

## **APPENDIX N**

# **MOHAVE GROUND SQUIRREL HABITAT ASSESSMENT**



# **Mohave Ground Squirrel Habitat Assessment DesertXpress Rail Project**

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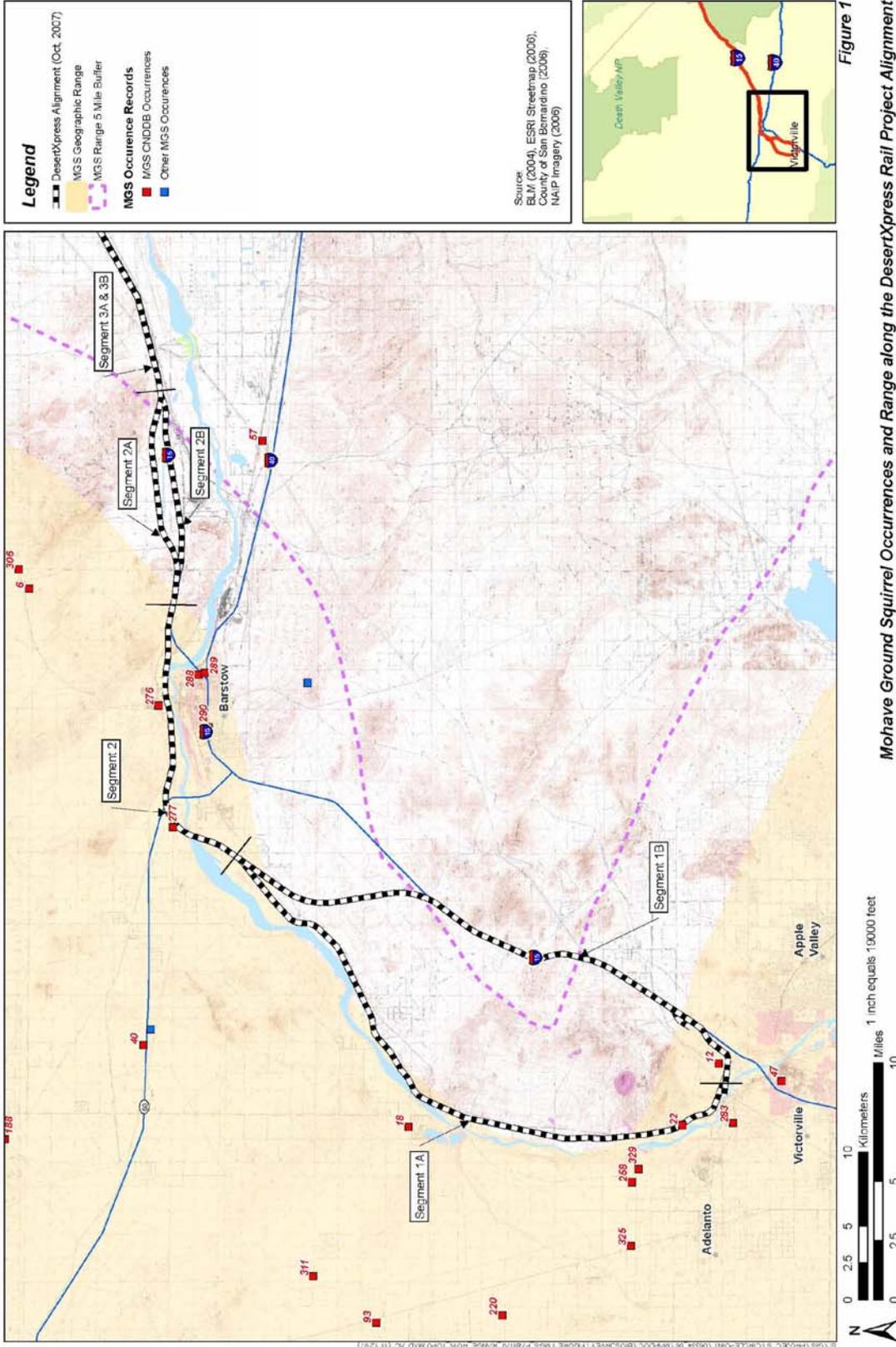
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## INTRODUCTION

The DesertXpress Rail Project is proposed to provide high speed passenger service between Victorville, California and Las Vegas, Nevada. Between Victorville and Barstow, two possible alignments are being evaluated. The Segment 1A alignment would follow the existing Mojave Northern Rail right-of-way that runs along the east side of the Mojave River. The Segment 1B alignment would follow the I-15 highway route from just north of Victorville to the Hodge Road Interchange and then strike north through open land to join the Alternative A route just south of Barstow. A single route is proposed through Barstow, crossing to the north side of the Mojave River near Lenwood and proceeding eastward to join the I-15 highway right-of-way where it is intersected by Old Highway 58. Two alternate alignments are being considered in the vicinity of Yermo. One route (Segment 2B) would run along the north side of I-15 from the interchange with Ft. Irwin Road east to the Agricultural Inspection Station. The other route (Segment 2A) would also be parallel to I-15, but about 0.75 mi to the north of the highway.

The permitting process for this project includes documentation of biological resources that may exist along the alternative alignments. As part of this effort, I conducted a field survey in May 2007 to assess the suitability of the proposed alignments between Victorville and Yermo as potential habitat for the Mohave ground squirrel (*Spermophilus mohavensis*), a species listed as Threatened by the State of California. In much of this region, the geographic range of the species is considered to lie west of the Mojave River. However, in the Victorville and Barstow areas, there are records of Mohave ground squirrel occurrence on the east side of the Mojave River.

The currently-accepted range boundary and all occurrence records within 10 miles of the boundary are shown on Fig. 1. Appendix A lists all Mohave ground squirrel occurrence records plotted on Fig. 1, along with information on the date of the detection and number of animals reported. Although the alternative DesertXpress alignments between Victorville and Barstow are generally outside of the currently-accepted range boundary, the Mohave Ground Squirrel Survey Guidelines (California Department of Fish and Game, 2003) define potential habitat as land supporting desert scrub vegetation within or adjacent to the geographic range of the species. The Guidelines indicate that trapping surveys to establish presence or absence of the Mohave ground squirrel may be required for projects located within 5 miles of the current range boundary. As shown in Fig. 1, the alternative routes for the DesertXpress project are almost entirely within the 5 mile zone. Because of this, it was considered necessary to conduct habitat suitability surveys along these routes for the Mohave ground squirrel. This report describes the habitat assessment methodology used, evaluates the habitat suitability of all alignments between Victorville and Yermo, and presents recommendations for presence/absence surveys.



## **HABITAT ASSESSMENT METHODS**

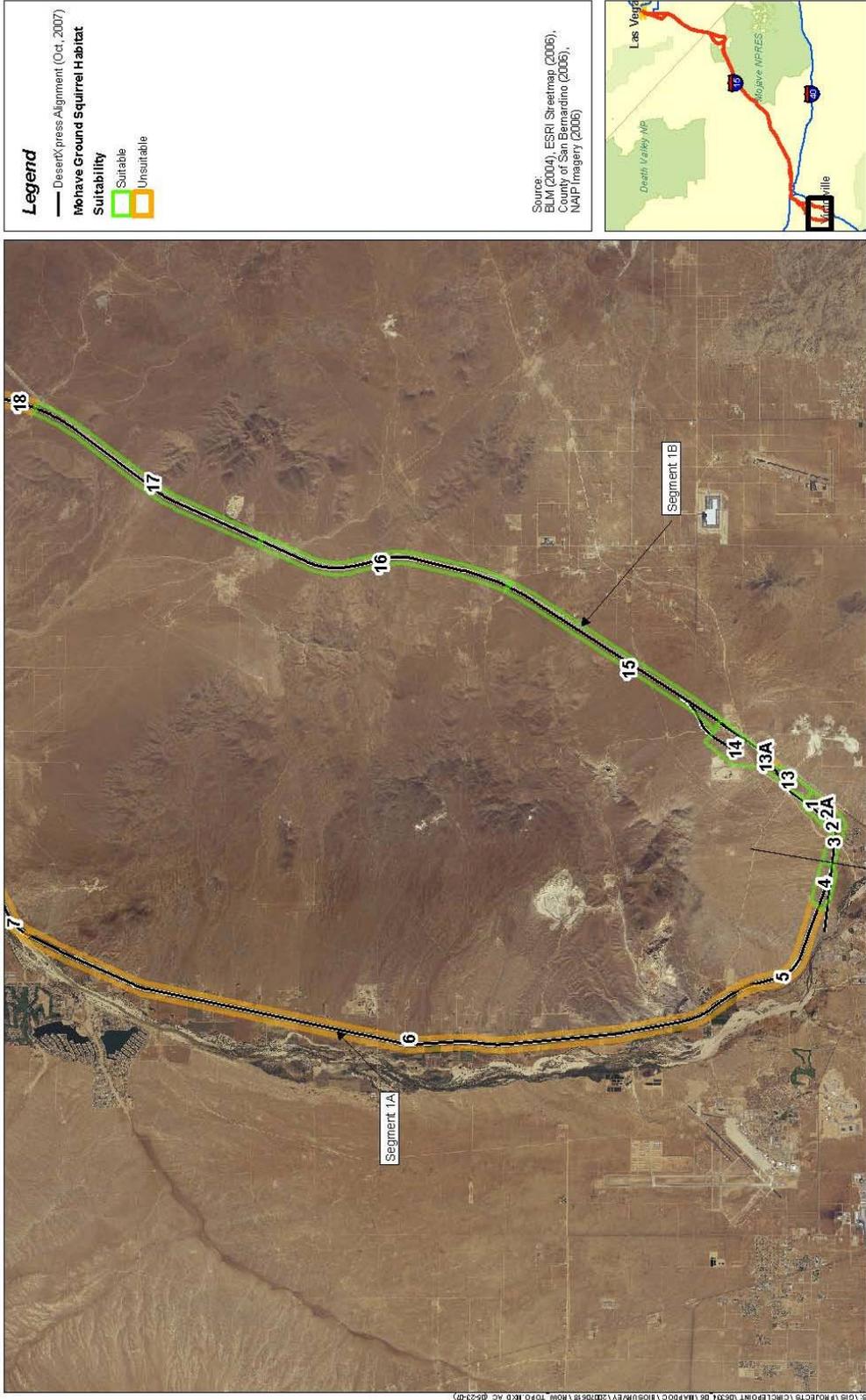
Habitat suitability along the proposed DesertXpress alignments was evaluated by surveying all routes between Victorville and Yermo by automobile and on foot. Habitat assessment efforts were focused on a 300 ft corridor that included the centerline of the right-of-way (ROW) and the adjoining habitat. This corridor was examined visually and detailed notes were taken on habitat characteristics such as land use, topography, soils, and vegetation. In addition, the habitat characteristics of nearby areas that showed connectivity with the corridor were carefully noted. A total of 54 hours was spent in the field during the period 25-30 May 2007. Other research in support of this assessment included checking the results of trapping surveys conducted previously in this region and preparing a database of all records of Mohave ground squirrel occurrence within 10 miles of the eastern edge of the species geographic range between Victorville and Yermo.

## **RESULTS**

As the alignments were surveyed, they were divided into linear sections that were characterized by similar land use, topography, soil conditions, and vegetation. Each section was given a numerical designation from 1 through 35 (Fig. 2). Table 1 lists these sections in numerical order. Sections 1, 2, and 2A are at the Victorville terminus of the proposed railroad line in an area that could be developed for a station and parking facility. Sections 3 through 12 are located on the Segment 1A alignment that runs from the Victorville terminus along the Mojave River toward Barstow, while Sections 13-20 are on the Segment 1B alignment starting at the Victorville terminus and ending where the 2 routes join southwest of Barstow. Sections 21 through 28 are located along the single route that swings to the north of the Mojave River and runs eastward through the Barstow area. Finally, Sections 29-31 are on the Segment 2B alignment that runs along the north side of I-15 from Fort Irwin Road to the Agricultural Inspection Station just east of Yermo, while Sections 32-35 are on the Segment 2A alignment about 0.75 mile to the north.

Seventeen sections of ROW were judged to be unsuitable as Mohave ground squirrel habitat (Table 1). There were several reasons for considering a particular section to be unsuitable. Some were characterized by steep, rocky terrain with no alluvial soils suitable for burrow construction. In other cases, the land surface was severely disturbed and supported little or no native vegetation. One section (No. 33) traversed a dry lake bed (playa) where the salty soil prevented vegetative growth. Finally, the land in several sections had been converted to agricultural, commercial, or residential uses.

The 20 sections of ROW that were classified as suitable habitat were on flat to moderately-sloping terrain with alluvial soils and all supported native desert scrub vegetation (Table 1). Twelve of these sections were in habitat classified as Mojave Creosote Bush Scrub, while 3 other sections were in Desert Saltbush Scrub communities. The remaining 5 sections included both types of habitat. Both Mojave Creosote Bush Scrub and Desert Saltbush Scrub are known to provide habitat for the Mohave ground squirrel (Gustafson, 1993).





**Legend**

- DesertXpress Alignment (Oct, 2007)
- Mohave Ground Squirrel Habitat
- Suitability
  - Suitable
  - Unsuitable

Source:  
 BLM (2004), ESRI Streetmap (2006),  
 County of San Bernardino (2006),  
 NADP Imagery (2006)

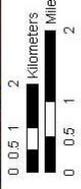


**Figure 2B**

**Mohave Ground Squirrel Habitat Suitability along the DesertXpress Rail Project Alignment**

Note: See Table for description of habitat suitability for the numbered stations

1 inch equals 7500 feet



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**Legend**

- DesertXpress Alignment (Oct, 2007)
- Mohave Ground Squirrel Habitat
- Suitability
  - Suitable
  - Unsuitable

Sources:  
 BLM (2004), ESRI, Streetman (2006),  
 County of San Bernardino (2006),  
 NAIP Imagery (2008)



**Figure 2C**

Note: See Table for description of the numbered stations



**Mohave Ground Squirrel Habitat Suitability along the DesertXpress Rail Project Alignment**

**Table 1.** Assessment of habitat suitability for the Mohave ground squirrel along the DesertXpress alignments between Victorville and Yermo. Code designations for important shrub species include ATPO (allscale saltbush) and LATR (creosote bush).

Section Number	Dimensions	Habitat Suitability	Habitat Description
1	~60acres	Suitable	LATR scrub / low diversity
2	~65 acres	Suitable	LATR scrub / low diversity
2A	~20 acres	Unsuitable	Barren
3	~60 acres	Suitable	LATR / ATPO in wash with LATR scrub in upland to W
4	~90 acres	Suitable	LATR scrub / medium diversity in small washes
5	1.9 mi	Unsuitable	LATR scrub / low diversity / very rocky granitic hills
6	11.8 mi	Unsuitable	Operational & abandoned ag fields / rural homes & ranches
7	1.6 mi	Unsuitable	Steep rocky hills meet riparian vegetation zone
8	1.7 mi	Suitable	ATPO in small washes / LATR on interfluves
9	1.6 mi	Unsuitable	Agricultural land uses / cropland & dairies
10	4.6 mi	Suitable	Monotypic ATPO stands / some areas sparse, low cover
11	2.0 mi	Unsuitable	Operational & abandoned ag fields / rural homes & ranches
12	1.3 mi	Suitable	Saltbush scrub / some shrub diversity including LATR
13	~90 acres	Suitable	LATR scrub / low diversity
13A	~30 acres	Unsuitable	Commercial development / almost no perennial vegetation
14	~220 acres	Suitable	LATR scrub / low diversity / steep ravines
15	4.2 mi	Suitable	LATR scrub / low diversity / gently-sloping bajada
16	4.3 mi	Suitable	LATR scrub / low diversity / rocky hills & bajadas
17	4.4 mi	Suitable	LATR scrub / low diversity / bajada sloping to W
18	1.0 mi	Unsuitable	Disturbed & barren / very sparse shrub cover
19	5.3 mi	Suitable	LATR scrub / low diversity / flats, washes, low hills
20	2.1 mi	Suitable	LATR scrub / medium diversity
21	0.9 mi	Suitable	Saltbush scrub with sand dunes
22	2.0 mi	Unsuitable	Mostly dunes with little native vegetation / abandoned fields
23	1.7 mi	Unsuitable	Disturbed ag land & dunes / little native vegetation
24	0.9 mi	Suitable	Dense saltbush scrub along abandoned RR embankment
25	2.5 mi	Unsuitable	Occasional saltbush / vegetation very sparse
26	3.1 mi	Unsuitable	Occasional saltbush / disturbed & barren land
27	1.4 mi	Suitable	Saltbush scrub in wash / LATR scrub low diversity in upland
28	2.6 mi	Unsuitable	Rocky steep terrain / almost no perennial vegetation
29	2.3 mi	Unsuitable	Very low density LATR patches / scattered development
30	2.0 mi	Suitable	LATR scrub / low diversity
31	4.0 mi	Unsuitable	Very sparse shrub cover / artificial drainage channel / rocky
32	2.2 mi	Suitable	LATR scrub grading into saltbush scrub / very sparse
33	2.2 mi	Unsuitable	Barren playa
34	1.7 mi	Suitable	LATR scrub / low diversity / on bajada slope
35	1.2 mi	Unsuitable	LATR scrub / low diversity / rocky bajada / very sparse

## DISCUSSION

### DesertXpress Alignments in Relation to Mohave Ground Squirrel Distribution

The proposed DesertXpress alignments from Victorville to Yermo generally follow the currently-accepted boundary of the Mohave ground squirrel geographic range (Figure 1). There are a number of Mohave ground squirrel occurrences close to the proposed Segment 1A route in the vicinity of Victorville and Adelanto. Although some of these records are quite old, there have been 2 occurrences in the last 3 years (CNDDDB Occ. #325 and 329). There is an older record (1977) near Helendale just across the Mojave River from the Segment 1A route (CNDDDB Occ. #18). Finally, there are several occurrences in the vicinity of Barstow, including a visual observation on July 8, 2005 at a proposed landfill expansion site ~4 miles south of Barstow, well beyond the currently-accepted range boundary (Simon, 2006). Two of the records in the Barstow area are very close to the proposed DesertXpress alignment (CNDDDB Occ. #276 and 277. The most recent reported occurrence (May 2007) was at a site near SR 58 west of Barstow and ~8 mi from the proposed DesertXpress route (ECORP Consulting, unpubl. data). Although there are no Mohave ground squirrel records near the Segment 1B route, it is within a few miles of the currently-accepted range boundary and there have been few trapping attempts in this area.

### Mohave Ground Squirrel Habitat Suitability

Mohave ground squirrel habitat requirements include alluvial soils suitable for burrow construction and a variety of shrubs and herbaceous plants sufficient to supply adequate food and moisture through the active season (February-July). The 20 sections of DesertXpress ROW that were identified as suitable Mohave ground squirrel habitat are characterized by alluvial soils and the presence of plant communities that are known to support Mohave ground squirrel populations. However, it is not clear that abundant, high quality forage resources are available in the vicinity of the DesertXpress alignments. Studies in Inyo County have shown that the foliage of winterfat (*Krascheninnikovia lanata*) and spiny hopsage (*Grayia spinosa*) are important in the diet both early and late in the active season when green herbaceous plants are not available and they appear to be essential in dry years (Leitner and Leitner, 1998).

Mohave ground squirrels also feed on the foliage and seeds of a number of native herbaceous species, including milkvetch (*Astragalus* spp.), lupines (*Lupinus* spp.), apricot mallow (*Sphaeralcea ambigua*), white mallow (*Eremalche exilis*), gilia (*Gilia* spp.), linanthus (*Linanthus* spp.), buckwheat (*Eriogonum* spp.), and composites such as *Coreopsis* spp. The only non-native herb that can appear to any extent in the diet is red-stemmed filaree (*Erodium cicutarium*). Seeds of boxthorn (*Lycium* spp.), creosote bush (*Larrea tridentata*), and cactus (*Opuntia* spp.) can be important as well. The survey conducted along the proposed DesertXpress routes in May did not detect many areas where a good variety of these plants occur. It is possible that the herbaceous species were not obvious because of the extremely dry winter. Although the 20 sections

identified as suitable do not appear to provide high quality habitat, there is the potential for the presence of the species at any of these locations.

## **CONCLUSIONS AND RECOMMENDATIONS**

A total of 20 linear sections along the various DesertXpress alignments between Victorville and Barstow appear to provide suitable Mohave ground squirrel habitat. Although habitat quality is not high, it is possible that Mohave ground squirrels could occur in these areas.

One option that is available to the project proponent is to assume the presence of the species in those sections of the project alignment that have been identified as suitable habitat (California Department of Fish and Game, 2003). The project proponent would then apply for a California Endangered Species Act incidental-take permit (Fish and Game Code Section 2081b) requiring mitigation and compensation. Compensation generally involves the purchase of habitat that is known to support the species, payment of a fee that will cover future management of the land, and the dedication of that land in perpetuity for conservation purposes. The total area that will be impacted must be calculated accurately and a compensation ratio determined. If this option is agreed upon, it could provide the basis for mitigation of project impacts as required during NEPA analysis and would support the preparation of the Environmental Impact Statement (EIS).

The second option available to the project proponent is to conduct visual and live-trapping surveys on each of the 20 sections of the project alignment that appear to support habitat suitable for the Mohave ground squirrel.

The option of conducting protocol surveys to determine presence or absence of the Mohave ground squirrel would require careful timing. Since the results of these surveys are only good for 1 year, they would have to be scheduled within 12 months of the time that project construction and ground disturbance are initiated. Because the details of the construction schedule are unknown at this point, it would be difficult to plan and schedule protocol surveys. A possible strategy would be to assume presence of the species in the 20 sections of the ROW with suitable habitat when discussing mitigation of impacts in the EIS preparation, but to then carry out protocol surveys at the appropriate time. If the results of the surveys were negative in some or all of the 20 sections, the compensation requirements would be reduced or eliminated. Another possible strategy would be to propose in the EIS that protocol surveys be conducted within 1 year prior to ground disturbance and that compensation would be provided if the surveys indicate that the species is present in particular sections of the ROW.

These surveys would follow the guidelines promulgated by the California Department of Fish and Game (California Department of Fish and Game, 2003). Trapping grids normally consist of 100 traps arranged in a 4 x 25 array for each linear mile of potential habitat or in a 10 x 10 array for each parcel of 80 acres or less. However, the guidelines state that special survey protocols should be developed for large-scale projects, defined as those projects that may impact >180 acres or those linear

projects that are >5 miles in length. The Department requires that such special survey protocols be developed through its consultation with either the project proponent or the local lead agency (if appropriate) or both entities. The DesertXpress project would clearly be considered as large-scale and a special protocol would have to be designed.

The special sampling protocol could include the following elements. Table 2 identifies the 20 sections of the ROW on which protocol surveys would be recommended, along with the suggested number of trapping grids for each section. It can be seen that the potential Mohave ground squirrel habitat that might be impacted includes a total of ~585 acres in 6 parcels as well as 37 miles of linear ROW. The 6 parcels are areas that could potentially be used for station facilities or construction laydown sites. It is recommended that a single grid of 100 traps be used to survey each of these 6 parcels. Although Section 14 is >80 acres, only 1 grid is proposed because of marginal habitat quality. The recommendations for the 14 sections of linear habitat are generally for somewhat <1 grid per mile. The ratios range from 1 grid per 0.9 mile up to 1 grid per 2.2 miles. In all cases where it is proposed that 1 grid should be used to sample >1 mile of corridor, the rationale is that habitat in that section is of relatively low quality and uniform in character. The exact locations of trapping grids have not been selected, pending decisions concerning the final structure of the sampling program.

A total of 27 trapping grids are recommended in order to adequately survey suitable habitat along the DesertXpress alignments between Victorville and Barstow. It can be seen that there is much more suitable habitat on Segment 1B than Segment 1A, resulting in 12 trapping grids as compared to only 7 grids on Segment 1A along the Mojave River. On the other hand, there is little difference in the amount of sampling required on Segments 2A and 2B.

**Table 2.** Recommendations for presence/absence trapping surveys for the Mohave ground squirrel along the DesertXpress alignments between Victorville and Yermo. Code designations for important shrub species include ATPO (allscale saltbush) and LATR (creosote bush).

Section Number	Dimensions	Habitat Description	Recommended Number of Trapping Grids
<b>Segment 1</b>			
Common to both alternatives			
1	~60acres	LATR scrub / low diversity	1
2	~65 acres	LATR scrub / low diversity	1
Alternative A			
3	~60 acres	LATR / ATPO in wash with LATR scrub in upland to W	1
4	~90 acres	LATR scrub / medium diversity in small washes	1
8	1.7 mi	ATPO in small washes / LATR on interfluves	1
10	4.6 mi	Monotypic ATPO stands / some areas sparse, low cover	3
12	1.3 mi	Saltbush scrub / some shrub diversity including LATR	1
Total Grids Segment 1A = 9			
Alternative B			
13	~90 acres	LATR scrub / low diversity	1
14	~220 acres	LATR scrub / low diversity / steep ravines	1
15	4.2 mi	LATR scrub / low diversity / gently-sloping bajada	2
16	4.3 mi	LATR scrub / low diversity / rocky hills & bajadas	2
17	4.4 mi	LATR scrub / low diversity / bajada sloping to W	2
19	5.3 mi	LATR scrub / low diversity / flats, washes, low hills	3
20	2.1 mi	LATR scrub / medium diversity	1
Total Grids Segment 1B = 14			
<b>Segment 2</b>			
Common to both alternatives			
21	0.9 mi	Saltbush scrub with sand dunes	1
24	0.9 mi	Dense saltbush scrub along old RR embankment	1
27	1.4 mi	Saltbush scrub in wash / LATR scrub low diversity in upland	1
Alternative A			
32	2.2 mi	LATR scrub grading into saltbush scrub / very sparse	1
34	1.7 mi	LATR scrub / low diversity / on bajada slope	1
Total Grids Segment 2A = 5			
Alternative B			
30	2.0 mi	LATR scrub / low diversity	1
Total Grids Segment 2 B = 4			

## REFERENCES

California Department of Fish and Game. 2003. California Department of Fish and Game Mohave Ground Squirrel Survey Guidelines. 5 pp.

Gustafson, J.R. 1993. A status review of the Mohave ground squirrel (*Spermophilus mohavensis*). Calif. Dep. Fish and Game, Nongame Bird and Mammal Sect., Sacramento, CA. 104 pp. + appendices.

Leitner, P. and B.M. Leitner. 1998. Coso Grazing Exclosure Monitoring Study. Mohave Ground Squirrel Study, Coso Known Geothermal Resource Area, Major Findings, 1988-1996. Final Report. 42 pp + append.

Simon, K. 2006. Biological Resources Assessment for the Barstow Sanitary Landfill Proposed Expansion, San Bernardino County, California. Prepared for ECORP Consulting, Inc., Redlands, CA. 26 pp.

**APPENDIX A**

**MOHAVE GROUND SQUIRREL  
OCCURRENCES BETWEEN VICTORVILLE AND YERMO  
WITHIN 10 MILES OF THE RANGE BOUNDARY**

CNDDDB Occurrence	Date	UTM Coordinates (NAD83)		Number of MGS
		Easting	Northing	
6	6/24/1977	0505471	3872486	1
12	6/28/1977	0473294	3825889	1
18	May-June 1977	0468993	3846840	16
22	5/24/1920	0469096	3828327	1
40	6/21/1988	0474553	3864762	1
47	3/02/1919	0472100	3821656	1
57	1981	0515485	3856715	22
93	6/19/1988	0455697	3849028	1
220	5/15/1991	0456186	3840518	2
258	6/14/1987	0465249	3831769	1
276	1982	0497530	3863732	1
277	Mar-Apr 1990	0489309	3862757	Unknown
283	6/03/1980	0469261	3824931	2
288	8/17/1993	0499622	3861033	1
289	8/17/1993	0499762	3860598	1
290	8/17/1993	0496093	3860328	1
306	6/24/1977	0506777	3873170	1
311	5/20/1994	0458853	3853292	1
325	4/21/2004	0460910	3831816	1
	7/08/2005	0499076	3853661	1
329	4/24/2007	0466134	3831302	1
	May 2007	0475616	3864258	1