the Operable Unit Carbon Tetrachloride Plume (OUCTP) in the A-Aquifer underlies FONR. The chemicals of concern (COCs) associated with OUCTP in the A-Aquifer are carbon tetrachloride (CT), tetrachloroethene (PCE), chloroform, 1,1-dichloroethene, total-1,2-dichloroethene, methylene chloride, vinyl chloride, and trichloroethene (TCE). The presence and concentration levels of CT are used to define the extent of OUCTP. The remedy for OUCTP in the A-Aquifer is EISB, which has been implemented at three deployment areas in FONR. In 2014 the U.S. Army Corps of Engineers contracted with Ahtna to conduct field work to collect additional site information to further characterize groundwater gradients and chemistry in the north and northeastern portions of the OUCTP to support the design and implementation of additional EISB deployment area(s), if necessary.

The FONR area is potentially impacted by the installation and development of monitoring wells and the deployment of the EISB remedy. Rare plant surveys are required by the Installation-Wide Multispecies Habitat Management Plan (HMP) for Former Fort Ord, California (USACE, 1997) and the Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California (BO; USFWS, 2015) in areas that are disturbed during construction activities associated with remediation efforts. Project activities undertaken must protect and maintain the special-status species found within FONR. Efforts are taken to avoid or minimize impacts to all HMP species, with emphasis on three federally listed plant species: Monterey spineflower, Monterey gilia, and Yadon's piperia.

¹ 2015 baseline surveys for the monitoring wells were conducted for only two annual special-status plant species, Monterey spineflower and Monterey gilia. Beginning in 2016 Yadon's piperia was included in the special-status plant species surveys.

DD&A met and coordinated with Ahtna, U.S. Army Corps of Engineers (USACE), U.S. Army Base Realignment and Closure (BRAC) Fort Ord Field Office, and FONR staff to finalize the scope and project path, as well as identify project boundaries, project footprint, and site access.

1.2 SITE DESCRIPTION

Activities described in this report occurred within FONR, which is approximately 605 acres in size. The habitats present within FONR include coast live oak woodland, maritime chaparral, coastal scrub, disturbed/developed land, and annual grassland. Areas surveyed as part of the installation of OUCTP monitoring wells (approximately 7 acres) and construction of an EISB deployment area (approximately 19 acres) included portions of each habitat type present on FONR.

1.2.1 OUCTP MONITORING WELL INSTALLATION/SURVEY AREA

The OUCTP monitoring well survey area consisted of locations for eight monitoring wells and corresponding access routes. The following monitoring wells are included in the survey area:

- MW-BW-85-A
- MW-BW-86-A
- MW-BW-87-A
- MW-BW-88-A
- MW-BW-89-A
- MW-BW-90-A
- MW-BW-91-A
- MW-BW-92-A

Monitoring well MW-BW-85-A was installed during this well installation effort, however, since it is located on a parcel designated as development (s2.1.1) the well location and access route were not included in the survey area.

1.2.2 OUCTP EISB DEPLOYMENT AREA – AREA OF IMPACT

An area of impact was identified for the EISB Deployment Area as part of the 2016 monitoring efforts. The EISB Deployment Area, area of impact consisted of areas where EISB components were installed as well as corresponding access routes. The area of impact for EISB Deployment Area included the following components:

Extraction wells	Injection wells	Pipelines
<ul style="list-style-type: none"> ▪ EW-BW-160-A ▪ EW-BW-161-A ▪ EW-BW-162-A ▪ EW-BW-163-A ▪ EW-BW-164-A ▪ EW-BW-165-A ▪ EW-BW-166-A ▪ EW-BW-167-A ▪ EW-BW-168-A ▪ EW-BW-169-A 	<ul style="list-style-type: none"> ▪ IW-BW-161-A ▪ IW-BW-162-A ▪ IW-BW-163-A ▪ IW-BW-164-A ▪ IW-BW-165-A ▪ IW-BW-166-A ▪ IW-BW-167-A ▪ IW-BW-168-A ▪ IW-BW-160-A ▪ IW-BW-159-A 	<ul style="list-style-type: none"> ▪ Injection ▪ Extraction

1.3 METHODOLOGY

1.3.1 PLANT SURVEYS

The Scope of Work (SOW) provided by Ahtna to DD&A was intended to comply with the HMP and the BO. The SOW required that annual biological surveys be conducted to determine the effects of well installation and other groundwater remediation activities on three federally listed HMP species: Monterey spineflower, Monterey gilia, and Yadon's piperia.² Rare plant survey methods were based on methods DD&A used previously for vegetation surveys at FONR on behalf of HydroGeoLogic, Inc. (HGL 2008, 2009a, 2009b, 2011, 2012, 2013a, 2013b, 2014 & 2015). In 2016 Yadon's piperia was added to the species surveyed.

Monterey spineflower, Monterey gilia, and Yadon's piperia are annual plant species that must be blooming in order to make a positive identification. DD&A conducts one survey effort per year at each site for the required monitoring period. DD&A used several reference sites and conferred with other local experts to ensure that surveys for Monterey spineflower and Monterey gilia were conducted within the appropriate blooming period. Annual plant surveys did not occur at the appropriate blooming period for Yadon's piperia. Of the three special-status plant species included in the survey efforts, the Yadon's piperia blooming period is later, occurring typically May through August. DD&A biologists document potential piperia basal rosettes and relay the location(s) to the BRAC Biologist so that additional surveys may be conducted by the BRAC Biologist during the appropriate blooming period for Yadon's piperia, if necessary.

Where found, the locations of the three rare plant species were mapped using a Trimble® Geo 7 Series global positioning system (GPS) with an external Zephyr Model 2 antenna. When either Monterey spineflower, Monterey gilia, or potential Yadon's piperia was identified, the survey in that area was extended to the boundary of the population encountered. Large areas of Monterey spineflower, Monterey gilia, and Yadon's piperia were mapped as polygons, with attributes to identify the number of individuals for Monterey gilia and Yadon's piperia or percent absolute cover for Monterey spineflower. Smaller

² Prior to 2016 Yadon's piperia was not included in the baseline or annual plant surveys.

groups and individuals were mapped as points with attributes to identify the number of individuals at each location.

Individual counts were made for all Monterey gilia and Yadon's piperia populations whether they were mapped using points (population ≤ 5) or polygons (population ≥ 6). However, Monterey spineflower were only counted as individuals when groups of five or less were mapped. Monterey spineflower populations consisting of greater than five individuals were mapped as polygons and characterized according to the percent of cover. The density classes used for percent cover were:

- Very Sparse (corresponding to an absolute cover of less than 3 percent),
- Sparse (3-25 percent absolute cover),
- Medium Low (26-50 percent absolute cover),
- Medium (51-75 percent absolute cover),
- Medium High (76-97 percent absolute cover), and
- Very High (>97-100 percent absolute cover).

GPS data, defining the population boundaries and/or point location(s), were exported to shapefile format. Shapefiles were then imported into the Geographic Information System (GIS) ESRI® ArcGIS 10.4.1 software platform and overlaid on high-resolution aerial photography/satellite imagery.

1.3.1.1 OUCTP MONITORING WELL SURVEY AREA

The survey area for the OUCTP monitoring wells included all proposed monitoring well locations with a 50-foot buffer area. The survey area also included potential access routes and a 20-foot buffer area on the potential access routes. The survey area for the monitoring wells installation is shown in Figure 1.1.³

1.3.1.2 EISB DEPLOYMENT AREA BASELINE SURVEY AREA & AREA OF IMPACT

The baseline area surveyed for the EISB Deployment Area components were determined in the field in coordination with Ahtna staff. At the time the baseline survey was conducted the specific configuration of the EISB components was not known; however, the general location of the EISB Deployment Area had been established. DD&A surveyed the entire general location of the EISB Deployment Area as part of the baseline surveys. The survey area for the EISB Deployment Area is shown in Figure 1.2.

The area of impact for the EISB Deployment Area was later defined within the baseline survey area.⁴ As required by the HMP, existing roads were used to the greatest extent feasible. Access roads, staging areas, and other appurtenant facilities were sited to minimize impacts to HMP plant and wildlife species. In general, the area of impact was defined using a 50-foot buffer area around the extraction and injection wells and a 20-foot buffer around access routes. The presence of University of California Santa Cruz (UCSC) study plots and transects required that in some instances the typical buffer area around wells and access routes be modified (reduced) to avoid impacts to study areas.

³ The location of MW-BW-85-A and the associated access route are outside of FONR in adjacent development property.

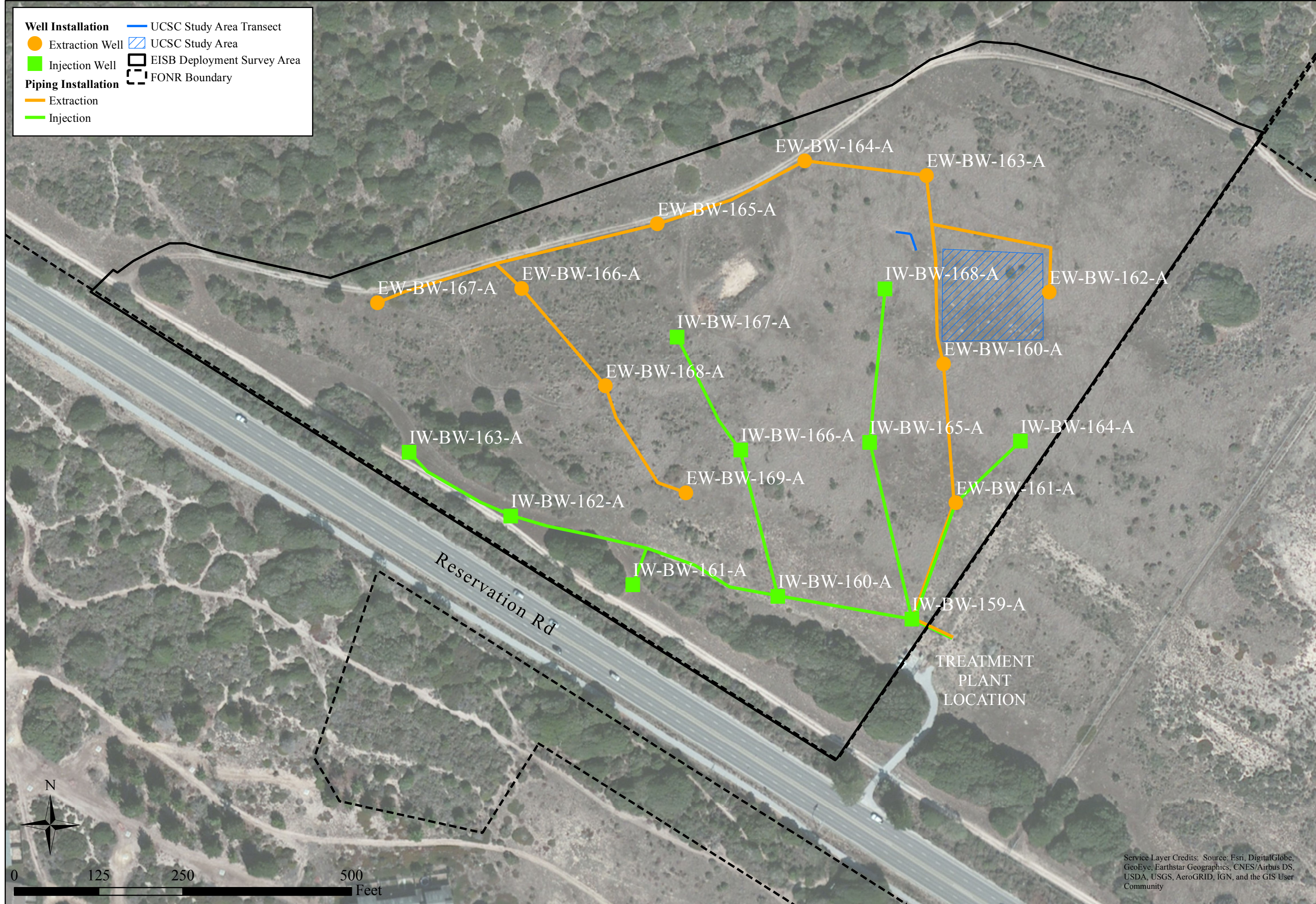
⁴ The area of impact for the EISB was entirely contained within the area surveyed during the baseline surveys.



Figure 1.1 Ahma FONR OUCTP Monitoring Well Installation and Access Route Survey Area



Figure 1.2 Ahtna FONR OUCTP EISB Deployment Baseline Survey Area



Furthermore, the area of impact was modified to avoid or minimize impacts to HMP species and to account for field conditions. In addition to wells and access routes, the EISB Deployment Area, area of impact included zones where pipeline and the treatment plant installation would occur. The area of impact for the EISB Deployment Area is shown in Figure 1.3.⁵ The area of impact is the area in which all construction activities occurred, inside the boundaries of FONR, and the area that will be surveyed in following years to assess impacts to Monterey spineflower, Monterey gilia, and Yadon's piperia.

1.3.2 EISB DEPLOYMENT AREA BIOLOGICAL MONITORING

A Habitat Checklist (HCL) was prepared by DD&A prior to construction occurring within the EISB Deployment Area. The HCL outlined specific avoidance and minimization measures, as required by the HMP and BO, which were implemented during project activities to reduce impacts to HMP species. The HCL was signed by the DD&A Project Biologist, the BRAC Biologist, Ahtna Project Manager, and the Ahtna Field Supervisor prior to work initiation. A copy of the HCL is in Attachment A.

DD&A biologists were available during all phases of work to monitor activity and ensure compliance with all relevant mitigation measures. DD&A staff was present on-site daily for a majority of the well installation activities⁶ and discussed the construction activities each day with National Exploration, Wells, and Pumps (NEWP), American Integrated Services (AIS), Jefferies Electric, and Ahtna staff, prior to monitoring. DD&A staff took photographs before, during, and after construction to document construction impacts.

1.4 PREVIOUS MONITORING

A baseline survey was conducted for the monitoring well installation in 2015. In 2016, a baseline survey was conducted for the EISB Deployment Area. No monitoring prior to 2016 was conducted for the EISB Deployment Area. A comparison of survey results to previous years is included in Section 4 (Discussion).

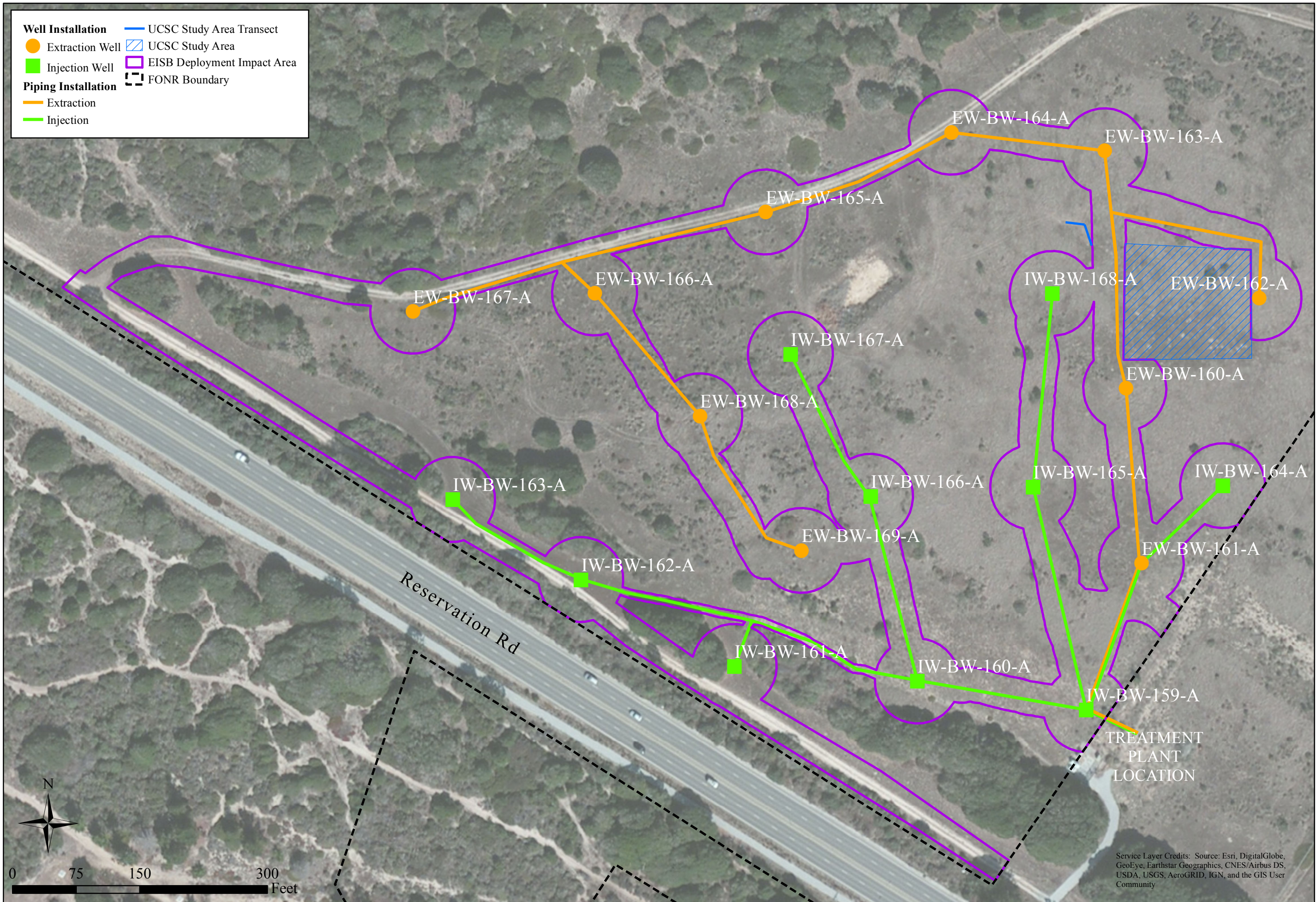
1.4.1 2015 BASELINE SURVEY RESULTS – MONITORING WELLS

In 2015, DD&A conducted baseline surveys for Monterey spineflower and Monterey gilia within the designated survey area for the monitoring wells (Figure A1.1), which included eight monitoring well installation locations and access routes. Attachment B includes detail maps of the survey results for the 2015 monitoring well baseline survey. In 2015, 150 populations of Monterey spineflower (20,563 ft² of polygons and 55 points) were identified. Monterey spineflower was found at (within 50 feet of) four of the eight well locations (MW-BW-86-A, MW-BW-88-A, MW-BW-90-A, and MW-BW-92-A) and along access routes. In 2015, 14 populations of Monterey gilia (347 individual plants) were identified. All Monterey gilia populations present in 2015 were located along the access route to monitoring well installation location MW-BW-89-A.

⁵ The location of treatment plant and the associated access route are outside of FONR in adjacent development property.

⁶ Well installation activities in the context of the EISB Deployment Area construction activities is an all-encompassing term for all construction activities associated with the EISB Deployment Area, including construction of pipelines, utility installation, and other treatment facility components.

Figure 1.3 Ahtna FONR OUCTP EISB Deployment Area of Impact



The DD&A reference site was also surveyed in 2015 and is surveyed every year rare plant surveys are conducted. Please refer to the *Biological Monitoring Completion Report for the Ahtna Well Installation and Development at the Operable Unit Carbon Tetrachloride Plume (OUCTP)* (DD&A, 2015) for additional details⁷.

1.4.2 2015 BIOLOGICAL MONITORING – MONITORING WELLS

In 2015, DD&A conducted construction phase biological monitoring for the installation and development of the OUCTP FONR monitoring wells. Please refer to the *Biological Monitoring Completion Report for the Ahtna Well Installation and Development at the Operable Unit Carbon Tetrachloride Plume (OUCTP)* (DD&A, 2015) for additional details.

2 RESULTS

As part of survey effort, a rare plant survey is conducted in a reference site each year. In 2016 the first annual follow-up survey was conducted for the OUCTP monitoring wells. Baseline surveys and construction monitoring for the EISB Deployment Area also occurred in 2016.

2.1 REFERENCE SITE SURVEY RESULTS 2016

The DD&A reference site was surveyed for Monterey spineflower and Monterey gilia on March 28 and May 4, 2016.

2.1.1 MONTEREY SPINEFLOWER

In 2016, Monterey spineflower occupied approximately 3,241 square feet at the reference site (Table 2.1.1 and Figure 2.1).

Table 2.1.1 Monterey Spineflower at DD&A Reference Site 2016. Polygon Density Class: Medium-Low (26-50 percent cover), and Medium (51-75 percent cover).

Year	# of Populations	# of Points	Polygons per Density Class		Total Area of Polygons (sq. ft.)
			Medium-Low	Medium	
2016	2	0	1	1	3,241

2.1.2 MONTEREY GILIA

In 2016, a total of 946 individual Monterey gilia plants were observed at the reference site (Table 2.1.2 and Figure 2.1).

⁷ Results detailed in the 2015 report included populations that were located outside of FONR associated with well MW-BW-85-A. For direct comparison to 2016 survey data populations outside of FONR have been removed from the survey results.

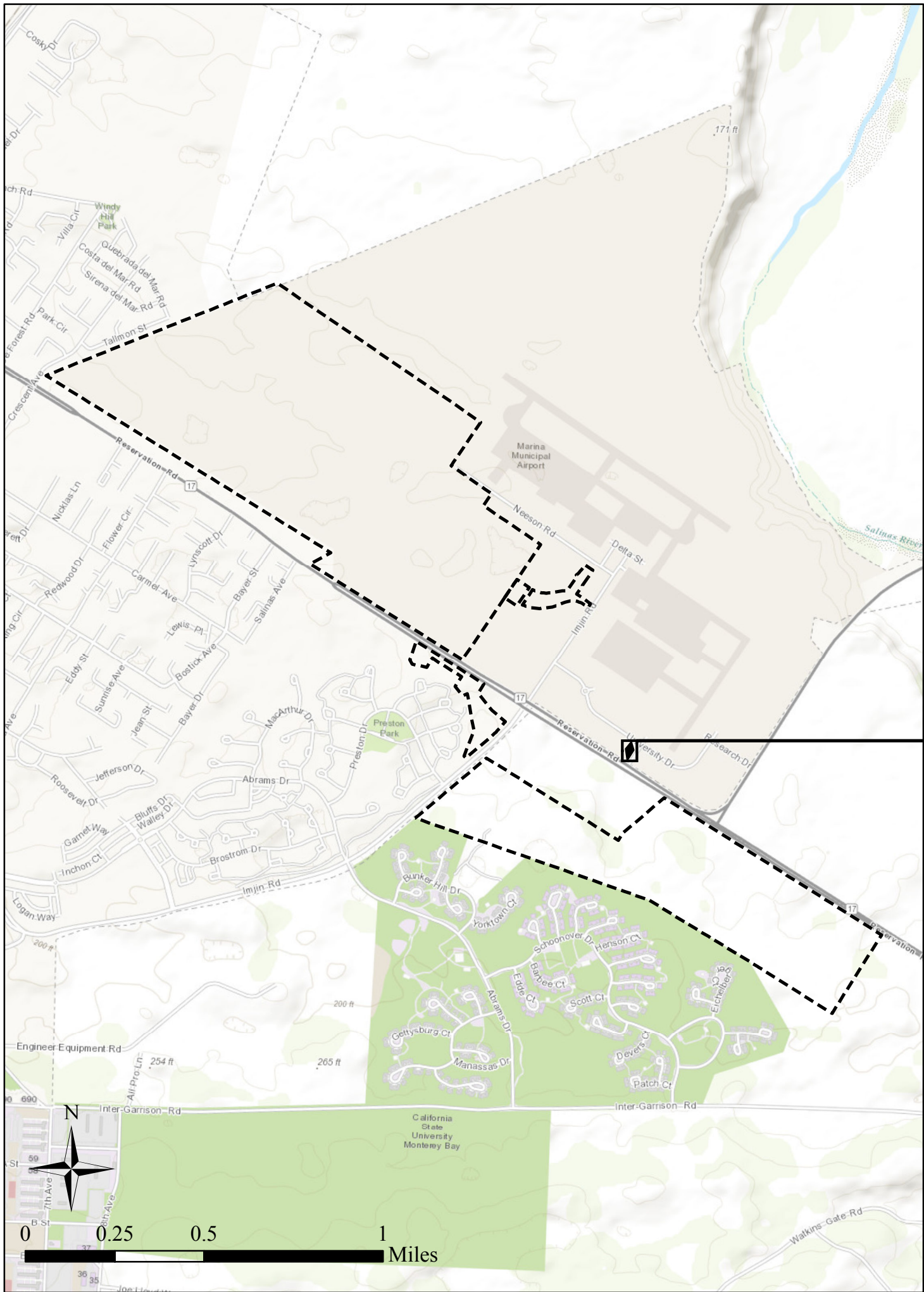
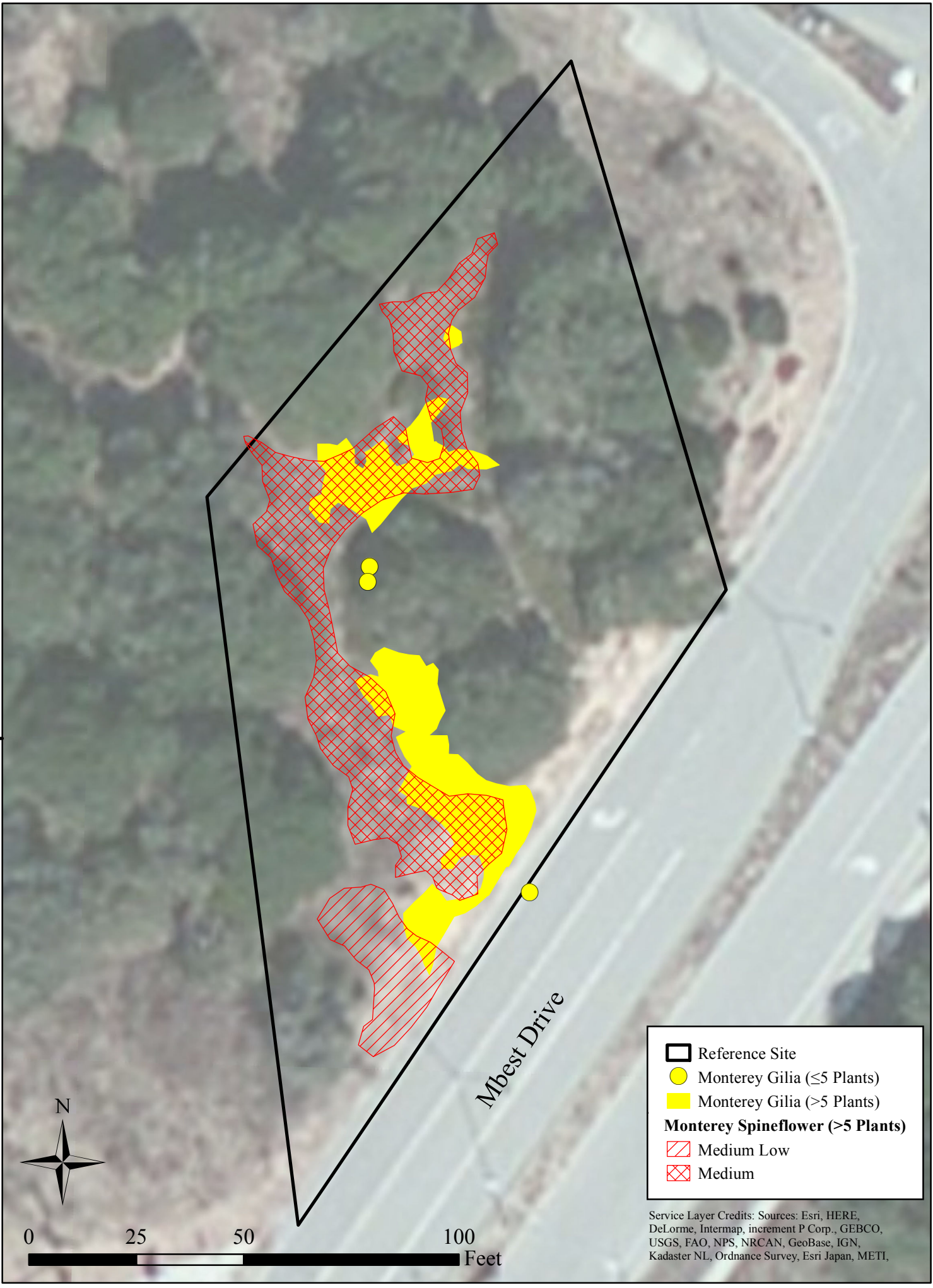


Figure 2.1 2016 DD&A Reference Site Survey Results



Table 2.1.2 Monterey Gilia at DD&A Reference Site 2016

Year	# of Populations	Individual Plants	# of Points	# of Polygons	Area of Polygons (sq. ft.)
2016	6	946	3	3	1,498

2.2 FIRST ANNUAL FOLLOW-UP SURVEY RESULTS 2016 – MONITORING WELLS

In 2016, DD&A performed a follow-up survey in the monitoring well survey area (Figure 1.1), which included eight monitoring well installation locations and the associated access routes. Annual survey efforts for the monitoring wells began March 28, 2016 and were concluded May 5, 2016. Attachment D includes detailed maps of the survey results for the 2016 monitoring wells first annual follow-up survey.

2.2.1 MONTEREY SPINEFLOWER SURVEY RESULTS

Monterey spineflower was found at (within 50 feet of) six of the eight well locations (MW-BW-86-A, MW-BW-87-A, MW-BW-88-A, MW-BW-89-A, MW-BW-90-A, and MW-BW-92-A) and along access routes (Table 2.2.1 and Attachment D). During the 2016 survey, 177 populations (75 points and 102 polygons) of Monterey spineflower were identified. Of the polygons mapped, the majority (78 polygons) were identified as having a density class of sparse (5-25 percent cover of Monterey spineflower) (Table 2.2.1).

Table 2.2.1 Monterey Spineflower at OUCTP Monitoring Wells - First Annual Survey Results 2016. Polygon Density Class: Sparse (3-25 percent cover), Medium-Low (26-50 percent cover), and Medium (51-75 percent cover).

Year	# of Populations	# of Points	Polygons per Density Class					Total Area of Polygons (ft²)
			Very Sparse	Sparse	Medium-Low	Medium	Medium-High	
2016	177	75	0	78	21	3	0	114,818

2.2.2 MONTEREY GILIA SURVEY RESULTS

Monterey gilia was present at (within 50 feet of) two of the eight well installation locations (MW-BW-92-A and MW-BW-89-A) and along access routes (Table 2.2.2 and Attachment D). During the 2016 survey, 66 populations (35 points and 31 polygons), consisting of a total of 1,591 individual Monterey gilia plants were found within the monitoring well survey area (Table 2.2.2). The largest number of Monterey gilia plants was observed 200 feet south of well MW-BW-89-A (521 individuals).

Table 2.2.2 Monterey Gilia at OUCTP Monitoring Wells - First Annual Survey Results 2016.

Year	# of Populations	Individual Plants	# of Points	# of Polygons	Area of Polygons (ft²)
2016	66	1591	35	31	4,921

2.2.3 YADON'S PIPERIA SURVEY RESULTS

In 2016, DD&A surveyed for Yadon's piperia within the monitoring well survey area (Figure 1.1), which included eight monitoring well installation locations and the associated access routes. Attachment D includes detail maps of the survey results for the 2016 annual follow-up survey. No piperia basal rosettes were found within the monitoring well survey area.

2.3 2016 BASELINE SURVEY RESULTS – EISB DEPLOYMENT AREA

In 2016, DD&A conducted baseline surveys for Monterey spineflower, Monterey gilia, and Yadon's piperia within the EISB Deployment Area (Figure 1.2). Attachment C includes a map of the survey results within the area of impact for the 2016 ESIB Deployment Area baseline surveys.

2.3.1 MONTEREY SPINEFLOWER SURVEY RESULTS

In 2016, 76 populations of Monterey spineflower (117,397 square feet of polygons and 22 points) were identified in the EISB Deployment Area⁸. Monterey spineflower was found at (within 50 feet of) fourteen of the twenty well locations (EW-BW-160-A, EW-BW-161-A, EW-BW-162-A, EW-BW-164-A, EW-BW-165-A, EW-BW-166-A, EW-BW-168-A, EW-BW-169-A, IW-BW-159-A, IW-BW-160-A, IW-BW-161-A, IW-BW-162-A, IW-BW-163-A, and IW-BW-165-A) and along access routes.

Table 2.3.1 Monterey Spineflower at EISB Deployment Area - Baseline Survey Results 2016. Polygon Density Class: Sparse (3-25 percent cover), Medium-Low (26-50 percent cover), and Medium (51-75 percent cover).

Year	# of Populations	# of Points	Polygons per Density Class			Total Area of Polygons (ft²)
			Sparse	Medium-Low	Medium	
2016	76	22	39	12	3	117,397

2.3.2 MONTEREY GILIA SURVEY RESULTS

In 2016, one population of Monterey gilia (36 individual plants) was identified in the EISB Deployment Area. The population of Monterey gilia was identified and mapped along the access route to well installation location IW-BW-160-A.

⁸ As described in Section 1.3, when either Monterey spineflower, Monterey gilia, or Yadon's piperia was identified, the survey in that area was extended to the boundary of the population encountered.

Table 2.3.2 Monterey Gilia at EISB Deployment Area - Baseline Survey Results 2016.

Year	# of Populations	Individual Plants	# of Points	# of Polygons	Area of Polygons (ft²)
2016	1	36	0	1	84

2.4 BIOLOGICAL MONITORING 2016 – EISB DEPLOYMENT AREA

Construction activities at the EISB Deployment Area, within the area of impact, were initiated on August 1, 2016 and were completed on November 1, 2016. DD&A biologists conducted the initial Environmental Awareness Training for all supervisors and field personnel on August 1, 2016. All site personnel who were not at the initial Environmental Awareness Training session received Environmental Awareness Training at a subsequent training event prior to working on the site. A total of 35 personnel received Environmental Awareness Training through the duration of the project. All construction activities, within FONR, occurred within the area of impact identified for the EISB Deployment Area (Figure 1.3).

The construction phase biological monitoring log (Attachment E) details the specific monitoring events and communication by DD&A personnel subsequent to initiation of well installation and development activities at FONR.⁹ Attachment E also documents communication and meetings with staff from Ahtna, NEWP, AIS, and Jeffries Electric, as well as construction oversight by DD&A biologists. DD&A kept a photo journal (Attachment F) of photographs before and after construction, which included a map for each well installation location as well as the location from which the photographs were taken.¹⁰

3 DISCUSSION

3.1 RARE PLANT POPULATIONS

As required by the BO, surveys are conducted for three years after a disturbance occurs during the groundwater remediation effort.

3.1.1 REFERENCE SITE

DD&A reference site were surveyed in 2015 as part of the monitoring well baseline survey. DD&A surveyed the reference site in 2016 as part of the EISB Deployment Area baseline survey and the first annual survey for the monitoring wells. The reference site is located in an area relatively undisturbed by anthropogenic activities.

⁹ The map included in the photo journal (Attachment F) also shows the site locations that are referred to throughout the construction phase biological monitoring log (Attachment E).

¹⁰ “Before” photos were taken before drilling operations commenced but after vegetation had been cleared at each well installation location.

3.1.1.1 MONTEREY SPINEFLOWER

Several environmental variables can influence the distribution and abundance of Monterey spineflower in a particular year (USFWS 2002). From 2015 to 2016 the DD&A reference site showed an increase in total area of Monterey spineflower polygons from 2,114 ft² to 3,241 ft², an increase of approximately 50% (Table 3.1.1.1).

Table 3.1.1.1 Monterey Spineflower Population at the DD&A Reference Site 2015 and 2016. Polygon Density Class: Sparse (3-25 percent cover), Medium Low (26-50 percent cover), and Medium (51-75 percent cover).

Year	# of Populations	# of Points	Polygons per Density Class					Total Area of Polygons (ft ²)
			Very Sparse	Sparse	Medium-Low	Medium	Medium-High	
2015	4	1	0	1	1	1	0	2,114
2016	2	0	0	0	1	1	0	3,241

3.1.1.2 MONTEREY GILIA

Several environmental variables can influence the distribution and abundance of Monterey gilia in a particular year (USFWS 2008). From 2015 to 2016 the DD&A reference site showed a decrease in number of individual Monterey gilia plants, from 1078 to 946, and a decrease in total area of Monterey gilia polygons from, 1512 ft² to 1,498 ft² (Table 3.1.1.2). The decrease in individual Monterey gilia plants (132, approximately 12%) was greater than the decrease in total area of Monterey gilia polygons (14 ft², approximately 1%). However, neither individual plants nor total area decreased by a substantial amount.

Table 3.1.1.2 Monterey Gilia at DD&A Reference Site 2015-2016.

Year	# of Populations	Individual Plants	# of Points	# of Polygons	Area of Polygons (ft ²)
2015	11	1078	4	7	1,512
2016	6	946	3	3	1,498

3.1.2 OUCTP FONR MONITORING WELL - RARE PLANT SURVEY

Surveys conducted in 2016 were the first of three annual surveys required following the disturbance associated with the well installation and other groundwater remediation efforts of 2015.

3.1.2.1 MONTEREY SPINEFLOWER

As stated in Section 2.2.1, 177 populations (75 points and 102 polygons) of Monterey spineflower were identified in 2016. Of the polygons mapped in 2016, the majority (78 polygons) were identified as having a density class of sparse (5-25 percent cover of Monterey spineflower). The total area of Monterey spineflower polygons increased from 21,174 ft² in 2015 to 114,818 ft² in 2016. Within the monitoring

well survey area, the total area of Monterey spineflower polygons increased by approximately 442%. During the 2015 baseline surveys, Monterey spineflower was observed within 50 feet of four well locations (MW-BW-86-A, MW-BW-88-A, MW-BW-90-A, and MW-BW-92-A) and along access routes. In 2016, Monterey spineflower was found at (within 50 feet of) six of the eight well locations (MW-BW-86-A, MW-BW-87-A, MW-BW-88-A, MW-BW-89-A, MW-BW-90-A, and MW-BW-92-A) and along access routes (Table 3.1.2.1 and Attachment D).

Table 3.1.2.1 Monterey Spineflower within the OUCTP FONR Monitoring Well Survey Area 2015-2016. Polygon Density Class: Very Sparse (3-25 percent cover), Sparse (26-50 percent cover), Medium-Low (51-75 percent cover), Medium (76-97 percent cover), and Medium-High (98-100 percent cover).

Year	# of Populations	# of Points	Polygons per Density Class					Total Area of Polygons (ft ²)
			Very Sparse	Sparse	Medium-Low	Medium	Medium-High	
2015	150	55	3	74	12	5	1	20,563
2016	177	75	0	78	21	3	0	114,818

As mentioned above several environmental variables can influence the distribution and abundance of Monterey spineflower in a particular year. Some combination of the environmental variables are likely responsible for a percentage of the increasing trend in Monterey spineflower populations observed at both the reference site and survey area in 2016. However, while both the survey area and the reference site exhibited an increase in Monterey spineflower, the percent increase in Monterey spineflower was much greater within the survey area compared to the reference site. In addition to favorable environmental factors, well installation activities within the survey area that required vegetation clearing may have resulted in an increase in suitable habitat for Monterey spineflower (open sandy areas), which may have contributed to the substantial increase of Monterey spineflower observed within the survey area in 2016. The relationship between activities associated with the cleanup of the former Fort Ord and an increase of Monterey spineflower populations has been previously documented (USFWS 2002).

3.1.2.2 MONTEREY GILIA

As stated in Section 2.2.2, 66 populations (35 points and 31 polygons), consisting of 1,591 individuals were found within the monitoring well survey area in 2016. Between 2015 and 2016, the monitoring well survey area experienced a substantial increase in number of individual Monterey gilia plants, from 347 observed in 2015 to 1591 observed in 2016, and an increase in total area of Monterey gilia polygons, from 1217 ft² in 2015 to 4921 ft² in 2016. Within the monitoring well survey area, the number of individual Monterey gilia plants increased by approximately 360% and the total area of Monterey gilia polygons increased by approximately 300%. During the 2015 baseline surveys Monterey gilia was not observed within 50 feet any of the well locations. However, during the 2016 follow-up survey, Monterey gilia was observed within 50 feet of two well locations (MW-BW-89-A and MW-BW-92-A). The number of Monterey gilia populations within the monitoring well survey area more than quadrupled in 2016 compared to the 2015 baseline data (Table 3.1.2.2). The detected increase in Monterey gilia between 2015 and 2016 at the monitoring wells is inconsistent with observations at the reference site.

Table 3.1.2.2 Monterey Gilia within OUCTP FONR Monitoring Well Survey Area 2015-2016.

Year	# of Populations	Individual Plants	# of Points	# of Polygons	Area of Polygons (ft²)	# of Wells Where Present	Well Location Where Present
2015	14	347	10	4	1217	0	
2016	66	1591	35	31	4921	2	MW-BW-89-A, MW-BW-92-A

As mentioned above, several environmental variables can influence the distribution and abundance of Monterey gilia in a particular year. Some combination of factors are likely responsible for the decreasing trend in Monterey gilia populations observed at the reference site and the increasing trend at the monitoring well survey area in 2016. However, the percent variation in Monterey gilia was much greater within the survey area compared to the reference site. In addition to favorable environmental factors, well installation activities within the survey area that required vegetation clearing may have resulted in an increase in suitable habitat for Monterey gilia (open sandy areas). Increased availability of suitable habitat and a reduction in resource competition within the survey area may have contributed to the substantial increase of Monterey gilia observed within this area in 2016.

3.2 BIOLOGICAL MONITORING – EISB DEPLOYMENT AREA

Modification to the location of wells, access routes, and staging areas were made using baseline survey data to minimize impacts to these HMP plant species. Modifications occurred at all well locations, by a minimum of one foot, under the direction of the on-site DD&A biologist and Ahtna Field Supervisor, to either avoid known populations of HMP species or at the request of NEWP drilling personnel. Modifications were also made to avoid UCSC study plots in coordination with FONR staff and the BRAC biologist. Discussions with the on-site DD&A biologist and drilling personnel prior to mobilization at each well location ensured that drilling equipment was placed to avoid HMP species to the greatest extent possible.

4 CONCLUSION AND RECOMMENDATION

4.1 OUCTP FONR MONITORING WELL - RARE PLANT SURVEY

In 2016, Monterey spineflower and Monterey gilia were present within the monitoring well survey area, and the populations were larger than those identified in the 2015 baseline survey for the monitoring well survey area. No piperia rosettes were identified in 2016. Annual surveys of the monitoring well survey site will be conducted again in 2017 and 2018, the second and third years following construction and development of the OUCTP FONR monitoring wells in 2015. The first annual follow up survey will also be conducted at the EISB Deployment Area in 2017. For at least the next two years the annual follow up survey areas for the monitoring wells and the EISB Deployment Area will be evaluated as one survey area to reduce confusion and repetitiveness in the subsequent reports. DD&A will communicate with all relevant parties prior to conducting annual surveys.

Well monitoring for the OUCTP involves driving or walking to the monitoring well location and collecting a water level measurement and groundwater samples from the well using passive diffusion bags. To reduce the amount of potential impacts to seedbank of rare annual plants or actual individuals of rare annual plants during the blooming period, walking would be the preferred method to access the monitoring well locations from the main thoroughfares whenever possible. Walking to well MW-BW-88-A is highly recommended, due to the slope and substrate of the secondary access road, to reduce excess erosion and potential impacts to rare annual plant species seed banks. To reduce the potential for impacts to rare annual plant species seed banks located along the main access roads it is recommended that vehicle traffic be limited to the minimum necessary to conduct well monitoring and vehicle speeds should remain under 15 mph. Four-wheel or all-wheel drive vehicles should be employed to conduct well monitoring activities to reduce the likelihood of vehicle becoming stuck and causing excess erosion.

4.2 BIOLOGICAL MONITORING – EISB DEPLOYMENT AREA

Construction and biological monitoring within the EISB Deployment Area was successfully completed in 2016. Annual surveys will be conducted for up to three years following the completion of the construction activities at the EISB Development Area in 2016 in accordance with the BO. DD&A will conduct the first annual survey in 2017 employing the methodology used for the baseline survey. DD&A will communicate with all relevant parties prior to conducting annual surveys. Additionally, DD&A will provide a report for each annual survey summarizing survey activities and results, including photographic documentation, survey results, cartographic materials, and recommendations for mitigation measures, if necessary.

5 REFERENCES

- Denise Duffy & Associates, Inc. [DD&A]. 2015. Biological Monitoring Completion Report for the Ahtna Well Installation and Development at the Operable Unit Carbon Tetrachloride Plume (OUCTP). Prepared for Ahtna Environmental, Inc. September 2015.¹¹
- HydroGeoLogic, Inc. [HGL], 2008. 2007 FONR Impact Assessment and Habitat and Rare Plant Survey Results, Fritzsche Army Airfield Fire Drill Area, Former Fort Ord, California. February. Administrative Record Series Number OU1-534.
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- U.S. Army Corps of Engineers [USACE], 1997. Installation-Wide Multispecies Habitat Management Plan (HMP) for Former Fort Ord, California. April. BW-1787.

¹¹ Attachment F to the Final Operable Unit Carbon Tetrachloride Plume Evaluation Technical Memorandum, A-Aquifer, Former Fort Ord, California. January 2016. OUCTP-0070.

- U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Chorizanthe pungens* var. *pungens* (Monterey spineflower). Federal Register 67(103): 37497-3754.
- U.S. Fish and Wildlife Service. 2008. Monterey Gilia (*Gilia tenuiflora* ssp. *arenaria*) 5-Year Review: Summary and Evaluation U.S. Fish and Wildlife Service Ventura Fish and Wildlife Office Ventura, California. March 2008.
- U.S. Fish and Wildlife Service [USFWS], 2015. Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California (8-8-09-F-74) (2015 Biological Opinion). May 28. AR# BW-2747.

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ATTACHMENT A
FORT ORD NATURAL RESERVE SITE HABITAT
CHECKLIST

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FORT ORD NATURAL RESERVE SITE HABITAT CHECKLIST

The following are requirements to minimize biological disturbances to protected species and habitat.

Please notify Matthew Johnson, Ahtna Biologist (831-917-3242), *before* proceeding if work tasks or work boundaries change, additional vegetation removal is necessary, vegetation cutting methods change, or any other conditions change. Field Supervisors must receive a copy of this checklist. Contact Number for the BRAC Biologist is (831) 242-7918.

SITE:	UC FONR OUCTP	DATE:	7-25-2016
WORK TO BE CONDUCTED:	Well Installation		

1. LAND USE:	<input checked="" type="checkbox"/> Habitat Reserve	<input type="checkbox"/> Development Area	<input type="checkbox"/> Other (specify):
2. LAND OWNER:	<input type="checkbox"/> Army	Location:	
	<input type="checkbox"/> BLM	Location:	
	<input checked="" type="checkbox"/> Other: UC	Location:	Fort Ord Natural Reserve

3. ENDANGERED, THREATENED, RARE, OR HMP-LISTED SPECIES	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Flagged/Marked
Species: <ul style="list-style-type: none"> ▪ Black legless lizard (<i>Anniella pulchra</i>) (CDFW SSC) (BLL) ▪ California tiger salamander (<i>Ambystoma californiense</i>; CTS) (FT, ST, CDFW SSC) ▪ Coast horned lizard (<i>Phrynosoma blainvillii</i>) (CDFW SSC) ▪ Coast wallflower (<i>Erysimum ammodophilum</i>) (CNPS 1B) ▪ Eastwood's goldenbush (<i>Ericameria fasciculata</i>) (CNPS 1B) ▪ Monterey ceanothus (<i>Ceanothus rigidus</i>) (CNPS 4) ▪ Monterey dusky-footed woodrat (<i>Neotoma fuscipes luciana</i>) ▪ Monterey manzanita (<i>Arctostaphylos montereyensis</i>) (CNPS 1B) ▪ Monterey ornate shrew (<i>Sorex ornatus salarius</i>) (CDFW SSC) ▪ Monterey spineflower (<i>Chorizanthe pungens</i> var. <i>pungens</i>) (FE, CNPS 1B) ▪ Sand gilia (<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>) (FE, ST, CNPS 1B) ▪ Sandmat manzanita (<i>Arctostaphylos pumila</i>) (CNPS 1B) ▪ Seaside bird's-beak (<i>Cordylanthus rigidus</i> var. <i>littoralis</i>) (SE, CNPS 1B) 	
Location:	Monterey spineflower and sand gilia flagged for avoidance, when possible.
Grid Numbers:	N/A

Restrictions:

- Sandmat manzanita along southern boundary in vicinity of proposed wells IW-BW-160-A and IW-BW-163-A, will be avoided.
- Access routes will be delineated by mowing paths prior to work beginning.
- Impacts to shrub species will be avoided to the greatest extent feasible.
- UC FONR drift fence arrays and 50x50 meter plots will be avoided.
- Remain on or within designated access routes and delineated well installation buffers at all times (see attached map).
- CTS encounters must be reported immediately to Field Supervisor and Ahtna Biologist. CTS must only be handled by a Service-approved biologist. Contact Matthew Johnson (831-917-3242) to document, handle, or relocate CTS if encountered. Mr. Johnson will coordinate with the BRAC biologist (831-242-7918) during these processes. Work must stop until CTS can be relocated. CTS field observation form will be filled out by Service-approved biologist.
- BLL encounters should be reported immediately to Field Supervisor and Ahtna Biologist. Field Supervisor or Ahtna Biologist should complete the attached BLL Field Observation Form. BLL should be relocated by Field Supervisor or Ahtna Biologist close to the original site (20-100 ft), under shade, and on the surface allowing the specimen to bury itself.
- Do not exceed 15 MPH within FONR.
- Do not litter. Remove trash from the job site on a daily basis.

- No pets, firearms, or hunting are allowed.
- No fires are allowed. Report any smoke or open flame immediately to the Ahtna Field Supervisor. Keep firefighting equipment in good operating order and readily available.
- Clean up and report all hazardous material spills immediately.
- Do not discharge any water or drill cuttings into unapproved areas.
- Holes and trenches left at the end of each work day should be covered or escape ramps shall be built to allow wildlife to exit.
- Report trapped, injured, or dead wildlife to the Ahtna Biologist.
- Keep all equipment either in approved work areas or travel corridors, or in approved staging/storage areas.
- Keep fluid spill containment and clean up materials readily available.

4. VERNAL POOLS/PONDS PRESENT	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Flagged/Marked
Location:			
Grid Numbers:			
Work Can Proceed in Pools/Ponds:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Restrictions:			

5. VEGETATION REMOVAL	
<input type="checkbox"/> No Removal Needed	Location:
<input type="checkbox"/> Manual Removal Needed	Location:
<input checked="" type="checkbox"/> Mechanical Removal Needed	Location: All secondary access routes and proposed well locations.
Vegetation Removal Restrictions:	
<ul style="list-style-type: none"> ▪ Keep trimming/removal of vegetation to the minimum necessary to complete well installation. ▪ Delineate area to be mowed prior to vegetation removal. 	


6. EROSION CONCERNS/SITE RESTORATION:
<ul style="list-style-type: none"> ▪ Following the well installation activities, disturbed land around the wells will be restored as closely as possible to its original condition by limited grading after coordination with the BRAC Biologist.


7. SITE ACCESS:
<ul style="list-style-type: none"> ▪ FONR access should be limited to the gate adjacent to Reservation Road. ▪ Access to work areas shall be along approved travel corridors.


8. INVASIVE SPECIES:
<ul style="list-style-type: none"> ▪ All equipment coming from off-site must be pressure washed prior to entering FONR to reduce the potential to spread non-native invasive plant species.

9. ADDITIONAL SITE CONCERNS:
<ul style="list-style-type: none"> ▪ Matting to reduce the level of soil disturbance may be required to access some of the well installation locations.

This checklist has been read, approved, and signed by the following:

DDA Biologist:  Date: 7-25-2016

Ahtna Project Manager:  Date: 7/27/2016

Ahtna Field Supervisor:  Date: 7/27/2016

KOWALSKI.BARTHOLOMEW.L.1387978115

Digitally signed by KOWALSKI.BARTHOLOMEW.L.1387978115
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=CONTRACTOR,
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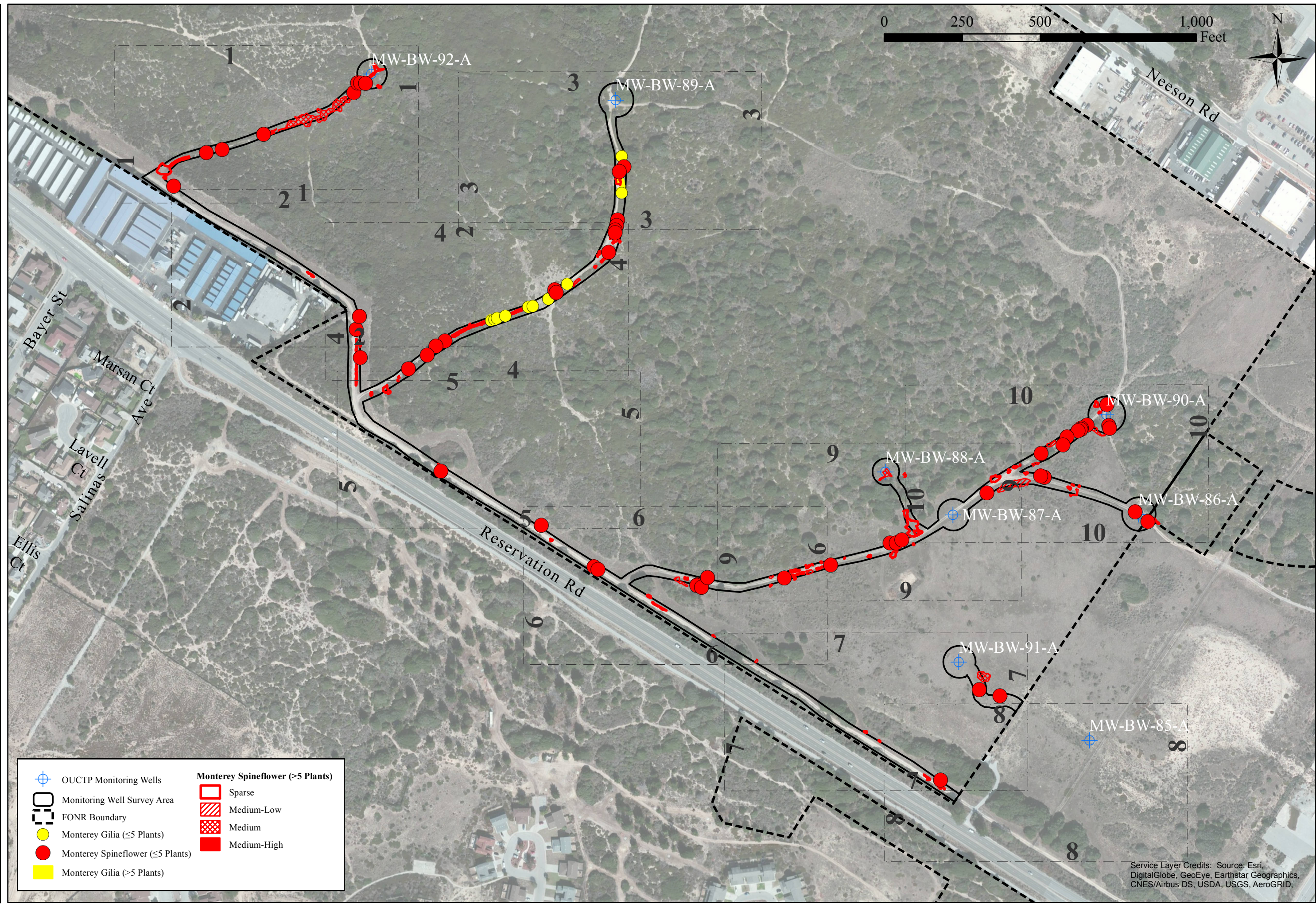
BRAC Biologist: _____ **Date:** _____

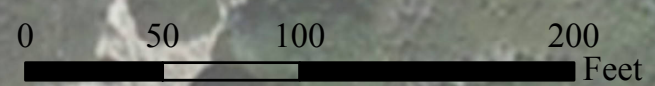
ATTACHMENT B

2015 MONITORING WELL BASELINE RARE PLANT SURVEY RESULTS OVERVIEW AND DETAIL MAPS


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Attachment B 2015 Monitoring Well Baseline Rare Plant Survey Results Overview and Detail Maps








MW-BW-92-A


 OUCTP Monitoring Wells

 Monitoring Well Survey Area


 FONR Boundary


 Monterey Gilia (≤5 Plants)


 Monterey Spineflower (≤5 Plants)


 Monterey Gilia (>5 Plants)

Monterey Spineflower (>5 Plants)

 Sparse

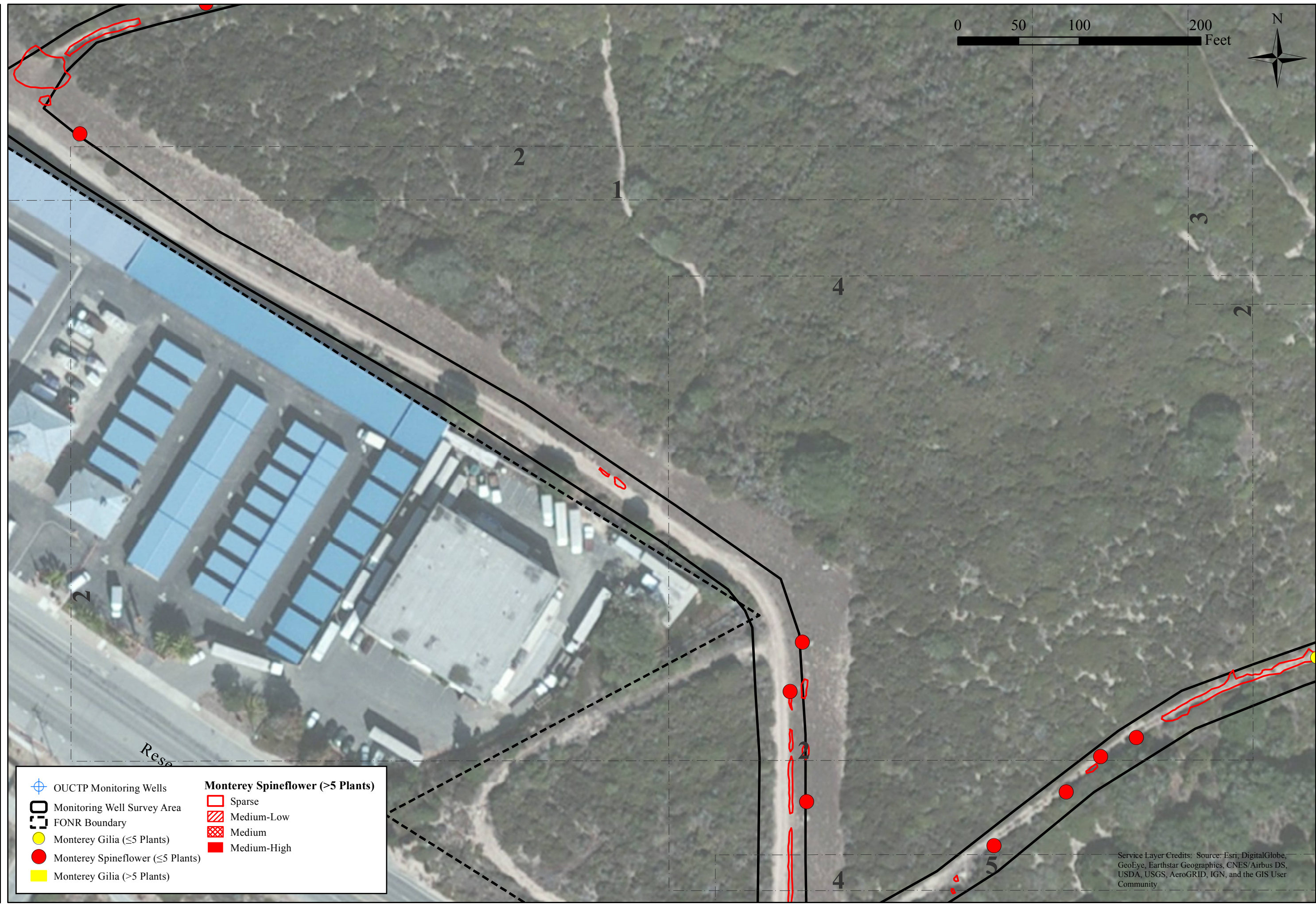
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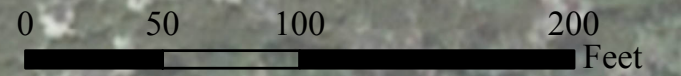


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 OUCTP Monitoring Wells	Monterey Spineflower (>5 Plants)
 Monitoring Well Survey Area	 Sparse
 FONR Boundary	 Medium-Low
 Monterey Gilia (≤ 5 Plants)	 Medium
 Monterey Spineflower (≤ 5 Plants)	 Medium-High
 Monterey Gilia (> 5 Plants)	

Attachment B 2015 Monitoring Well Baseline Rare Plant Survey Results Overview and Detail Maps

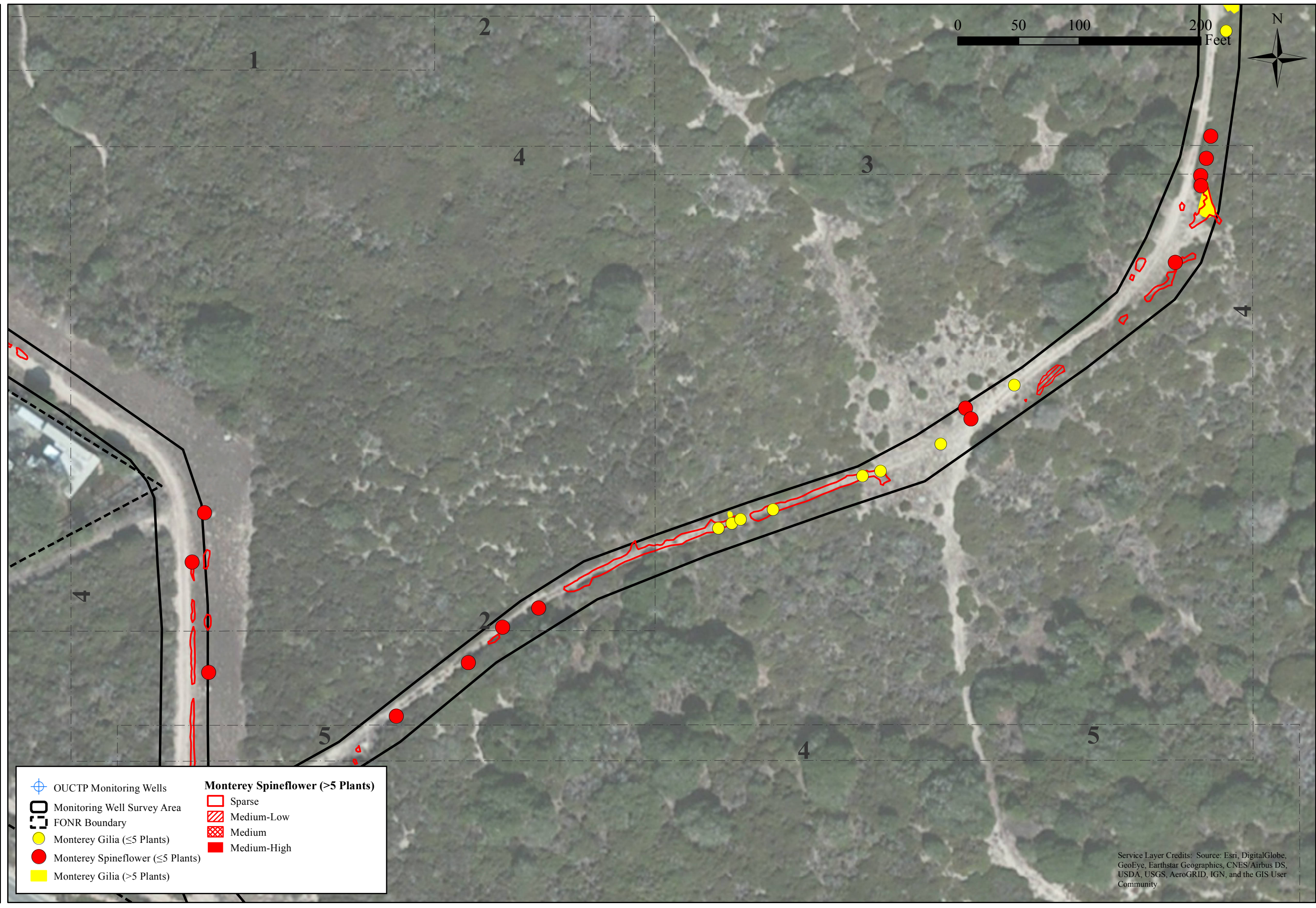
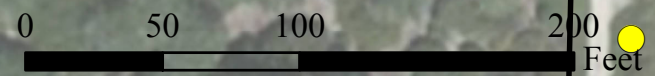





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- | | |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
|  OUCTP Monitoring Wells | Monterey Spineflower (>5 Plants) |
|  Monitoring Well Survey Area |  Sparse |
|  FONR Boundary |  Medium-Low |
|  Monterey Gilia (≤ 5 Plants) |  Medium |
|  Monterey Spineflower (≤ 5 Plants) |  Medium-High |
|  Monterey Gilia (>5 Plants) | |








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 OUCTP Monitoring Wells

 Monitoring Well Survey Area


 FONR Boundary


 Monterey Gilia (≤ 5 Plants)


 Monterey Spineflower (≤ 5 Plants)


 Monterey Gilia (> 5 Plants)

Monterey Spineflower (>5 Plants)

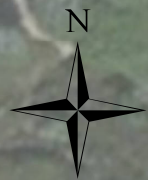
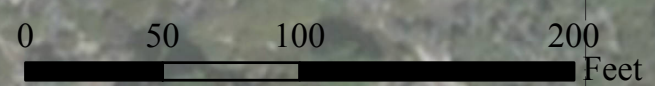
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
 OUCTP Monitoring Wells

 Monitoring Well Survey Area


 FONR Boundary


 Monterey Gilia (≤5 Plants)


 Monterey Spineflower (≤5 Plants)


 Monterey Gilia (>5 Plants)

Monterey Spineflower (>5 Plants)

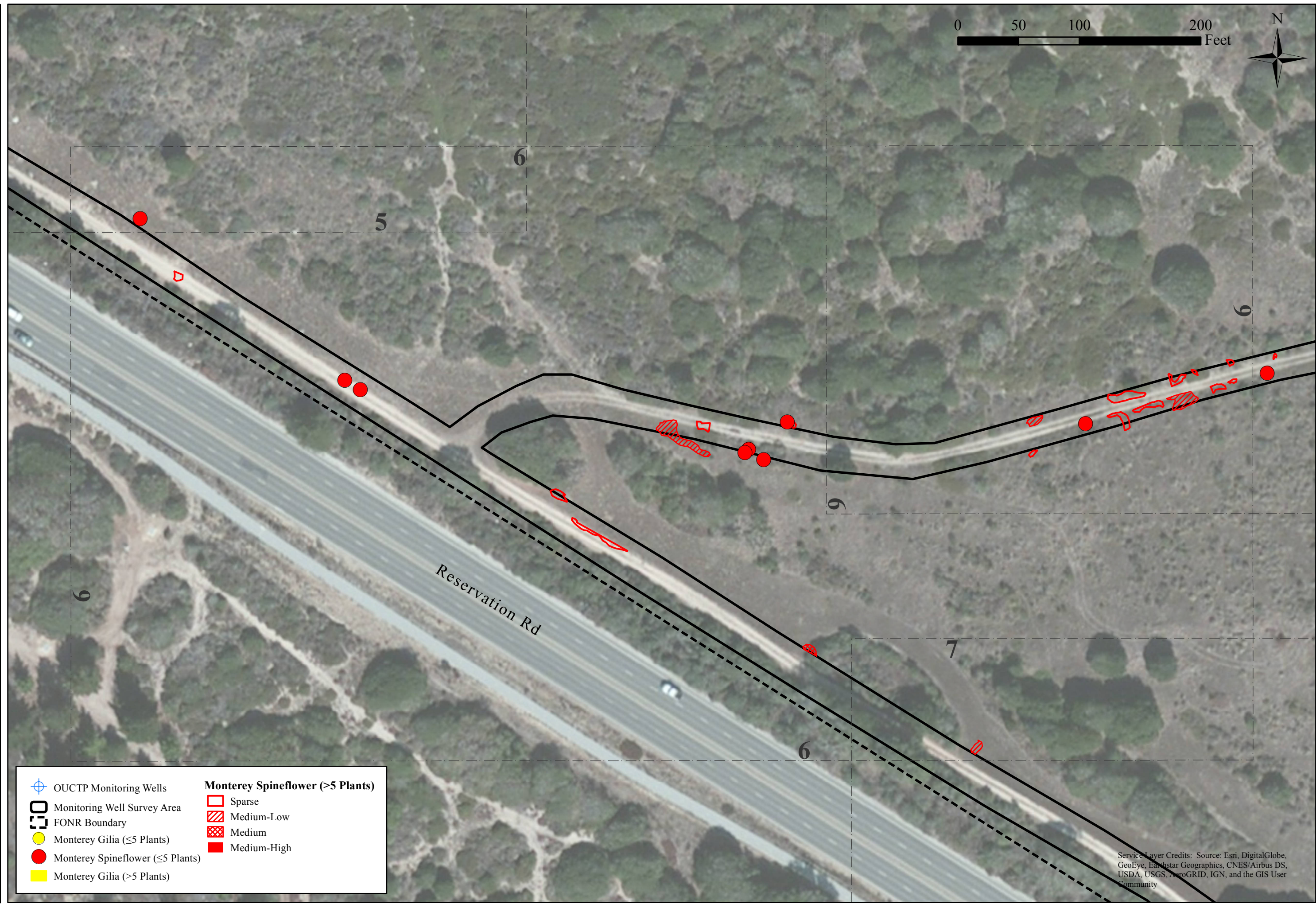
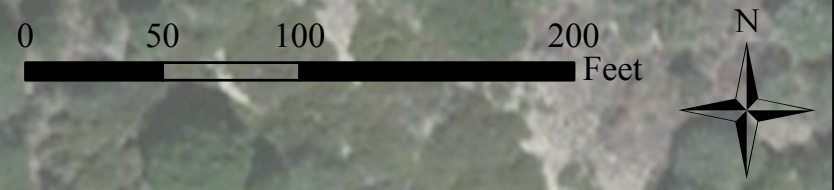
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 Medium-Low


 Medium


 Medium-High








 OUCTP Monitoring Wells

 Monitoring Well Survey Area


 FONR Boundary


 Monterey Gilia (≤5 Plants)


 Monterey Spineflower (≤5 Plants)


 Monterey Gilia (>5 Plants)

Monterey Spineflower (>5 Plants)

 Sparse

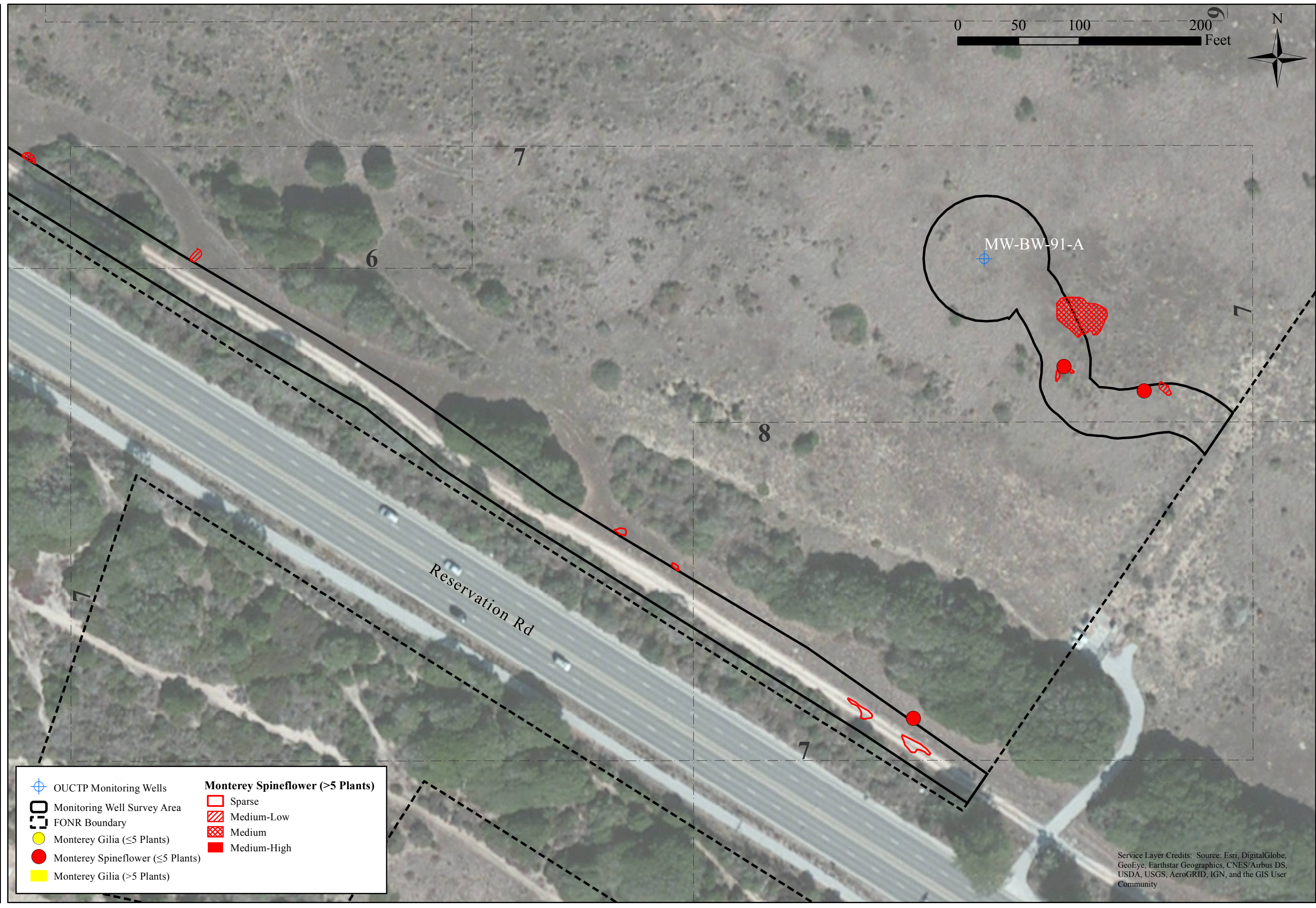
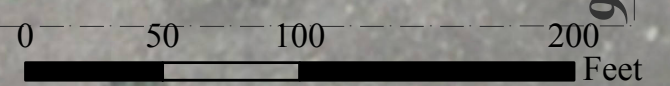
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 Medium-High


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 OUCTP Monitoring Wells


 Monitoring Well Survey Area


 Monterey Gilia (≤ 5 Plants)


 Monterey Spineflower (≤ 5 Plants)


 Monterey Gilia (> 5 Plants)

Monterey Spineflower (> 5 Plants)

 Sparse

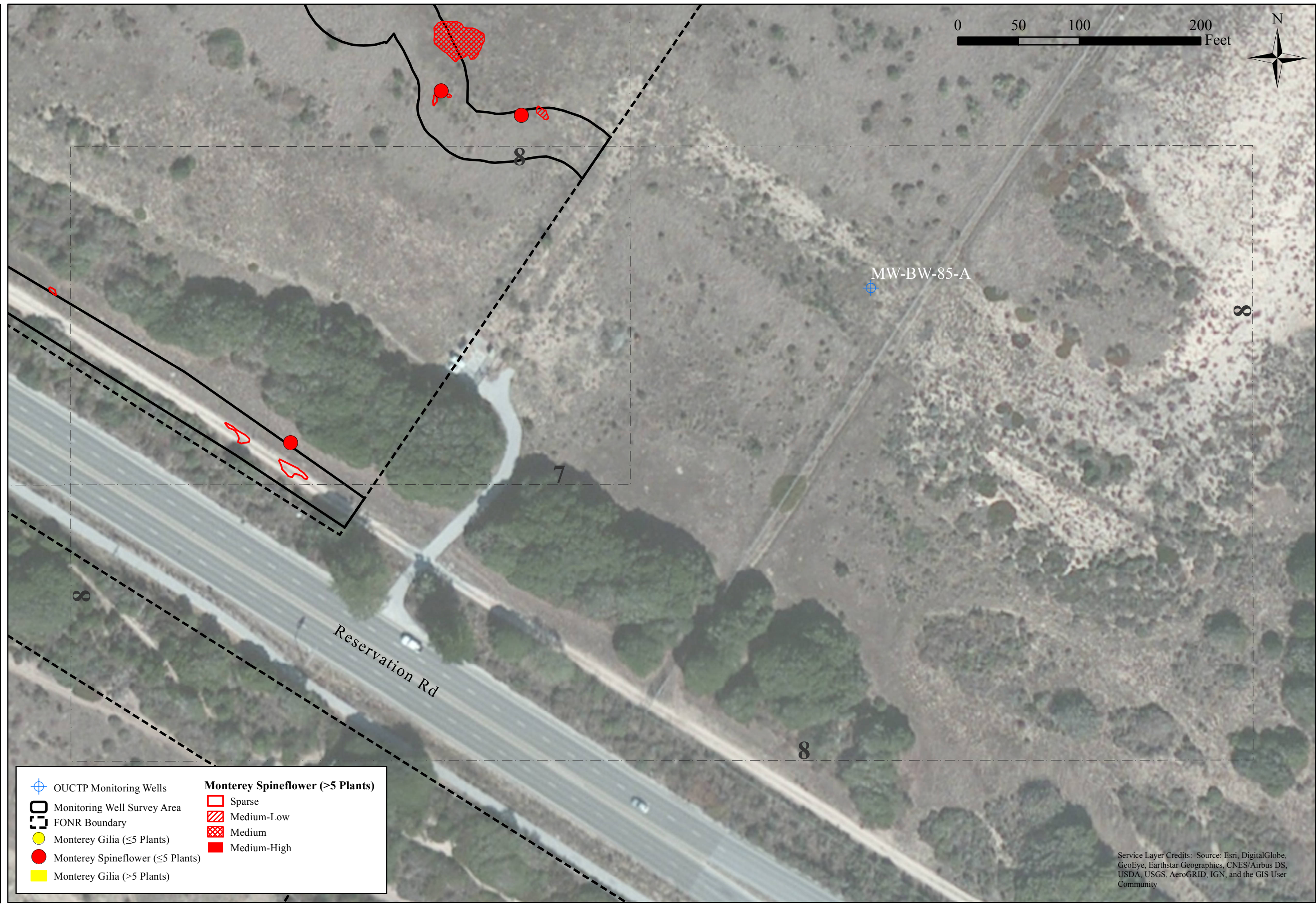
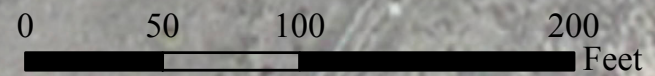
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OUCTP Monitoring Wells

Monitoring Well Survey Area

FONR Boundary

Monterey Gilia (≤5 Plants)

Monterey Spineflower (≤5 Plants)

Monterey Gilia (>5 Plants)

Monterey Spineflower (>5 Plants)

Sparse

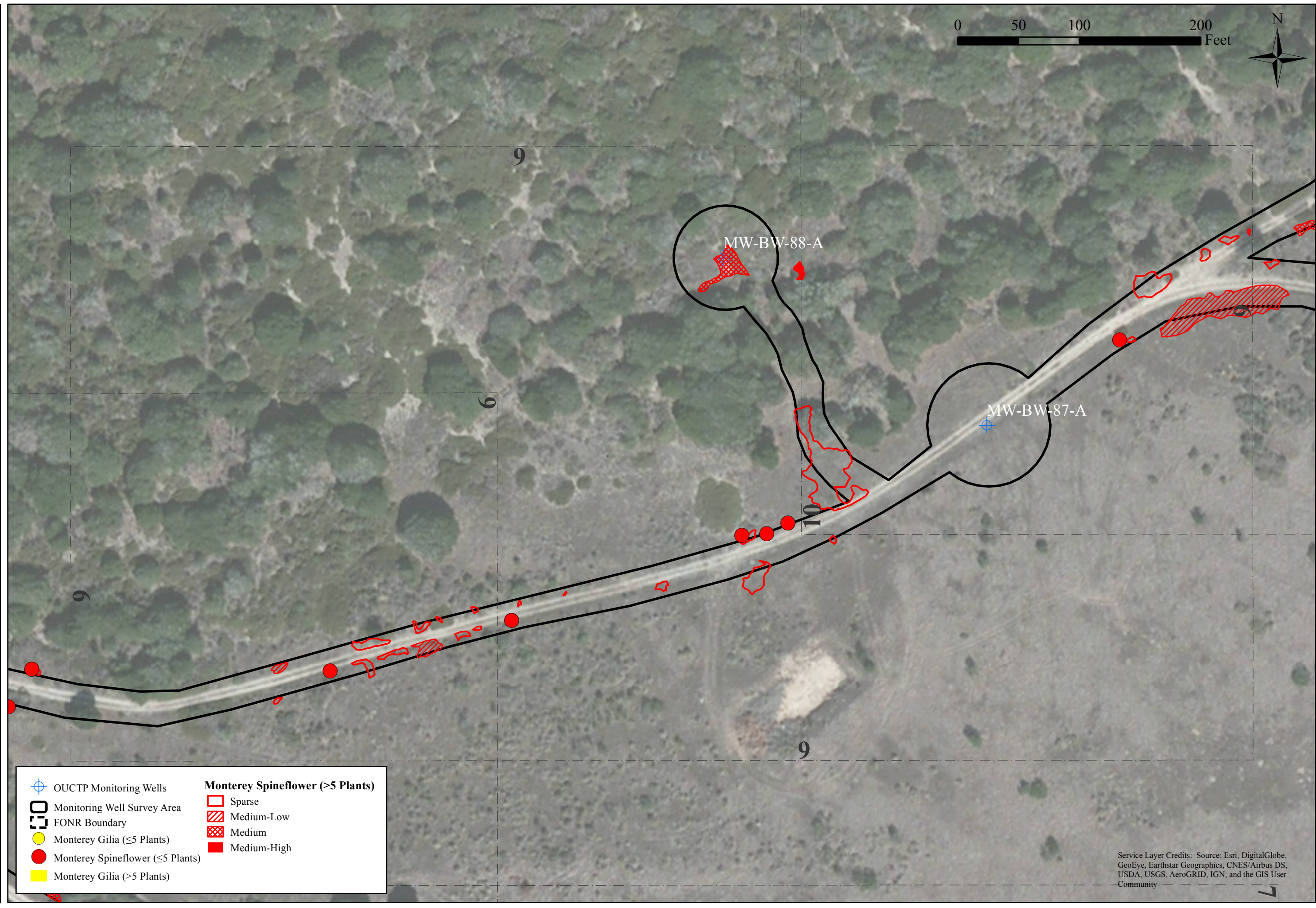
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Medium-High


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 OUCTP Monitoring Wells

 Monitoring Well Survey Area


 FONR Boundary


 Monterey Gilia (≤ 5 Plants)


 Monterey Spineflower (≤ 5 Plants)


 Monterey Gilia (> 5 Plants)

Monterey Spineflower (> 5 Plants)

 Sparse

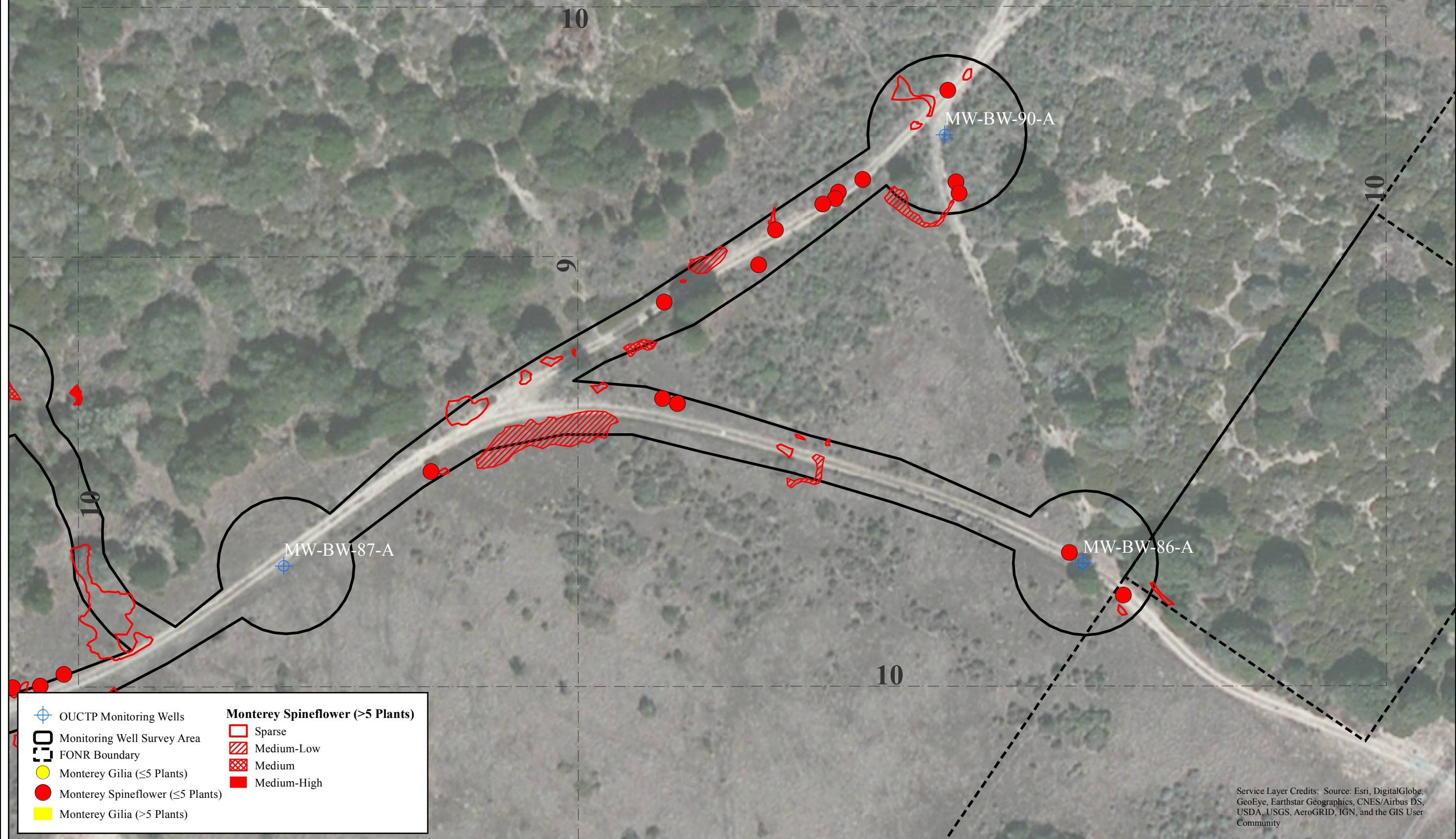
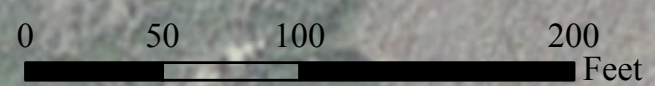
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
 OUCTP Monitoring Wells

 Monitoring Well Survey Area


 FONR Boundary


 Monterey Gilia (≤ 5 Plants)


 Monterey Spineflower (≤ 5 Plants)


 Monterey Gilia (> 5 Plants)

Monterey Spineflower (> 5 Plants)

 Sparse

 Medium-Low

 Medium

 Medium-High

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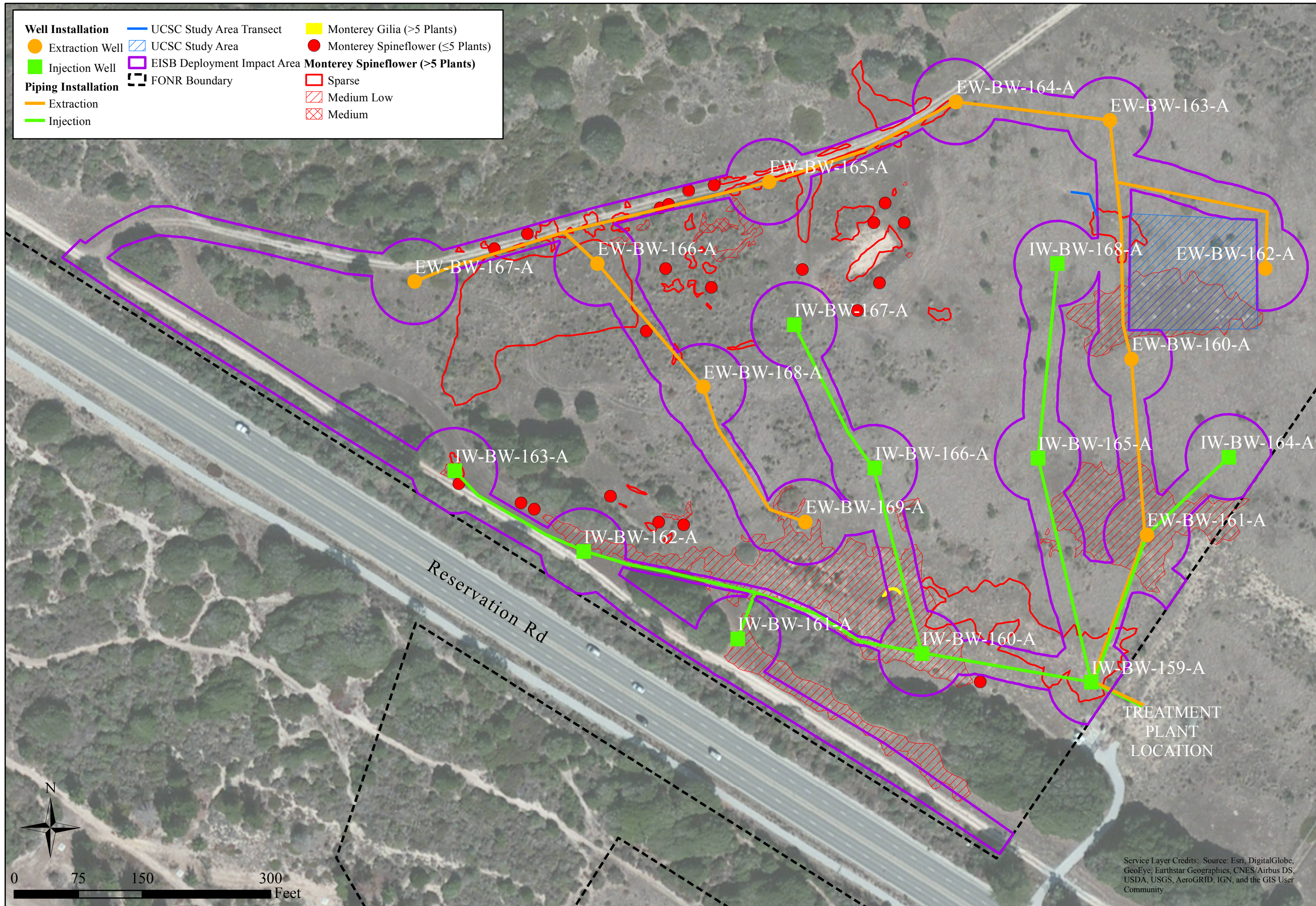
ATTACHMENT C

2016 EISB DEPLOYMENT AREA BASELINE RARE PLANT SURVEY RESULTS MAP

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Attachment C 2016 EISB Deployment Area Baseline Rare Plant Survey Results Map

Date: 3/13/2017



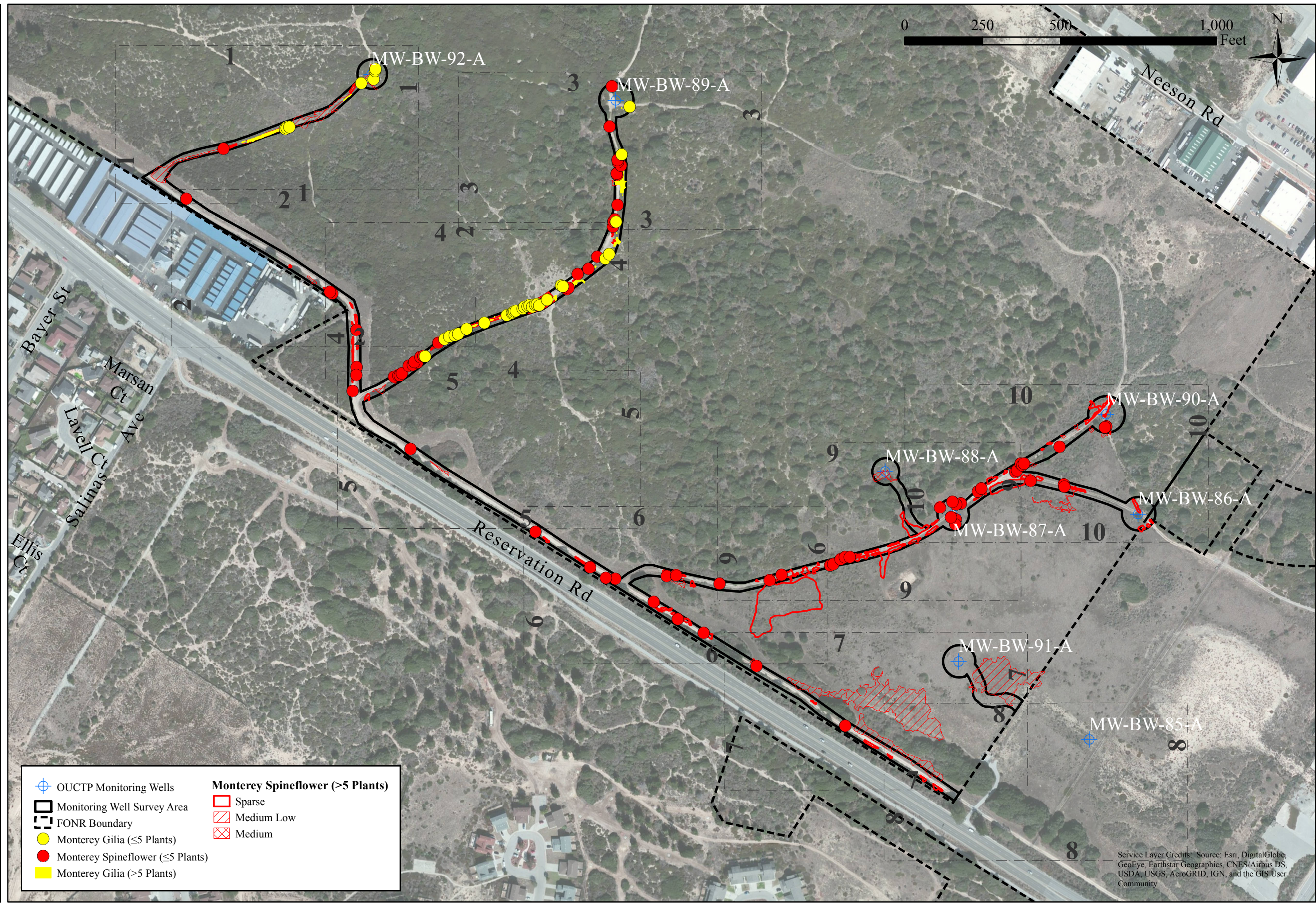
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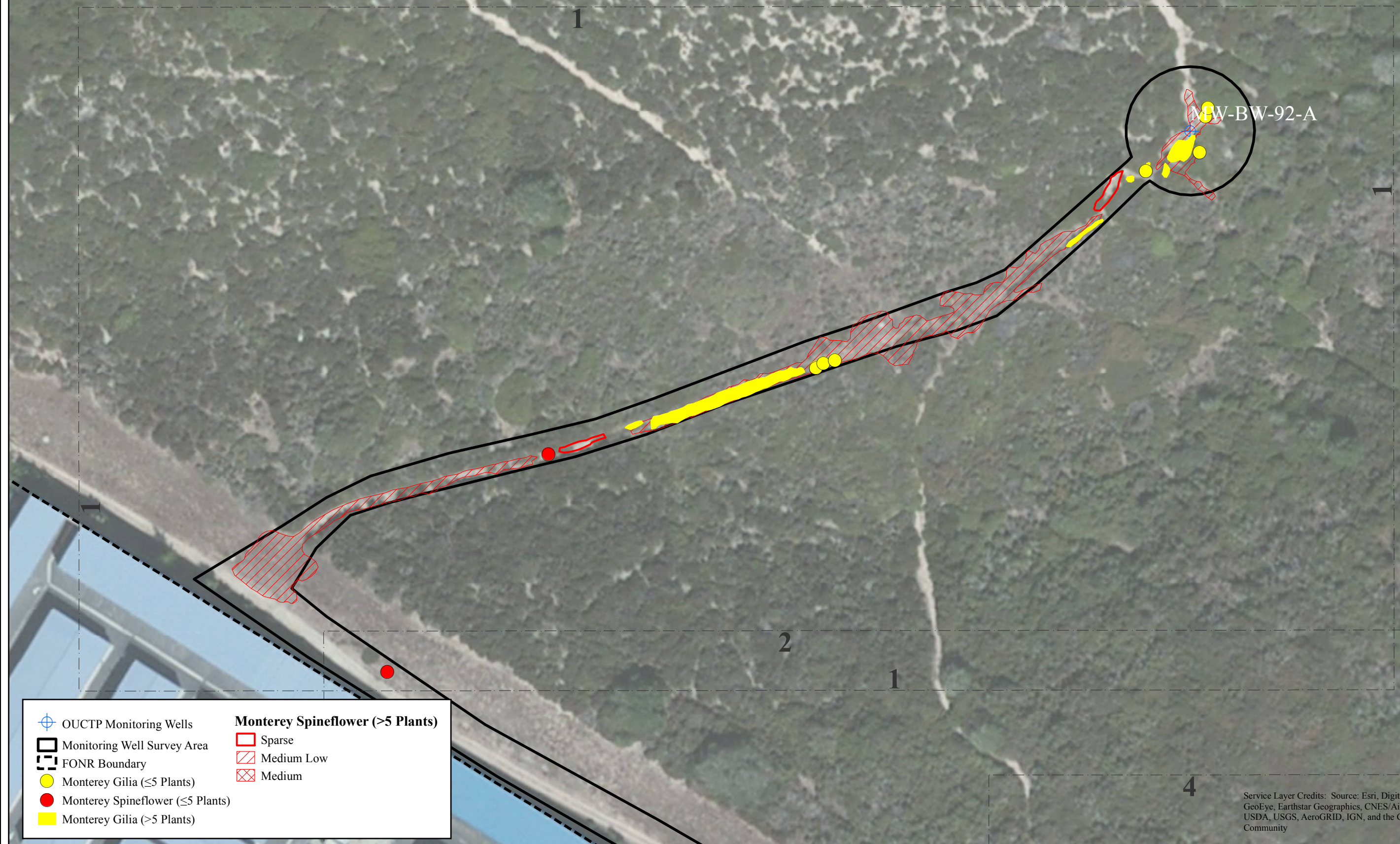
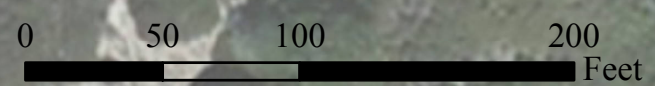
ATTACHMENT D

2016 MONITORING WELL FIRST ANNUAL RARE PLANT SURVEY RESULTS OVERVIEW AND DETAIL MAPS

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Attachment D 2016 Monitoring Well First Annual Rare Plant Survey Results Overview and Detail Maps





MW-BW-92-A

- | | |
|-----------------------------------|--------------------------------------------|
| OUCTP Monitoring Wells | Monterey Spineflower (>5 Plants) |
| Monitoring Well Survey Area | Sparse |
| FONR Boundary | Medium Low |
| Monterey Gilia (<=5 Plants) | Medium |
| Monterey Spineflower (<=5 Plants) | |
| Monterey Gilia (>5 Plants) | |

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



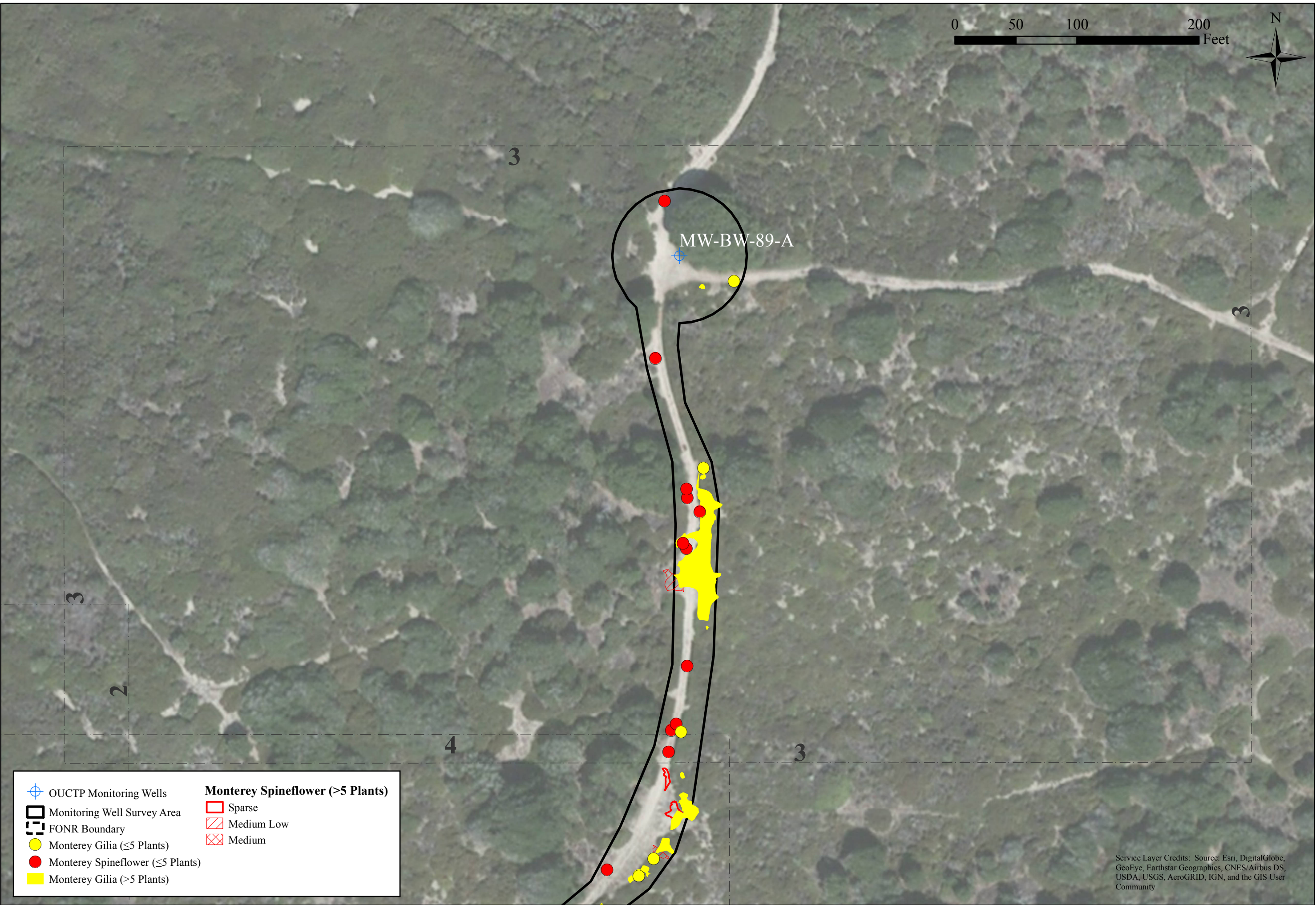
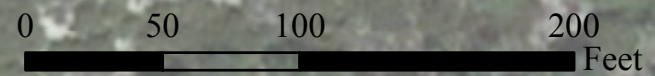


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community










OUCTP Monitoring Wells	Monterey Spineflower (>5 Plants)
Monitoring Well Survey Area	Sparse
FONR Boundary	Medium Low
Monterey Gilia (≤5 Plants)	Medium
Monterey Spineflower (≤5 Plants)	
Monterey Gilia (>5 Plants)	

Attachment D 2016 Monitoring Well First Annual Rare Plant Survey Results Overview and Detail Maps





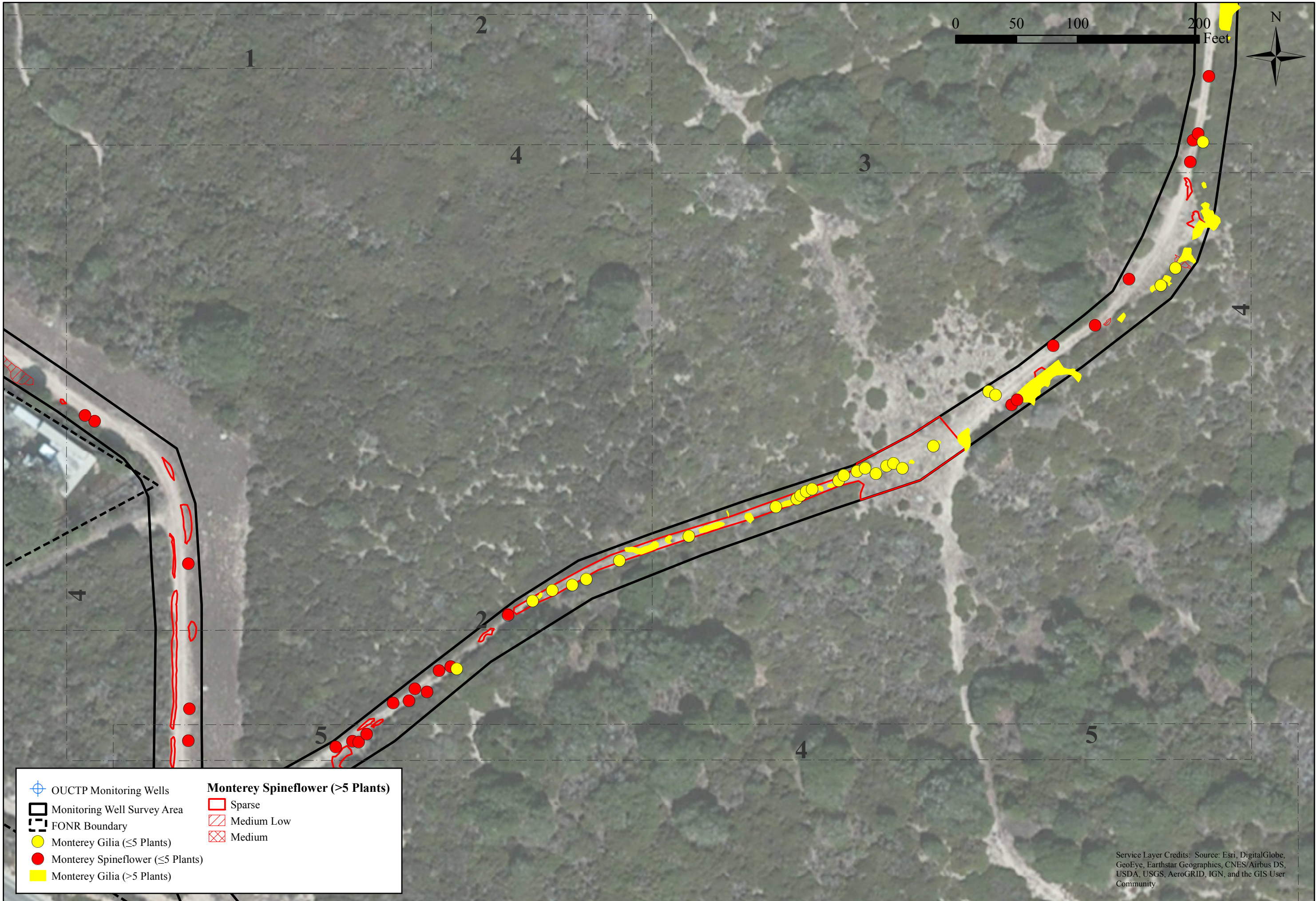
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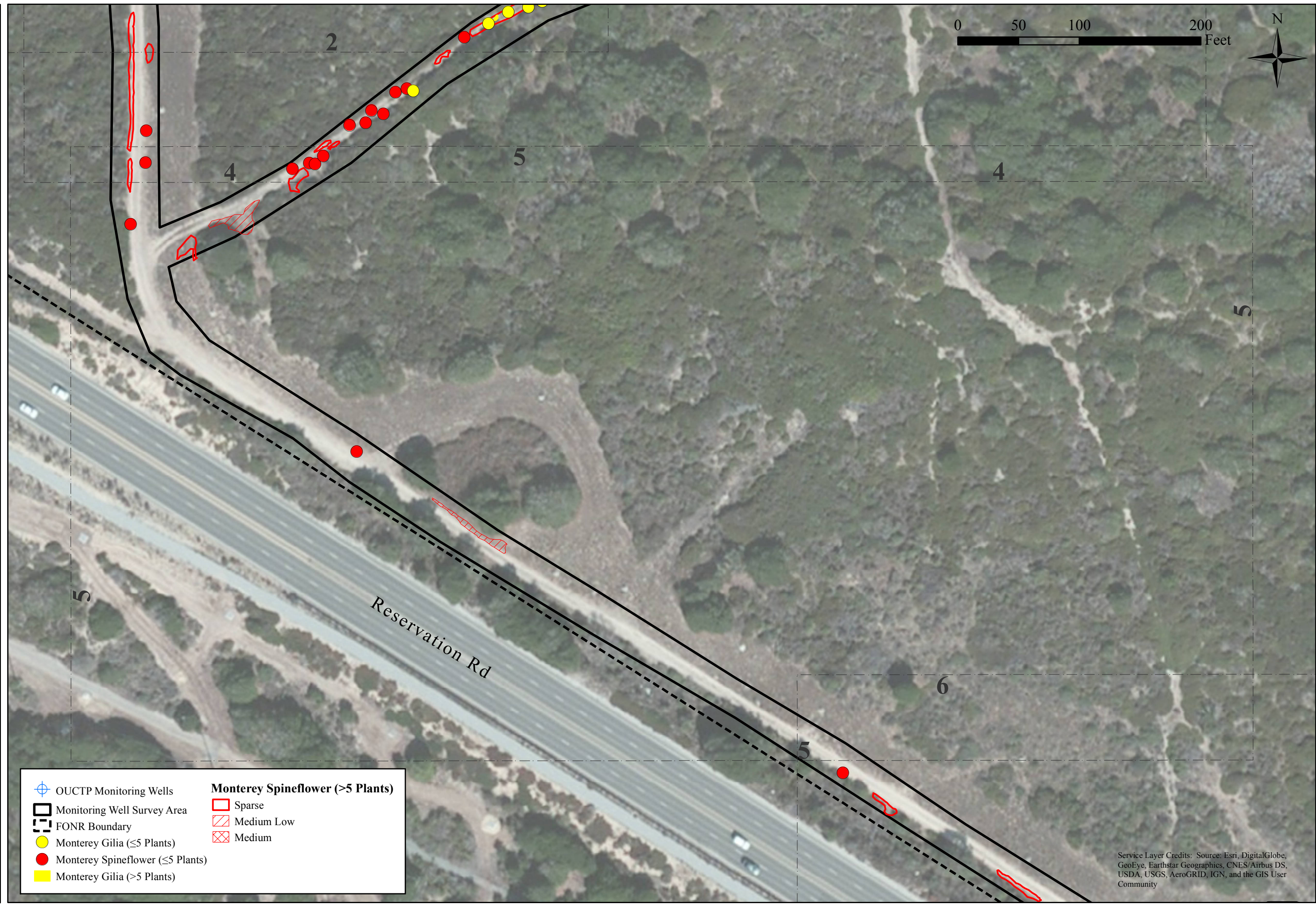
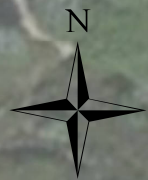
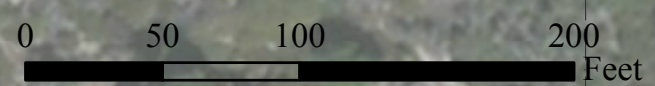
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 Monitoring Well Survey Area	 Sparse
 FONR Boundary	 Medium Low
 Monterey Gilia (≤5 Plants)	 Medium
 Monterey Spineflower (≤5 Plants)	
 Monterey Gilia (>5 Plants)	



Attachment D 2016 Monitoring Well First Annual Rare Plant Survey Results Overview and Detail Maps

Date: 3/13/2017

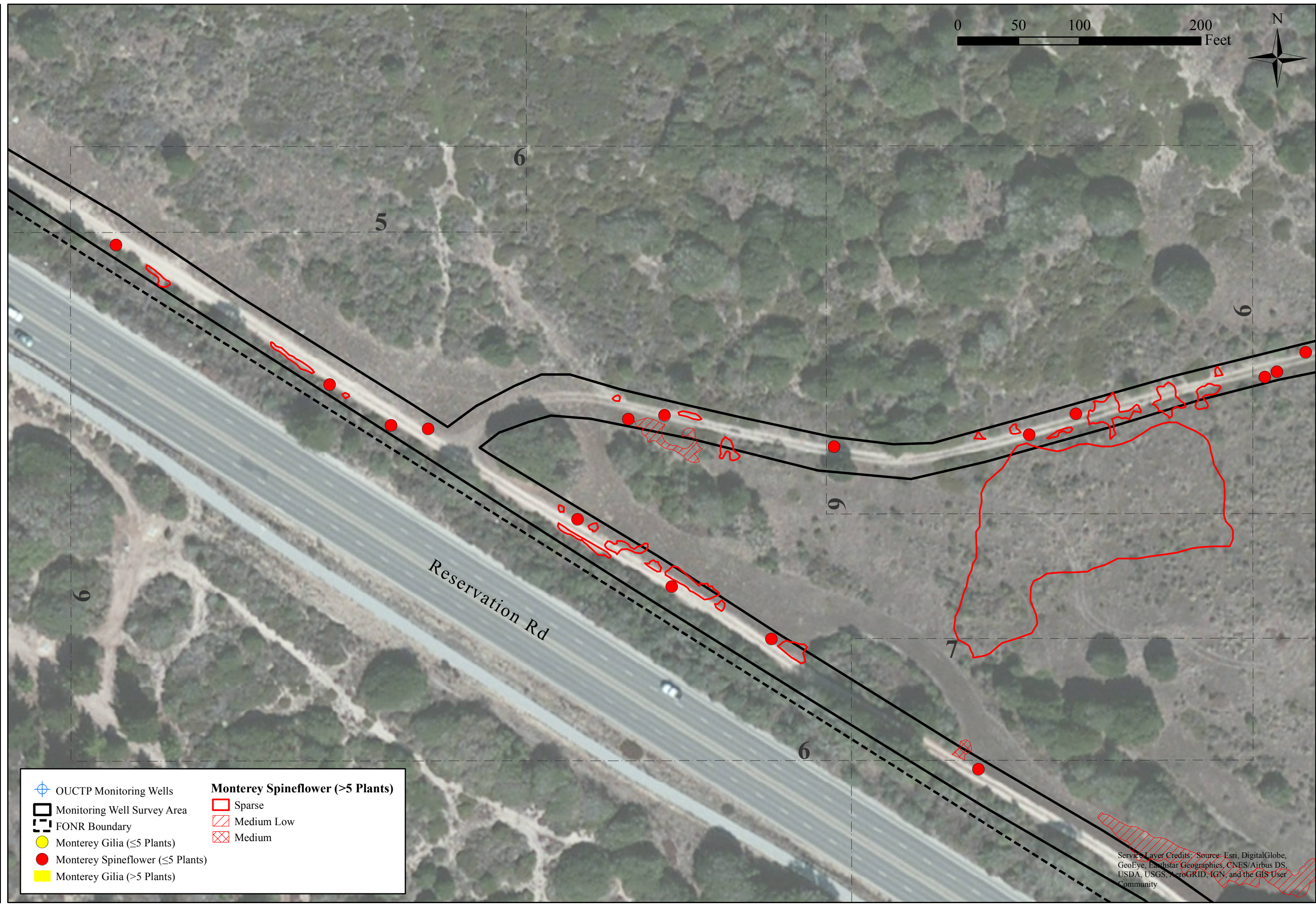
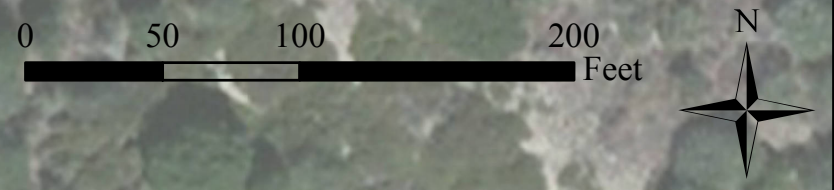




OUCTP Monitoring Wells	Monterey Spineflower (>5 Plants)
Monitoring Well Survey Area	Sparse
FONR Boundary	Medium Low
Monterey Gilia (<=5 Plants)	Medium
Monterey Spineflower (<=5 Plants)	
Monterey Gilia (>5 Plants)	

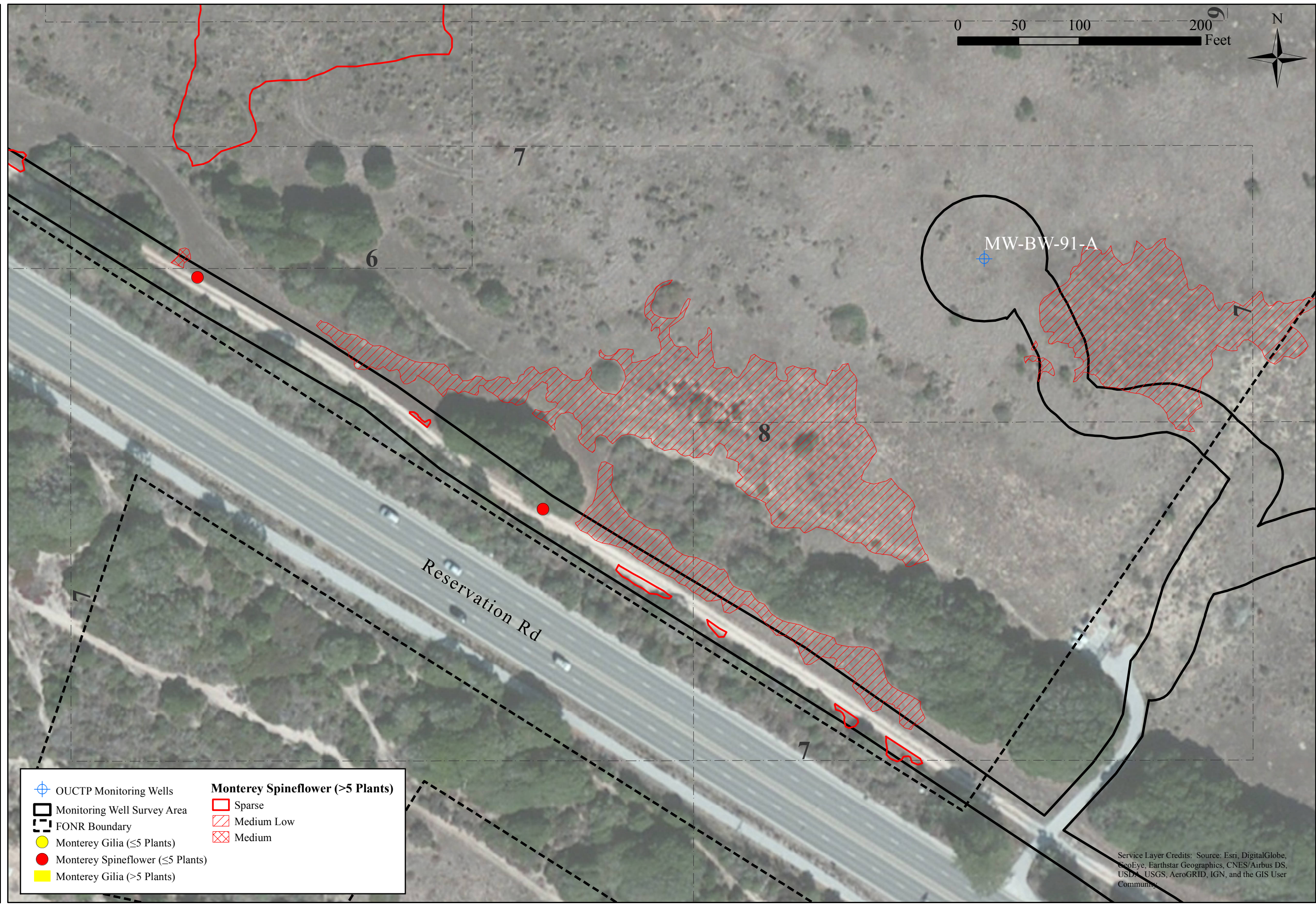
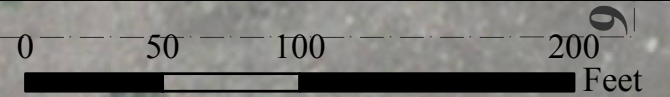
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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

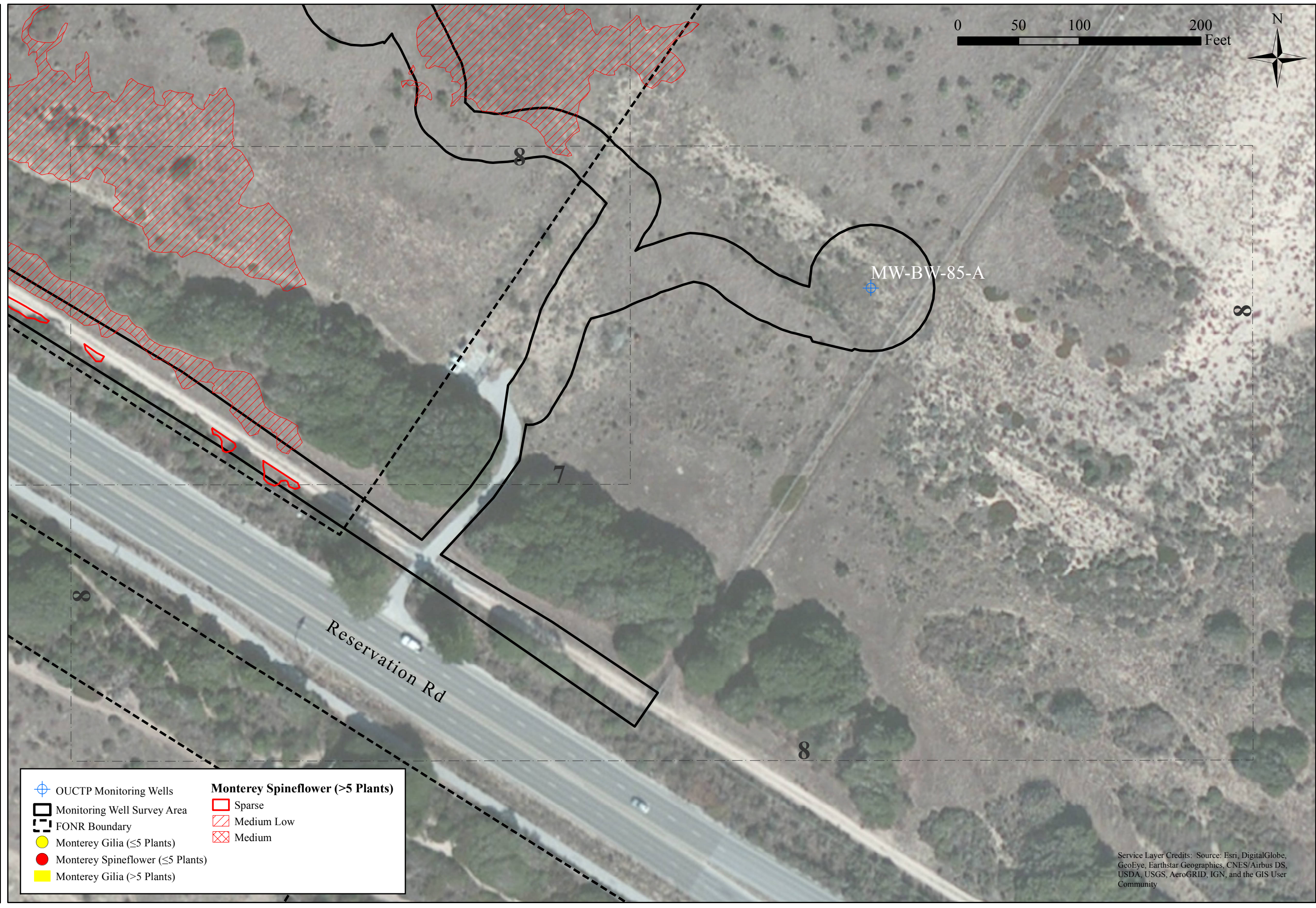
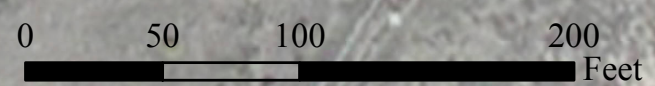
OUCTP Monitoring Wells	Monterey Spineflower (>5 Plants)
Monitoring Well Survey Area	Sparse
FONR Boundary	Medium Low
Monterey Gilia (≤5 Plants)	Medium
Monterey Spineflower (≤5 Plants)	
Monterey Gilia (>5 Plants)	



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Monterey Spineflower (≤5 Plants)	
Monterey Gilia (>5 Plants)	

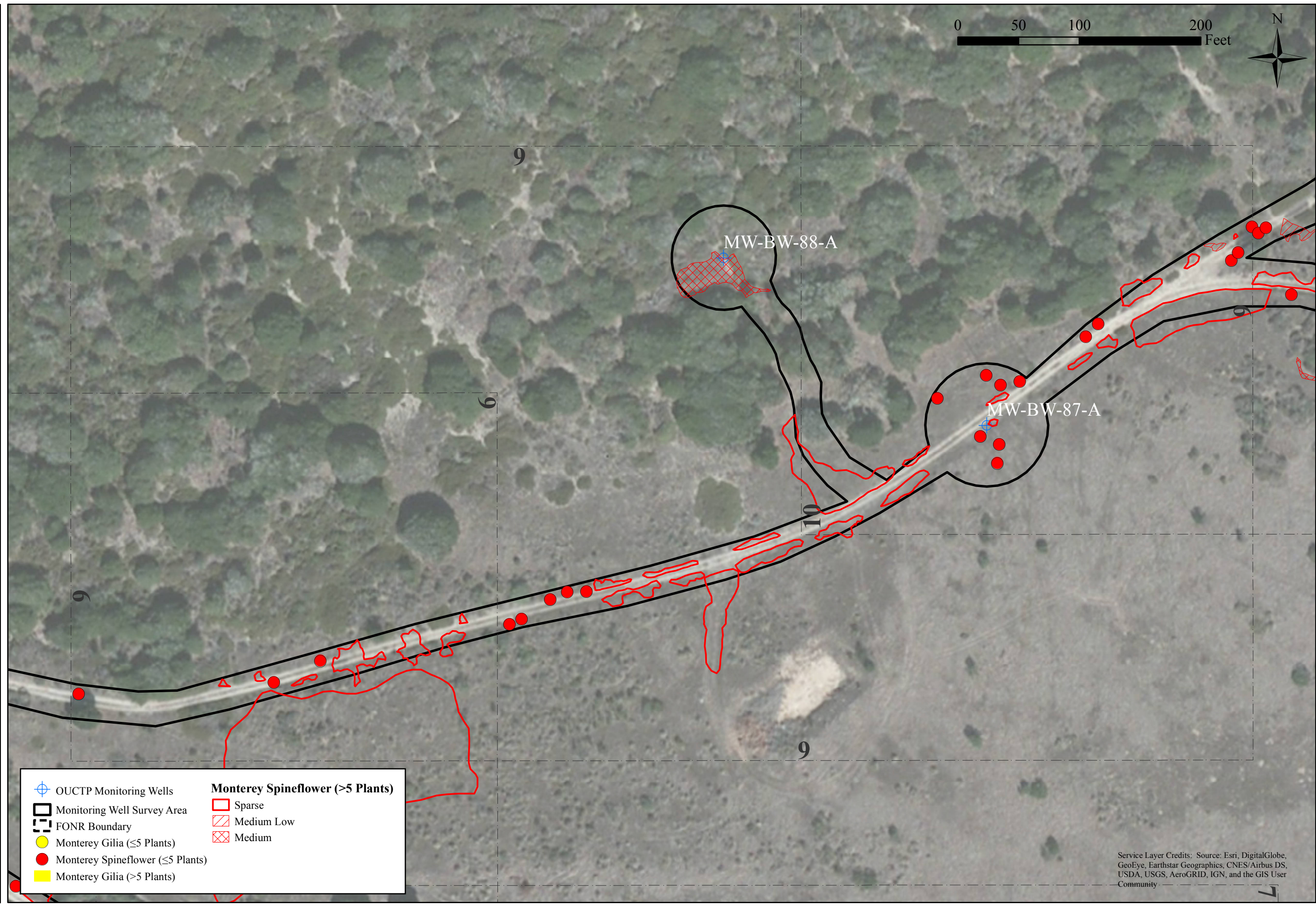






OUCTP Monitoring Wells	Monterey Spineflower (>5 Plants)
Monitoring Well Survey Area	Sparse
FONR Boundary	Medium Low
Monterey Gilia (≤5 Plants)	Medium
Monterey Spineflower (≤5 Plants)	
Monterey Gilia (>5 Plants)	


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community








 OUCTP Monitoring Wells

 Monitoring Well Survey Area


 FONR Boundary


 Monterey Gilia (≤ 5 Plants)


 Monterey Spineflower (≤ 5 Plants)

 Monterey Gilia (> 5 Plants)

Monterey Spineflower (> 5 Plants)

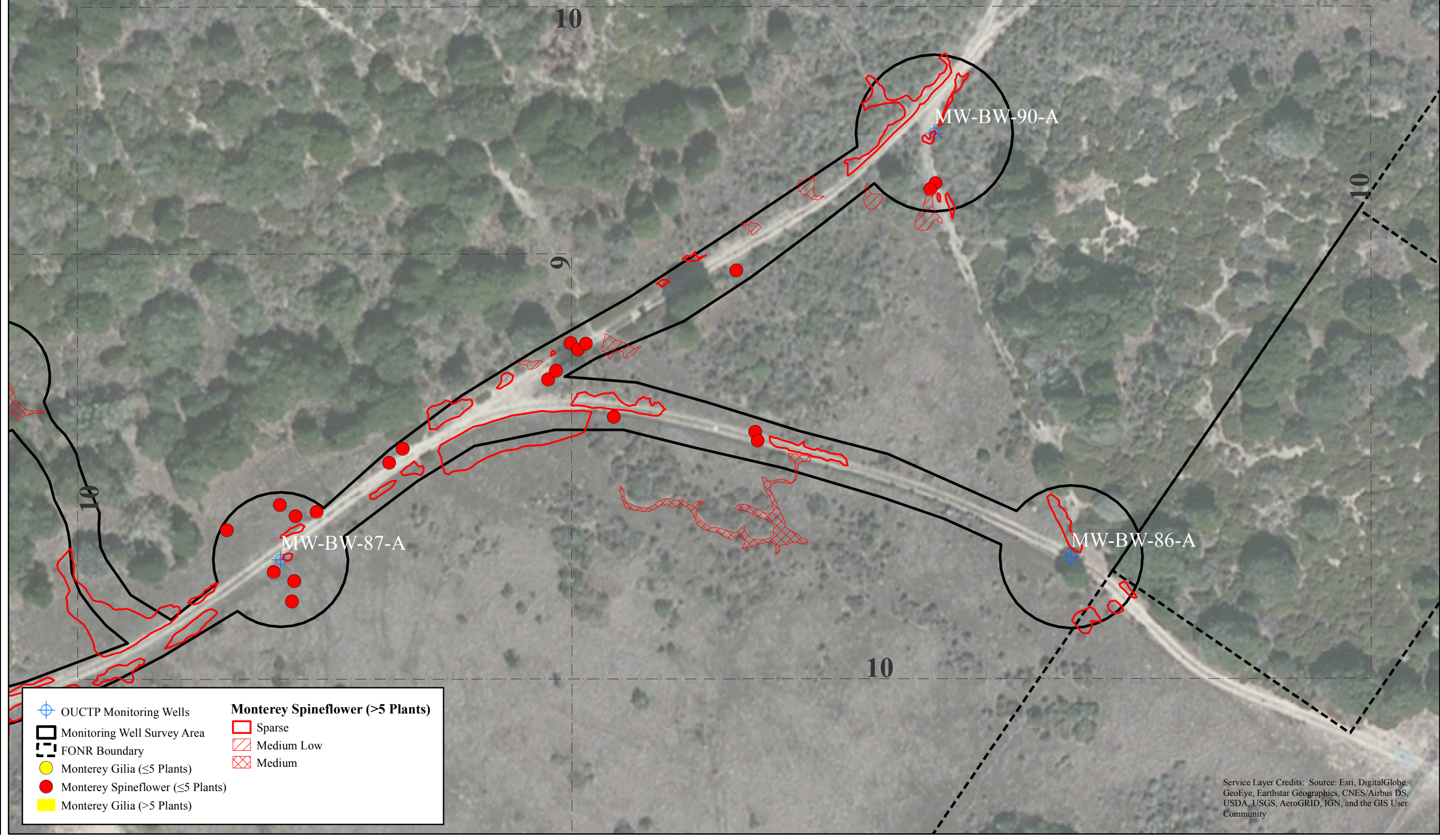
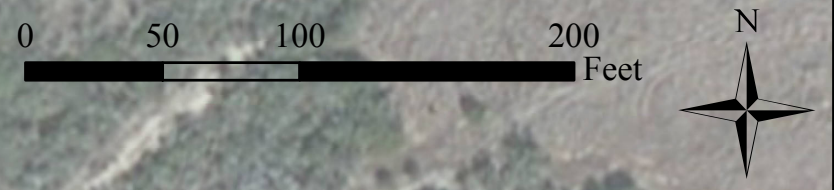
 Sparse

 Medium Low

 Medium

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





OUCTP Monitoring Wells	Monterey Spineflower (>5 Plants)
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Monterey Spineflower (≤5 Plants)	
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ATTACHMENT E

EISB DEPLOYMENT AREA-2016 CONSTRUCTION PHASE BIOLOGICAL MONITORING LOG

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► 08/01/2016 - **Start of Well Installation and Development Activities**

- DD&A conducted initial Environmental Awareness Training for Ahtna, USACE, and NEWP staff.
- DD&A recorded GPS coordinates of mowed area for access routes and proposed well locations.
- DD&A provided guidance to drillers setting up first well installation location IW-BW-161-A.

► 08/03/2016

- DD&A monitored the installation of well IW-BW-162-A.
- Installation of well IW-BW-161-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-162-A.
- DD&A conducted Environmental Awareness Training for new Ahtna staff.
- Discussed with Ahtna crew not to drive vehicles outside well and access route buffer.

► 08/04/2016

- DD&A conducted Environmental Awareness Training for USACE.

► 08/05/2016

- DD&A monitored the installation of well IW-BW-163-A.
- Installation of well IW-BW-162-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-163-A.
- DD&A moved well installation location IW-BW-163-A 8 feet southeast of original well installation location to minimize impacts to vegetation.

► 08/08/2016

- DD&A monitored the placement of equipment at well installation location IW-BW-167-A.
- DD&A conducted Environmental Awareness Training for new USACE staff.
- Installation of well IW-BW-163-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-167-A.

► 08/10/2016

- Installation of well IW-BW-167-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-166-A.

► 08/11/2016

- Installation of well EW-BW-166-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-168-A.
- DD&A conducted Environmental Awareness Training for new NEWP staff.
- DD&A moved well installation location IW-BW-168-A 8 feet south of original well installation location to minimize impacts to vegetation.

► 08/16/2016

- Installation of well EW-BW-168-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-169-A.

► 08/17/2016

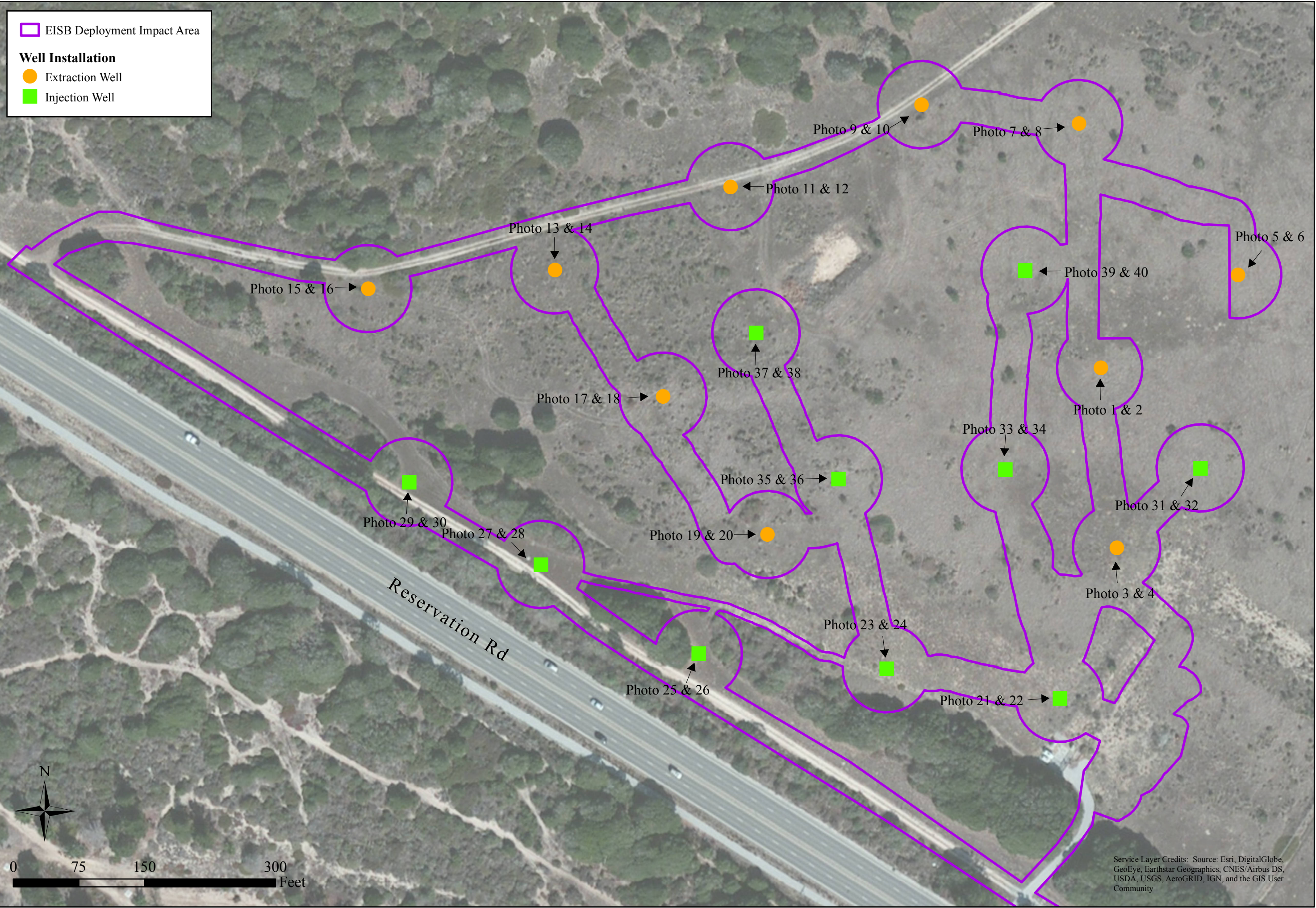
- Installation of well EW-BW-169-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-165-A.
- ▶ 08/18/2016
 - Installation of well EW-BW-165-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-167-A.
- ▶ 08/21/2016
 - Installation of well IW-BW-166-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-160-A.
 - DD&A moved well IW-BW-160-A 8 feet northeast of original well site to avoid HMP species.
- ▶ 08/22/2016
 - Installation of well IW-BW-160-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-159-A.
- ▶ 08/23/2016
 - DD&A conducted Environmental Awareness Training for new Ahtna and NEWP staff.
 - Installation of well IW-BW-159-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-161-A.
- ▶ 08/24/2016
 - Installation of well EW-BW-161-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-164-A.
- ▶ 08/25/2016
 - Installation of well EW-BW-161-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-164-A.
- ▶ 08/29/2016
 - DD&A conducted Environmental Awareness Training for new NEWP staff (well surface completion crew).
- ▶ 08/30/2016
 - Installation of well IW-BW-165-A completed; DD&A monitored mobilization of equipment to well installation location IW-BW-168-A.
- ▶ 08/31/2016
 - Installation of well IW-BW-168-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-160-A.
- ▶ 09/01/2016
 - Attended progress meeting at Ahtna office
 - Met with Ahtna on site personnel to talk about leak that occurred, no contamination of soil, leak did not leave truck bed.
- ▶ 09/02/2016
 - Installation of well EW-BW-160-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-164-A.
- ▶ 09/06/2016
 - DD&A conducted Environmental Awareness Training for AIS team.
 - Installation of well EW-BW-164-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-163-A.
- ▶ 09/08/2016

- DD&A discussed placement of pipeline with Ahtna and NEWP staff, recommended that the pipeline be placed adjacent to well to avoid HMP species.
- ▶ 09/08/2016
 - Installation of well EW-BW-163-A completed; DD&A monitored mobilization of equipment to well installation location EW-BW-162-A.
- ▶ 09/12/2016
 - Installation of well EW-BW-162-A completed; DD&A monitored NEWP team as they left site, drilling on site is complete.
 - DD&A conducted Environmental Awareness Training for Jeffries Electric team.
- ▶ 09/19/2016
 - DD&A conducted Environmental Awareness Training for AIS personnel.
- ▶ 09/26/2016
 - DD&A conducted Environmental Awareness Training for AIS personnel.
- ▶ 11/01/2016 **Well Installation and Development Activities Complete**
 - DD&A conducted site visit to check site conditions and photograph completed well locations.

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ATTACHMENT F
EISB DEPLOYMENT AREA- PHOTO JOURNAL

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Attachment F Ahma FONR OUCTP 2016 EISB Deploymentt Area Photo Location Map





Photo 1. Well installation location EW-BW-160-A facing north, before installation.



Photo 2. Well EW-BW-160-A facing north, after installation.



Photo 3. Well installation location EW-BW-161-A facing north, before installation.



Photo 4. Well EW-BW-161-A facing north, after installation.



Photo 5. Well installation location EW-BW-162-A facing southwest, before installation.



Photo 6. Well EW-BW-162-A facing southwest, after installation.



Photo 7. Well installation location EW-BW-163-A facing east, before installation.



Photo 8. Well EW-BW-163-A facing east, after installation.



Photo 9. Well installation location EW-BW-164-A facing northeast, before installation.



Photo 10. Well EW-BW-164-A facing northeast, after installation.



Photo 11. Well installation location EW-BW-165-A facing west, before installation.



Photo 12. Well EW-BW-165-A facing west, after installation.



Photo 13. Well installation location EW-BW-166-A facing south, before installation.



Photo 14. Well EW-BW-166-A facing south, after installation.



Photo 15. Well installation location EW-BW-167-A facing east, before installation.



Photo 16. Well EW-BW-167-A facing east, after installation.



Photo 17. Well installation location EW-BW-168-A facing east, before installation.



Photo 18. Well EW-BW-168-A facing east, after installation.



Photo 19. Well installation location EW-BW-169-A facing east, before installation.



Photo 20. Well EW-BW-169-A facing east, after installation.



Photo 21. Well installation location IW-BW-159-A facing east, before installation.



Photo 22. Well IW-BW-159-A facing east, after installation.



Photo 23. Well installation location IW-BW-160-A facing south, before installation.



Photo 24. Well IW-BW-160-A facing south , after installation.



Photo 25. Well installation location IW-BW-161-A facing northeast, before installation.



Photo 26. Well IW-BW-161-A facing northeast, after installation.



Photo 27 Well installation location IW-BW-162-A facing southeast, before installation.



Photo 28. Well IW-BW-162-A facing southeast, after installation.



Photo 29. Well installation location IW-BW-163-A facing north, before installation.



Photo 30. Well IW-BW-163-A facing northwest, after installation.



Photo 31. Well installation location IW-BW-164-A facing northeast, before installation.



Photo 32. Well IW-BW-164-A facing northeast, after installation.



Photo 33. Well installation location IW-BW-165-A facing south, before installation.



Photo 34. Well IW-BW-165-A facing south, after installation.



Photo 35. Well installation location IW-BW-166-A facing east, before installation.



Photo 36. Well IW-BW-166-A facing southwest, after installation.



Photo 37. Well installation location IW-BW-167-A facing north, before installation.



Photo 38. Well IW-BW-167-A facing north, after installation.



Photo 39. Well installation location IW-BW-168-A facing west, before installation.



Photo 40. Well IW-BW-168-A facing west, after installation.

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