Appendix O
Biological Monitoring Plan

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Final
Biological Monitoring Work Plan
Munitions Response Site 16
Former Fort Ord, California

Prepared for

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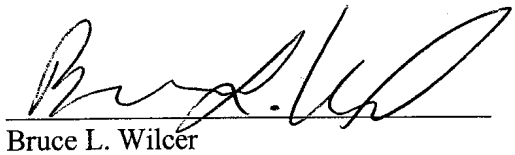

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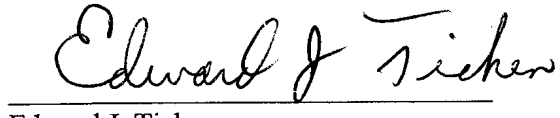

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CONTENTS

1.0 INTRODUCTION

MACTEC Engineering and Consulting, Inc. (MACTEC) has prepared this Work Plan to meet biological monitoring requirements at the former Fort Ord. The purpose of biological monitoring is to address the United States Department of the Army (Army) and United States Fish and Wildlife Service (USFWS) biological resources monitoring requirements, as identified in the Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California (*HMP; USACE, 1997*), and the Biological and Conference Opinions (BO/BC) issued by the USFWS for sites where munitions and explosives of concern (MEC) response actions are planned. The HMP identifies flora species, fauna species, and habitats of concern within the former Fort Ord, and outlines mitigation measures intended to document baseline conditions and monitor the regeneration of species and habitats upon completion of remediation activities.

Base closure and reuse activities conducted at the former Fort Ord are required to follow specific protocols approved by the USFWS, as detailed in the BO/BC on the Closure and Reuse of Fort Ord, Monterey County, California (*USFWS, 1999,2002,2005*). The BO/BCs identify mitigation measures to be implemented during remediation and predisposal activities.

2.0 SITE DESCRIPTION

The former Fort Ord is located adjacent to Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco. The base consisted of approximately 28,000 acres adjacent to the cities of Seaside, Sand City, Monterey, and Del Rey Oaks to the south and the City of Marina to the north. A Union Pacific Railroad line and Highway 1 pass through the western part of the former Fort Ord, separating the beachfront portions from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border the former Fort Ord to the south and southeast, respectively. Land use east of the former Fort Ord is primarily agricultural.

2.1 Ecological Setting

The former Fort Ord is located on California's central coast, a biologically diverse and unique region. The range and combination of climactic, topographic, and soil conditions at the former Fort Ord support many biological communities.

Central maritime chaparral is the most extensive natural community at the former Fort Ord and occupies approximately 12,500 acres in the south-central portion of the base. Oak woodlands are widespread at the former Fort Ord and occupy the next largest area, about 5,000 acres. Grasslands, primarily in the southeastern and northern portions of the former Fort Ord, occupy approximately 4,500 acres. Other plant community types, including riparian, coastal strand and dune, and coastal scrubs, generally occupy less than 500 acres each. Vernal pools (wetland habitat) are primarily found in grasslands, chaparral, and oak woodlands on the former Fort Ord. The remaining approximately 4,000 acres of the former Fort Ord are considered to be fully developed and do not support ecological communities.

2.2 Habitats and Species Considered for Habitat Monitoring

The habitats of concern identified in the HMP as occurring within MRS-16 are the central maritime chaparral. Central maritime chaparral surveys are characterized in terms of flora species composition and dominance, the location and extent of HMP species, and the location and extent of special-status fauna

observed at MEC removal or remediation sites. There are no vernal pools within MRS-16 but there is one east of the site. Environmental parameters such as surface area, water depth, pH, and turbidity will be recorded at the beginning of the rainy season prior to the burn at this vernal pool. Central maritime chaparral habitats at MRS-16 possess many of the special-status flora and fauna species identified in the HMP MEC removal and remediation project sites include Hooker's manzanita (Arctostaphylos h. hookeri), sandmat manzanita (Arctostaphylos pumila), Monterey ceanothus (Ceanothus cuneatus rigidus), and Monterey spineflower (Chorizanthe p. pungens).

Wetland species associated with the OE removal and remediation project sites include California tiger salamander (Ambystoma californiense).

3.0 SURVEYS AND MONITORING

In recent years, baseline and follow-up monitoring surveys have been conducted in areas supporting maritime chaparral, wetlands, and HMP annual species that would be disturbed during MEC response activities.

3.1 Baseline Surveys

Baseline surveys are conducted to characterize the composition of these habitats in order to establish an informational database identifying current biological resources. Baseline surveys have been conducted at MRS-16 in 1996 for HMP Shrubs and 1998 for HMP Annuals. Results are presented in the 1996 Annual Monitoring Report, Biological Baseline Studies and Follow-up Monitoring at Unexploded Ordnance Sites 10 East, 10 West, 11, 12, and 16, Presidio of Monterey Annex and 1998 Annual Monitoring Report, Biological Baseline Studies and Follow-up Monitoring at Unexploded Ordnance Sites on the Former Fort Ord, Presidio of Monterey Annex, Monterey, California.

3.2 Follow-up Monitoring

Follow-up monitoring is conducted at chaparral, wetland, and HMP annuals sites following MEC removal has been completed and is required for five intervals following MEC removal. Follow-up monitoring will be initiated at MRS-16 after initiation of the MEC removal.

4.0 METHODS

Methods proposed to be used to collect data for MRS-16 are described in Protocol for Conducting Vegetation Sampling at Fort Ord in Compliance with the Installation-Wide Multispecies Habitat Management Plan (HMP Sampling Protocol) (*USACE, 1995*).

The survey methods proposed are specifically designed for central maritime chaparral. Survey methods for central maritime chaparral monitoring include: 1) seedling count sampling to document shrub species variances within the three pre-burn serial stages - disturbed, intermediate-aged, and mature, 2) quadrat sampling to characterize the herbaceous component, and 3) visual surveys in suitable habitat to map the distribution of HMP annual species. All biological monitoring performed in the Impact Area (IA) will be with an OE specialist escort.

4.1 Central Maritime Chaparral Monitoring

The survey methods proposed for central maritime chaparral monitoring are described in detail below in Sections 5.1.1 and 5.1.2.

4.1.1 Shrub Seedling Count Methods

Shrub seeding counts are used to identify species variances between the three serial stages (disturbed, intermediate-aged, and mature) of central maritime chaparral. All seedling species and numbers will be counted starting from 0 –left, then 10 meters – right and continue to alternate to the end of the transects. Direct counts of seedlings will be collected by placing a quarter meter quadrats alternating from the left to right side of each transect.

4.1.2 Quadrat Sampling Methods

Quadrat sampling is used to characterize the herbaceous component of central maritime chaparral habitat. Quadrat sampling is conducted along the line intercept tape at 10-meter intervals; 0.25-meter square quadrats are placed; starting at 10-meter intervals alternating from the left to right side of the transect.

Plant species present within each quadrat are identified; percent cover provided by each species is estimated and recorded.

4.2 HMP Annual Species Surveys

The survey methods proposed for HMP annual species monitoring are described in detail below in Sections 5.2.1, 5.2.2, and 5.2.3.

4.2.1 Monterey Spineflower, Sand Gilia, Seaside Bird's-Beak Surveys

Visual HMP annual surveys will be conducted at MRS-16 to verify the continued presence of previously recorded locations of HMP annuals or to identify new locations.

The HMP annual surveys will be conducted by inspecting each 100-ft grid. Counts for small populations, or a low density of HMP annuals are based upon direct counts. At locations supporting relatively large numbers or high densities of HMP annuals, estimates of HMP annuals are based upon direct counts of representative sample areas. These sample counts are then used to estimate the number of HMP annuals individuals throughout a given location. The locations of observed HMP annual species are recorded using GPS. Results of large populations of HMP annuals on OE removal and remediation sites are categorized as follows:

- 0 individuals per grid
- 1 - 50 individuals per grid
- 51 - 100 individuals per grid
- 101 - 500 individuals per grid
- > 500 individuals per grid.

4.2.3 Fuelbreak Surveys

Prior to vegetation removal in the fuelbreaks, a habitat survey will be conducted as described below.

Permanent vegetation monitoring transects will be installed in accordance with the Protocol for Conducting Vegetation Sampling at Fort Ord in Compliance with the Installation-Wide Multispecies Habitat Management Plan. The ends points of each transect will be recorded using GPS. For the baseline survey, temporary, non-metallic markers will be positioned at the end points. For subsequent surveys, metal t-posts will be installed. The line-intercept method will be used to measure % cover of chaparral species. Randomly selected 50 meter transects will be installed until there is a less than 10% change in percent cover of the HMP chaparral species.

Herbaceous cover will be visually estimated or determined using a 1/4 meter quadrat.

To evaluate possible increases of invasive species, including grasses, within the firebreaks, existing populations of weeds, including grasses, will be mapped using GPS prior to vegetation removal. A density classification of high, medium, or low will be assigned to areas of invasive species for use in comparing future vegetation recovery as required by the HMP.

Pictures of the area will be taken using photo points established using GPS and the direction of the photo will be recorded. Photos will be used for future comparisons to the baseline conditions as well as determining the density of the grasses within different areas of the firebreak.

4.3 Optimization of Investigation Design for Obtaining Data

The most resource-effective data collection design for each of the parameters of interest have been developed using our current understanding of the site and following the objectives of the investigation. The rationale for selected sampling design is based upon previous sampling methods conducted at the former Fort Ord, and the time period after vegetative clearance had occurred. The guidelines developed for baseline and follow-up monitoring are described below:

- Commencing the first year after a prescribed burn, follow-up monitoring will be limited to surveys for HMP annual species. Due to an expected lack of shrub species, quadrat sampling of scrub species and herbaceous will not occur in the first year following a prescribed burn;

- Commencing the second year after a prescribed burn, line-intercept sampling will be replaced by quadrat sampling along previously established transects to determine shrub seedling recruitment (species and numbers). Quadrat sampling will be used to determine species and seedling recruitment following the prescribed burn in central maritime chaparral habitat; and

- Commencing the second year after a prescribed burn, quadrat sampling of the herbaceous component of central maritime chaparral habitat will also be collected.

5.0 REPORTING

Monitoring Reports will present the results of the habitat monitoring activities on an annual basis. The report will include results of the monitoring, a comparison to previous results, and a recommendation for future monitoring activities or elimination of site from the monitoring program as appropriate.

6.0 REFERENCES

United States Army Corps of Engineers (USACE), Sacramento District, 1995. *Protocol for Conducting Vegetation Sampling at Fort Ord in Compliance with the Installation-Wide Multispecies Habitat Management Plan.* September. With technical assistance from Jones and Stokes Associates, Sacramento, California.

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