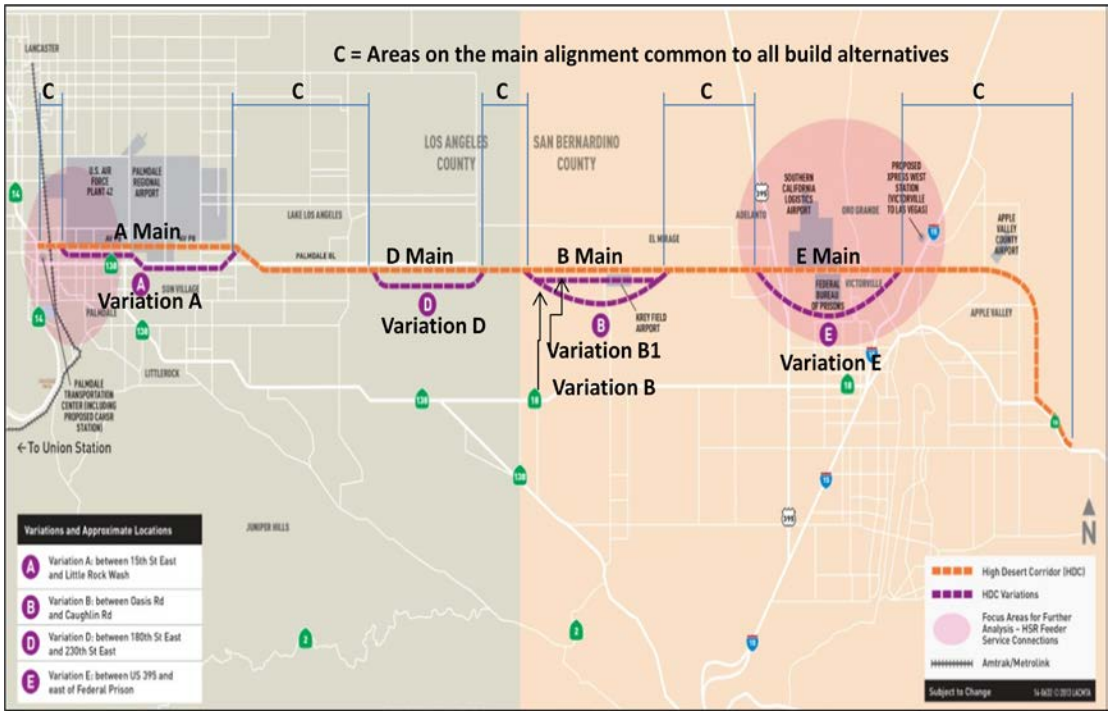
3.3 Biological Environment

This section describes impacts to various biological resources as a result of the HDC Project implementation including natural communities, wetlands and other waters, plant species, animal species, threatened and endangered species, and invasive species. Figure 3.3-1 presents the notation of the alignment and variation sections along the HDC within the biological study area (BSA) used in describing the impacts on various biological resources throughout this section.

Figure 3.3-1 Alignment Key Map for Biological Study Area



3.3.1 Natural Communities

This section of the document discusses natural communities of concern. The focus of this section is on biological communities, not individual plant or animal species. This section includes information on wildlife corridors and habitat fragmentation. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation involves the potential for dividing sensitive habitat and thereby lessening its biological value.

Habitat areas that have been designated as critical habitat under the Federal Endangered Species Act (FESA) are discussed below in Section 3.3.5, Threatened and Endangered Species. Wetlands and other waters are discussed below in Section 3.3.2.

Affected Environment

Information regarding natural communities was obtained from the *Natural Environment Study* (September, 2014). The biological study area (BSA) encompasses

approximately 9,037 acres, including 32 different plant communities and 6 habitat types. It is generally 500 feet in width over most of the 63-mile alignment, with a few exceptions at interchanges, intersections with on-/off-ramps, where the rail line and highway separate, and in a few areas where the roadway narrows.

Plant communities were classified consistent with “A Manual of California Vegetation" (Sawyer et al. 2009) and "List of Vegetation Alliances and Associations" (CDFG 2010). At times, specific areas did not conveniently fall within a described series, alliance, or association within these references; therefore, plant communities were assigned based on descriptions provided in these references.

Plant communities or habitat types present within the BSA include agriculture, allscale scrub alliance, allscale scrub/creosote bush scrub alliance, allscale series/rubber rabbitbrush series; big sagebrush alliance, bulrush-cattail series, California buckwheat scrub alliance, cheesebush scrub alliance, creosote bush scrub alliance, creosote bush-white burr sage scrub, developed, disturbed, disturbed allscale scrub alliance, disturbed creosote bush scrub alliance, disturbed creosote bush-white bursage scrub, disturbed Joshua tree woodland alliance, disturbed rubber rabbitbrush scrub alliance, disturbed salt grass flats alliance, disturbed white bursage scrub alliance, fiddleneck field, fourwing saltbush scrub alliance, fourwing saltbush series/rubber rabbitbrush series, Fremont cottonwood forest alliance, Joshua tree woodland alliance, mixed willow series, Mojave yucca scrub alliance, non-native grasslands, ornamental**,** Parry's rabbitbrush scrub alliance, red brome grasslands, rock outcropping**,** rubber rabbitbrush scrub alliance, saltgrass flats alliance, sandbar willow thickets, scalebroom scrub alliance, unvegetated wash, white bursage scrub alliance, and winterfat scrubland, Each habitat type is described in Section 3.1.2 of the Natural Environment Study. The total acres of each natural community are included in Table 3.3.1-1.

The predominant plant communities observed were creosote-bush scrub, saltbush scrub, and non-native grassland. Riparian scrub and riparian woodland also occur, primarily in the Mojave River area.

Wildlife was found to use the natural drainages as movement corridors throughout the project site. Wildlife movement corridors are linkages of natural habitat between larger areas that are not contiguous or otherwise connected. The purpose of these linkages is to provide seasonal travel routes or connecting important resources, which would prevent the isolation of populations. Isolation of populations can have a negative effect on genetics of the individual population and possibly the species as a whole, and it places the isolated population at risk of eventual elimination.

The proposed project site is located within a large contiguous open space area of the Mojave Desert with the east and west ends of the site within developed areas. As such there are no regional corridors linking two or more non-contiguous area of natural habitat within the project site rather the site is located within a larger contiguous open space. A large regional movement corridor located to the east of the

proposed project site was identified and is depicted in Appendix G Wildlife Corridor Evaluations of the NES.

Table 3.3.1-1 Natural Communities and Habitat Types in the BSA

Natural Community / Habitat Type	Existing (acres)	Natural Community / Habitat Type	Existing (acres)
Agriculture	200	Allscale scrub alliance	346
Allscale scrub/ creosote bush scrub alliance	18	Allscale series/rubber rabbitbrush series	76
Big sagebrush alliance	23	Bulrush-cattail series,	1.55
California buckwheat scrub alliance	6	Cheesebush scrub alliance	74
Creosote bush scrub alliance	2981	Creosote bush-white burr sage scrub	329
Developed	1073	Disturbed	527
Disturbed allscale scrub alliance	654	Disturbed creosote bush scrub alliance	393
Disturbed creosote bush-white bursage scrub	101	Disturbed Joshua tree woodland alliance	71
Disturbed rubber rabbitbrush scrub alliance	323	Disturbed salt grass flats alliance	2
Disturbed white bursage scrub alliance	23	Fiddleneck field	42
Fourwing saltbush scrub alliance	176	Fourwing saltbush series/rubber rabbitbrush series	54
Fremont cottonwood forest alliance	22	Joshua tree woodland alliance	653
Mixed willow series	2.4	Mojave yucca scrub alliance	106
Non-native grasslands	246	Ornamental	3
Parry's rabbitbrush scrub alliance	3	Red brome grasslands	9
Rock outcropping	30	Rubber rabbitbrush scrub alliance	351
Saltgrass flats alliance	10	Sandbar willow thickets	4
Scalebroom scrub alliance	25	Unvegetated wash	52
White bursage scrub alliance	4	Winterfat scrubland	24

Source: Natural Environment Study, 2014.

The Mojave River and its associated habitats, Big Rock Wash, Littlerock Wash, and several other larger drainages provide for wildlife movement and connectivity between large open spaces to the north and to the south of the proposed project site. Numerous smaller drainages along the proposed HDC also provide for local movement of wildlife within the open space immediately surrounding the proposed project site. In addition, large expanses of creosote bush scrub within the region allow relatively unrestricted movement of various species of wildlife, such as gray fox, kit fox, coyote, American badger, and bobcat.

Environmental Consequences

No Build Alternative

Because no ground disturbance would occur under the No Build Alternative, there would be no impacts on natural communities or wildlife movement corridors.

Build Alternatives

The build alternatives would result in temporary and permanent impacts to all natural communities due to roadway development and the development of existing and to be acquired right-of–way (ROW). Tables 3.3.1-2 and 3.3.1-3 quantify the amount of permanent and temporary impacts to vegetation communities and habitat types present within the variations for the highway only, and highway and rail alternatives. For the purpose of avoiding redundancy, when discussing project impacts, it should be noted that the Freeway/Expressway Alternative, Freeway/Tollway Alternative, Freeway/ Expressway Alternative with the HSR Feeder Service, and the Freeway/Tollway Alternative with the HSR Feeder Service (see Figure 3.3-1 Alignment Key Map for Biological Study Area) are discussed collectively because the impacts amount to the same in main alignment/common areas; however, it is the variations and options that differ in impacts to plant communities, and thus they are each broken down and discussed.

Assuming the loss of estimated acreage for each of the plant communities, these are a relatively low amount when considering the amount of undisturbed habitat within the region and especially within the overall Mojave Desert, with the possible exception of creosote bush scrub. Revegetation of the slopes after construction would further reduce these impacts. Although creosote bush scrub is not designated as a special-status plant community, the amount of impacts to this community is substantial compared to the region from which it would be impacted. Because of the amount of impact to creosote scrub habitat, similar habitat should be acquired and protected in perpetuity.

Joshua Tree Woodland

A total of 653 acres of Joshua tree woodland and 71 acres of disturbed Joshua Tree woodland occurs within the project limits. It is estimated that there are 3,300 to 3,630 Joshua trees within the limits of impact. Impacts for all variations and options would be low after mitigation is implemented.

Freeway/Expressway and Freeway/Tollway Alternatives

Main Alignment/Common Areas

Approximately 240 acres of this plant community exist within the main alignment/ common areas. Through implementation of the above avoidance and minimization measures, and replanting efforts, impacts to this plant community will be reduced.

Table 3.3.1-2 Impacts to Vegetation Communities for Variations of Highway Only Alternatives (in acres)

	Main Alignment/ Common Areas		Variation A Main Alignment		Variation A Alignment		Variation D Main Alignment		Variation D Alignment		Variation B Main Alignment		Variation B Alignment		Variation B1 Alignment		Variation E Main Alignment		Variation E Alignment	
	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact
Agriculture	65.878	92.802	0.711	3.292	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allscale scrub Alliance	136.166	122.643	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.877	10.648	12.153	23.389
Allscale scrub Alliance/Creosote bush scrub Alliance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.424	3.131	2.443	0.868
Allscale series/Rubber rabbitbrush series	6.923	4.056	21.873	10.273	18.591	10.186	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Big sagebrush Alliance	4.887	6.123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulrush-Cattail series	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.454	0.671
California buckwheat scrub Alliance	0.123	5.460	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cheesebush scrub Alliance	13.071	15.407	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Creosote bush scrub Alliance	284.481	417.535	-	-	-	-	109.776	144.018	93.396	137.195	86.529	113.425	205.380	317.473	147.297	230.856	74.391	94.034	40.549	47.314
Creosote bush-white bursage scrub series	-	-	-	-	-	-	15.671	22.071	41.207	65.803	28.504	36.190	3.596	7.180	1.658	8.223	0.040	0.014	26.503	36.264
Developed	166.183	112.021	28.213	22.894	23.335	26.409	9.222	7.709	4.641	3.465	13.228	19.641	5.106	7.923	26.160	37.427	53.601	26.924	33.125	27.875
Disturbed	104.438	146.868	13.540	4.201	12.199	6.196	3.266	4.166	5.234	8.509	24.441	33.066	7.873	12.127	8.544	10.269	6.697	7.819	7.967	9.283
Disturbed Allscale scrub Alliance	648.327	4.253	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.326	0.302	-	-
Disturbed Creosote bush scrub Alliance	11.425	17.349	-	-	-	-	-	-	-	-	104.268	137.633	3.274	4.193	18.642	32.286	0.186	0.144	19.940	18.217
Disturbed Creosote bush-white bursage scrub series	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.073	0.014	37.591	54.823
Disturbed Joshua tree woodland Alliance	-	-	12.154	17.648	13.084	20.538	-	-	-	-	-	-	-	-	-	-	6.899	6.361	-	0.015
Disturbed Rubber rabbitbrush scrub Alliance	30.175	45.197	44.080	62.091	40.765	62.344	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disturbed Salt grass flats Alliance	0.983	0.797	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disturbed White bursage scrub Alliance	0.645	-	-	-	-	-	-	-	-	-	10.077	9.256	9.527	11.971	10.086	10.382	-	-	-	-
Fiddleneck field	13.501	19.313	-	-	-	-	-	-	0.839	0.857	-	-	-	-	-	-	-	-	-	-
Fourwing saltbush scrub Alliance	48.686	71.903	-	-	-	-	1.869	2.579	1.224	3.243	-	-	-	-	-	-	4.764	2.746	0.246	0.186
Fourwing saltbush series/Rubber rabbitbrush series	10.045	18.799	-	-	5.547	3.795	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fremont cottonwood forest Alliance	3.776	5.862	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.094	2.170	0.235	0.499
Joshua tree woodland Alliance	106.706	133.561	75.693	47.523	61.662	63.615	-	-	-	-	0.116	0.173	5.123	3.649	0.115	0.177	14.923	16.751	19.167	28.127
Mixed willow series	-	0.410	-	-	0.840	1.148	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mojave yucca scrub Alliance	21.276	18.247	-	-	-	-	-	-	-	-	-	-	3.565	6.282	-	-	15.212	12.701	11.629	9.909
Non-native grassland	14.689	12.785	-	-	-	-	-	-	-	-	-	-	-	-	28.113	47.425	27.326	12.614	8.507	20.537
Ornamental	0.110	0.091	0.950	0.391	0.342	0.146	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parry's rabbitbrush scrub Alliance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.678	2.098	-	-
Red brome grasslands	4.768	2.235	-	-	-	-	0.268	0.186	1.096	0.186	-	-	-	-	-	-	-	-	-	-

Table 3.3.1-2 Impacts to Vegetation Communities for Variations of Highway Only Alternatives (in acres)

	Main Alignment/ Common Areas		Variation A Main Alignment		Variation A Alignment		Variation D Main Alignment		Variation D Alignment		Variation B Main Alignment		Variation B Alignment		Variation B1 Alignment		Variation E Main Alignment		Variation E Alignment	
	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact
Rock outcropping	0.931	4.178	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.049	1.522	1.272	1.805
Rubber rabbitbrush scrub Alliance	29.822	54.924	35.001	33.438	28.890	37.462	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salt grass flats Alliance	6.200	3.519	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sandbar willow thickets Alliance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.261	0.138	0.775	0.538
Scale broom scrub Alliance	3.010	1.001	8.122	2.920	8.122	2.920	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unvegetated wash	0.779	0.690	-	-	-	-	15.685	25.039	0.240	0.125	-	-	-	-	-	-	0.198	0.160	0.274	0.221
White bursage scrub Alliance	0.002	0.070	-	-	-	-	-	-	-	-	-	-	-	0.649	-	-	0.554	0.457	-	-
Winterfat scrubland Alliance	-	-	-	-	-	-	-	-	-	-	-	-	9.031	11.406	-	-	-	-	-	-

Table 3.3.1-3 Impacts to Vegetation Communities for Variations of Highway and Rail Alternative (in acres)

	Main Alignment/ Common Areas		Variation D Main Alignment		Variation D		Variation B Main Alignment		Variation B		Variation B1		Variation E Main Alignment		Variation E		Rail Option 1		Rail Option 7	
	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact
Agriculture	21.426	11.275	76.961	68.436	77.889	69.638	-	-	-	-	-	-	-	-	8.316	-	4.991	-	4.991	-
Allscale scrub Alliance	139.188	107.144	4.369	1.921	4.286	1.983	-	-	-	-	-	-	17.241	9.106	14.653	27.359	-	-	-	-
Allscale scrub Alliance/Creosote bush scrub Alliance	-	-	-	-	-	-	-	-	-	-	-	-	4.996	1.397	2.810	0.835	-	-	-	-
Allscale series/Rubber rabbitbrush series	41.963	24.455	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.522	-	1.522	-
Big sagebrush Alliance	4.930	4.778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.868	-	3.396	-
Bulrush-Cattail series	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.454	0.348	-	-	-	-
California buckwheat scrub Alliance	0.123	5.460	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cheesebush scrub Alliance	31.511	17.648	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.124	-	1.124	-
Creosote bush scrub Alliance	389.837	329.541	199.456	109.630	171.770	106.545	129.516	93.336	317.908	235.280	230.566	185.902	183.745	130.189	171.660	73.102	25.487	-	25.487	-
Creosote bush-white bursage scrub series	-	-	27.298	11.111	69.018	52.077	45.965	21.464	7.305	10.849	5.392	6.237	0.182	0.008	44.880	30.600	2.928	-	2.928	-
Developed	196.023	108.337	37.318	13.417	34.675	13.840	19.295	20.147	10.676	4.884	42.478	23.617	72.939	24.045	66.139	31.819	107.624	-	65.818	-
Disturbed	144.118	101.669	33.898	24.040	41.929	31.310	35.405	26.621	9.481	4.881	13.161	7.013	14.873	16.369	13.051	7.020	11.905	-	12.009	-
Disturbed Allscale scrub Alliance	648.404	4.176	-	-	-	-	-	-	-	-	-	-	0.075	0.040	0.606	-	-	-	-	-
Disturbed Creosote bush scrub Alliance	10.463	13.598	-	-	-	-	156.707	96.365	4.365	0.581	34.725	19.872	0.004	0.673	34.744	17.321	2.272	-	2.272	-
Disturbed Creosote bush-white bursage scrub series	-	-	-	-	-	-	-	-	-	-	-	-	0.029	0.025	52.103	47.929	-	-	-	-
Disturbed Joshua tree woodland Alliance	21.853	10.655	-	-	-	-	-	-	-	-	-	-	8.899	4.360	-	-	0.958	-	0.958	-

Table 3.3.1-3 Impacts to Vegetation Communities for Variations of Highway and Rail Alternative (in acres)

	Main Alignment/ Common Areas		Variation D Main Alignment		Variation D		Variation B Main Alignment		Variation B		Variation B1		Variation E Main Alignment		Variation E		Rail Option 1		Rail Option 7	
	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact	Perm. Impact	Temp. Impact
Disturbed Rubber rabbitbrush scrub Alliance	102.431	102.060	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38.599	-	30.395	-
Disturbed Salt grass flats Alliance	1.006	0.775	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disturbed White bursage scrub Alliance	-	-	-	-	-	-	14.753	5.365	13.342	7.440	14.326	6.792	-	-	-	-	-	-	-	-
Fiddleneck field	23.265	11.191	-	-	0.523	1.173	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fourwing saltbush scrub Alliance	60.542	53.590	3.096	2.043	3.483	2.138	-	-	-	-	-	-	8.830	2.515	1.532	0.126	2.990	-	2.990	-
Fourwing saltbush series/Rubber rabbitbrush series	14.437	12.728	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fremont cottonwood forest Alliance	6.210	4.220	-	-	-	-	-	-	-	-	-	-	3.526	1.372	2.947	0.300	1.021	-	1.021	-
Joshua tree woodland Alliance	249.967	155.087	-	-	-	-	1.246	0.860	7.177	3.880	1.246	0.861	37.067	16.961	43.424	23.878	8.561	-	8.561	-
Mixed willow series	-	0.410	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mojave yucca scrub Alliance	15.879	9.184	-	-	-	-	-	-	5.850	3.971	-	-	33.490	18.242	20.247	12.870	-	-	-	-
Non-native grassland	15.724	9.694	-	-	-	-	-	-	-	-	43.258	42.666	39.299	21.173	14.270	21.761	0.921	-	0.921	-
Ornamental	1.464	0.655	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.560	-	0.263	-
Parry's rabbitbrush scrub Alliance	-	-	-	-	-	-	-	-	-	-	-	-	2.711	0.301	-	-	-	-	-	-
Red brome grasslands	-	-	4.778	1.099	5.251	2.073	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock outcropping	11.500	3.501	-	-	-	-	-	-	-	-	-	-	4.571	0.931	1.272	1.269	-	-	-	-
Rubber rabbitbrush scrub Alliance	95.513	83.355	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	64.071	-	58.750	-
Salt grass flats Alliance	5.870	3.849	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sandbar willow thickets Alliance	-	-	-	-	-	-	-	-	-	-	-	-	0.592	0.112	1.362	0.326	-	-	-	-
Scale broom scrub Alliance	15.453	9.459	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.482	-	1.482	-
Unvegetated wash	0.773	0.542	19.931	23.021	0.455	0.062	-	-	-	-	-	-	0.338	0.086	4.609	0.162	0.038	-	0.038	-
White bursage scrub Alliance	0.002	0.911	-	-	-	-	-	-	-	-	-	-	0.870	0.969	-	-	-	-	-	-
Winterfat scrubland Alliance	-	-	-	-	-	-	-	-	12.340	11.114	-	-	-	-	-	-	-	-	-	-

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Variation A

Approximately 123 acres of this plant community occur within the main alignment corridor corresponding to Variation A (a so-called Variation A Main alignment), and approximately 125 acres occur within Variation A alignment. Variation A Main alignment would result in lesser impacts to this plant community compared to Variation A alignment. Through implementation of the above avoidance and minimization measures, and replanting efforts, impacts to this plant community will be reduced.

Variation B

Approximately 0.3 acres of this plant community occur within the main alignment corridor corresponding to Variation B (a so-called Variation B Main alignment) 8.7 acres occur within the Variation B1 alignment, and 0.3 acres occur in Variation B alignment. Variation B Main alignment or Variation B1 alignment would result in lesser impacts to this plant community compared to Variation B alignment.

Variation D

This plant community was not observed in this variation.

Variation E

Approximately 32 acres of this plant community occur within the main alignment corridor corresponding to Variation E (a so-called Variation E Main), and approximately 42 acres occur within Variation E. Variation E Main alignment would result in lesser impacts to this plant community in comparison to Variation E alignment.

Freeway/Expressway and Freeway/Tollway with HSR Alternatives

Main Alignment/Common Areas

Approximately 405 acres of this plant community occur within the main alignment/common areas. Through implementation of the above avoidance and minimization measures, and replanting efforts, impacts to this plant community will be reduced.

Variation B

Approximately 2.1 acres of this plant community occur within the main alignment corridor corresponding to Variation B (a so-called Variation B Main), approximately 11.1 acres occur within Variation B alignment, and approximately 2.1 acres occur within Variation B1 alignment. Variation B Main alignment or Variation B1 alignment would result in lesser impacts to this plant community in comparison to Variation B alignment.

Variation D

This plant community was not observed in this variation.

.*Variation E*

Approximately 54 acres of this plant community occur within the main alignment corridor corresponding to Variation E (a so-called Variation E Main), and approximately 67 acres occur within Variation E alginment. Variation E Main alignment would result in less impacts to this plant community in comparison to Variation E alignment.

Rail Option 1 and Rail Option 7

Approximately 8.6 acres of this plant community occur within both Option 1 and Option 7. Either option would result in the same amount of impacts to this plant community. Through implementation of the above avoidance and minimization measures, and replanting efforts, impacts to this plant community will be reduced.

Riparian Woodland

Approximately 28 acres of riparian woodlands (Fremont cottonwood forest [21.7], sandbar willow thickets [4.1 acres], and mixed willow [2.4]) are located within the BSA, with majority of them occurring near the Mojave River.

As stated above, this plant community was noted within the Mojave River. Because the proposed roadway is expected to be spanning the river on a bridge with no footings within the river, no direct impacts to this plant community are expected to occur. There will be a shadowing effect to this community from the bridge and abutment structures. Because of this indirect impact the plant community below is expected to degrade. The total 28 acres of this community should be considered as a permanent loss as a result.

Freeway/Expressway and Freeway/Tollway Alternatives

Main Alignment/Common Areas

Approximately 9.6 acres of Freemont cottonwood forest exist within the main alignment/common areas. Approximately 0.4 acres of mixed willow thickets occur within the main alignment/common areas. Through implementation of the above avoidance and minimization measures, and replanting efforts, impacts to this plant community will be reduced.

Variation A

Approximately 2 acres of mixed willow occurs within Variation A. This plant community was not observed in the main alignment corridor corresponding to Variation A (Variation A Main) A and thus would result in lesser impacts in comparison to Variation A..

Variation B

This plant community was not observed in this variation.

Variation D

This plant community was not observed in this variation.

Variation E

Approximately 3.3 acres of Fremont cottonwood forest was observed within Variation E Main, and approximately 0.7 acres occurs within Variation E. Variation E would result in less impacts to this plant community in comparison to Variation E Main.

Approximately 0.4 acres of sandbar willow thickets was observed within Variation E Main, and approximately 1.3 acres occurs within Variation E. Variation E Main would result in less impact to this plant community in comparison to Variation E.

Freeway/Expressway and Freeway/Tollway with HSR Alternatives

Main Alignment/Common Areas

Approximately 10.4 acres of Freemont cottonwood forest exist within the main alignment/common areas. Approximately 0.4 acres of mixed willow occur within the main alignment/common areas. Through implementation of the above avoidance and minimization measures, and replanting efforts, impacts to this plant community will be reduced.

Variation B

This plant community was not observed in this variation.

Variation D

This plant community was not observed in this variation.

Variation E

Approximately 4.9 acres Freemont cottonwood forest was observed within Variation E Main alignment and approximately 3.2 acres occurs within Variation E alignment. Variation E would result in less impacts to this plant community in comparison to Variation E Main alignment

Approximately 0.7 acres of sandbar willow thickets was observed within Variation E Main alignment, and approximately 1.7 acres occurs within Variation E alignment. Variation E Main alignment would result in less impacts to this plant community in comparison to Variation E alignment.

Rail Option 1 and Rail Option 7

Approximately 1 acre of Freemont cottonwood forest occur both Option 1 and Option 7. Either option would result in the same amount of impacts to this plant community. Through implementation of the above avoidance and minimization measures, and replanting efforts, impacts to this plant community will be reduced.

Wildlife Movement Corridors

Permanent impacts on wildlife movement corridors may occur under all of the build alternatives for species such as gray fox, kit fox, coyote, American badger, and bobcat. Construction of a multi-lane highway over such a long span has the potential to create a barrier to wildlife movement locally. Each build alternative, including the

proposed variations, would have the same effect on wildlife movement because each crosses the same natural drainages at right angles. Two exceptions are Variation E alignment, which would cross the Mojave River in two locations instead of at one location, and the alternative with rail, which would impact an area of I-15 that would otherwise not be impacted; however, all crossings of the Mojave River are expected to be bridged at a relatively high elevation, which would minimize impacts. More information on wildlife movement corridors can be found in Appendix G Wildlife Corridor Evaluations of the NES (AMEC, 2011).

Indirect Impacts

Indirect impacts on biological resources would occur to those natural habitats in surrounding areas immediately adjacent to the proposed project limits, after the completion of the proposed project. Any one of these topics or combination of two or more can be referred to as an "edge effect." It is expected that implementation of the proposed project would result in indirect impacts to biological resources in the following ways: increased light and glare; increased noise; vibration; increase in populations of non-native plants; increase in vehicle/wildlife collisions and kills; and growth inducement.

Indirect impacts associated with the proposed project are not quantifiable but are reasonably foreseeable. As such, the discussion that follows provides a common-sense identification of the types of secondary impacts and their relative magnitude.

Light and Glare

Development of the site has the potential to increase the nighttime light and glare sources on the site when compared to current levels. In particular, areas most sensitive to increased lighting and glare over natural conditions would be the rivers, washes, and drainages, which provide for a natural pathway for wildlife. It appears that lighting fixtures installed at these natural features would cast light into them.

Nighttime illumination is known to adversely affect some species of wildlife in natural areas. It can disturb breeding and foraging behavior and potentially alter breeding cycles of birds, mammals, and nocturnal invertebrates. In addition, light could deter some animal species, especially the lager mammals, from using rivers, creeks, and washes as a movement corridor. If uncontrolled, such lighting where proximal to these movement corridors, could adversely impact the composition and behavior of the wildlife that occur in these areas. This impact is considered potentially substantial. With the implementation of the proposed mitigation measures stated below, the level of impacts to wildlife due to lighting and glare would be less than substantial.

It appears there is no appreciable difference in impacts to wildlife due to lighting between the alternatives or among any of the variations or options.

Noise

It is understood that operating noise from the proposed rail would be 65 dBA at a distance of about 300 feet and it is estimated that temporary noise levels during construction would be at 65 dBA to 400 feet from any point source. U.S. Fish and Wildlife Service typically uses 65 dBA as the threshold at which nesting birds have been observed to be affected. Therefore, it is expected that activities of noise-sensitive wildlife would be impacted by noise levels up to 400 feet temporarily and up to 300 feet during regular operation for all alternatives including high speed rail. Because construction of the rail line would occur in phases along the route and would be temporarily in nature, impacts from construction on wildlife are expected to be less than substantial. Similarly to construction impacts normal operation of the HSR would be temporary in nature and limited only to those instances when trains are passing any given point. Based on given average train trips, impacts from normal operation of the HSR on wildlife are expected to be less than substantial

It is expected that the use of the Freeway/Expressway (Freeway/Tollway) would increase the level of noise when compared to the current conditions of cars traveling in rural areas up to 65 dBA at a distance of 100 feet from the source. Therefore it is expected that activities of noise-sensitive wildlife would be impacted by noise levels up to 400 feet temporarily during construction and up to 150 feet during regular operation for all Freeway/Expressway (Freeway/Tollway) only alternatives.

Vibration

Similar to noise, it is expected that trains traveling on the HSR would generate vibrations as it passed along the rail. It is reasonable to expect that the vibrations would be detected by wildlife within the immediate vicinity, but it is difficult to quantify the level at which each individual animal would detect the vibrations and even more difficult to predict individual reactions. It is possible, and even expected at times, for wildlife that are attempting to cross the route at crossing points (culverts) would be stressed and not cross. Some individuals could attempt to cross again at a later time and some may never attempt again. However, the source of stressor (passing train) would occur for relatively short periods. Based on the anticipated daily train trips, it is expected that few individuals would be affected by the vibrations. Those that are affected would have periods without such stressor, providing opportunities to cross. Because of the relatively few anticipated daily train trips, momentary nature of the source of stressor, and opportunities without the source of the stressor, it is expected that impacts to wildlife activities caused by HSR vibrations would be less than substantial.

Larger vehicles such as semi trucks traveling along the Freeway/Expressway or Freeway/Tollway would also generate vibrations. These vibrations would be much less when compared to HSR trains due to the smaller mass of the vehicle and slower speed. As such, vibrations would attenuate over a short distance and are not expected to affect wildlife within the crossings or beyond the immediate road shoulder. Therefore, impacts to wildlife due to the use of the Freeway/Expressway or

Freeway/Tollway alternative, variations or options would be considered less than substantial.

Vibrations would be generated by construction equipment during the construction phase of the project. Certain heavy equipment is known to cause vibrations when operating such as pile drivers, dozers, and large excavators. It is assumed that this equipment would have a need to operate within all areas of the disturbance envelope, including the margins of the project nearest the adjacent open space and natural washes. It is the operation of heavy equipment in these areas that have the potential to substantially affect the movement of wildlife species. With the implementation of the below proposed mitigation measure, it is expected that impacts to nocturnal wildlife activities caused by construction equipment vibrations would be minimized to a point that is less than substantial. Diurnal wildlife activities would be temporarily impacted and wildlife from immediately surrounding construction areas would be temporarily displaced. Because it would be temporary and because construction would occur along the route in phases, impacts to diurnal wildlife activities is expected to be less than substantial.

Non-native Plants

Areas within the project development envelope consist of native and non-native plants. Although non-native plants already occur within the project footprint and within the vicinity, it can be reasonably concluded that creation of a larger roadway could exacerbate this condition.

Vehicle/Wildlife Collision Kills

Various types of dirt, gravel and paved roads exist throughout the development envelope of the proposed project. With the exception of the areas where the new proposed Freeway/Expressway (Freeway/Tollway) alignment intersect with the existing SR-14, SR-395, Interstate 15 and SR-18, no roads are currently exist along the proposed corridor.

Road-strike data were collected in various areas of the project site during the wildlife crossing study. Based on these data, it was determined that wildlife was taken as a result of vehicle strikes. Because few animals were noted a statistical analysis could not be conducted to determine amount of collisions one could expect under the existing conditions of the project site. When attempting to understand the difference between existing conditions when compared to post-implementation of the proposed project it must be assumed relatively few strikes occur under current conditions. Because of the speed limits expected on the proposed Freeway/Expressway and Freeway/Tollway alternatives, and considering the expected volume of traffic within a rural area, it is expected that there would be a relatively high vehicle/wildlife collision rate. Therefore, there is potential for a substantial increase in vehicle/wildlife collisions to occur with the implementation of any of the proposed build alternatives. It appears there is no appreciable difference among any of the build alternatives, variations, or options. Implementation of the proposed mitigation

measures could reduce the impact from the potential increase in vehicle/wildlife collisions to a level less than substantial.

Any vehicle/wildlife strikes resulting from operation of the HSR would be an increase from the existing conditions since such a rail does not currently exist. Because the rail line is located within the median of the proposed freeway/expressway for much of the route, the alternative including HSR and all of the related variations and options would not substantially increase the number of vehicle/wildlife collisions.

Growth Inducement

It is reasonable to assume that the construction of a new highway a rural area such as many areas of the proposed project site would provide opportunities for development that would not otherwise exist. The construction of the Freeway/Expressway or Freeway/Tollway would provide a faster travel time to/from the vicinity of the project site providing for development. It is challenging to predict the amount of development, or growth, of areas surrounding the project site and therefore difficult to quantify the impacts to the natural resources. It should be assumed that any growth that converts natural habitat to a developed condition would negatively impact biological resources. The level of impact would be dependent on the specifics of the individual project and would only be understood after the evaluation of those individual projects. Analysis of known approved projects to biological resources is discussed in the Cumulative Impacts section.

Avoidance, Minimization, and/or Mitigation Measures

The project would be designed to minimize impacts on natural communities. If impacts to natural communities cannot be avoided, the following measures will be implemented:

BNC-1: The road shoulder and graded slopes will be revegetated with like plant communities prior to construction conditions to minimize the loss of each community.

BNC-2: The elevation of the highway will be kept to a minimum necessary for drainage to reduce the overall footprint due to required shoulder sloping.

BNC-3: Joshua tree woodland will be preserved in place as feasible. A biological monitor will be onsite to establish an environmentally sensitive area (ESA) around the areas where this species occurs. If impacts cannot be avoided, these areas should be included in the calculations for acquisition of land to preserve in perpetuity. To further reduce project impacts to this community, individual trees can be translocated to an area that will not be impacted. To aid in revegetation of the finish graded slopes, individual trees can be temporarily located in an onsite nursery and replanted within revegetation areas located within ROW outside the clear recovery zone.

BNC-4: Riparian woodland will be preserved in place as feasible. Impacts will be avoided with the design of a span bridge over the river with no impacts to jurisdictional areas. A biological monitor will be onsite to establish an ESA around the jurisdictional areas within the Mojave River.

The project would also be designed to minimize impacts on wildlife movement corridors. When feasible, all Mojave River crossings will be bridged at a relatively high elevation to minimize impacts. However, this must be balanced with BNC-2 to determine an elevation suitable for wildlife crossings while minimizing the project footprint. Specific design features will include the following:

BNC-5: Use large at-grade culverts under the new highway where natural drainages occur, where feasible. Wildlife are more likely to use such crossings when "daylight" or openings to the other side are visible. Where culvert lengths need to be longer due to design, median daylights will be used. Fencing will be used as needed to guide wildlife into the culverts and along the ROW to prevent wildlife from trying to cross the highway.

BNC-6: Construct bridges and culverts that cross drainage features to be high and wide enough to allow large wildlife to travel under the structure. The design will also include culverts as crossing structures that are specifically designed for wildlife travel.

BNC-7: Design the culverts to be a "soft bottom." Because it is not feasible to bridge all 200+ natural drainages, it is understood that the smaller drainages will have a hard-bottom box culvert that is placed a minimum 1 foot below surrounding grade to allow soil to be placed on top of the hard bottom, thus creating a soft bottom. It is also understood that without this soft-bottom design, each culvert would essentially require a bridging design that would be cost prohibitive. As feasible, culverts will also be designed to be tall and wide to better attract wildlife use.

With the implementation of the mitigation measures stated below, the indirect impacts to wildlife would be less than substantial.

BNC-8: Use lighting in areas only where necessary for safety and signage. Eliminate all lighting in other areas.

BNC-9: All lighting should be downcast to minimize lighting of natural areas, particularly rivers, washes and drainages.

BNC-10: Limit operation of vibration causing equipment such as pile drivers, dozers, large excavators to daylight hours when working in areas adjacent to open space.

BNC-11: Biological monitor shall be present to observe activities of wildlife during construction adjacent to open spaces. If activities are noted to affect wildlife, biological monitor shall stop construction activities as necessary.

BNC -12: Install fencing along the route that prevent wildlife from crossing in areas other than intended wildlife crossing locations. Fencing shall be installed to channel wildlife to the intended crossing locations.

BNC-13: Maintain fencing throughout the existence of the Freeway/Expressway or Freeway/Tollway alignment.

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