



UPPER LAS VEGAS WASH
CONSERVATION TRANSFER AREA:
A SYSTEM TO DEVELOP
ALTERNATIVE SCENARIOS

UtahState
UNIVERSITY



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A SYSTEM TO DEVELOP
ALTERNATIVE SCENARIOS

PREPARED FOR THE LAS VEGAS
BUREAU OF LAND MANAGEMENT

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PREFACE

The Las Vegas Valley is located in southern Clark County, Nevada within the Mojave Desert Ecoregion of the Basin and Range Province. The Mojave Desert is an expansive region in the arid western United States spanning southeastern California and southern Nevada (Figure 1). The low elevations of the Mojave Desert create warm year-round temperatures with the number of frost-free days greater than 200. Rainfall in the Mojave Desert is scarce and averages less than six inches (15.24 cm) per year. The average precipitation in Las Vegas, Nevada is 4.13 inches (10.49 cm). The limited precipitation in the Mojave Desert promotes unique vegetation communities characterized by low, widely spaced shrubs with numerous species of cacti, yucca, and flowering annuals. The creosote bush-dominated communities of southern Nevada provide habitat for several species of reptiles, birds, and mammals (MacMahon, 1985; Rundel and Gibson, 1996).

The Las Vegas Valley is one of the fastest growing regions in the United States and is continuing to grow at unprecedented rates with the remaining parcels of private land being converted to urban land uses to accommodate the growing population. The combined population of the North Las Vegas and Las Vegas municipalities more than doubled from 306,003 in 1990 to 721,822 in 2005. The population of Clark County increased from 741,459 in 1990 to 1,710,551 in 2005 (Figure 2) (United States Census Bureau).



Figure 1. The Nature Conservancy Mojave Desert Ecoregion.

As a result of rapid urbanization and previous legislation mandating the disposal of Federal lands in the Las Vegas Valley, BLM managed lands have become widely separated and surrounded by more urbanized land uses. To address issues associated with the need for developable lands and the management of public lands, Congress passed the Southern Nevada Public Land Management Act (SNPLMA) in 1998 (Public Law 105-263). The SNPLMA authorized the Bureau of Land Management to dispose of federal lands in

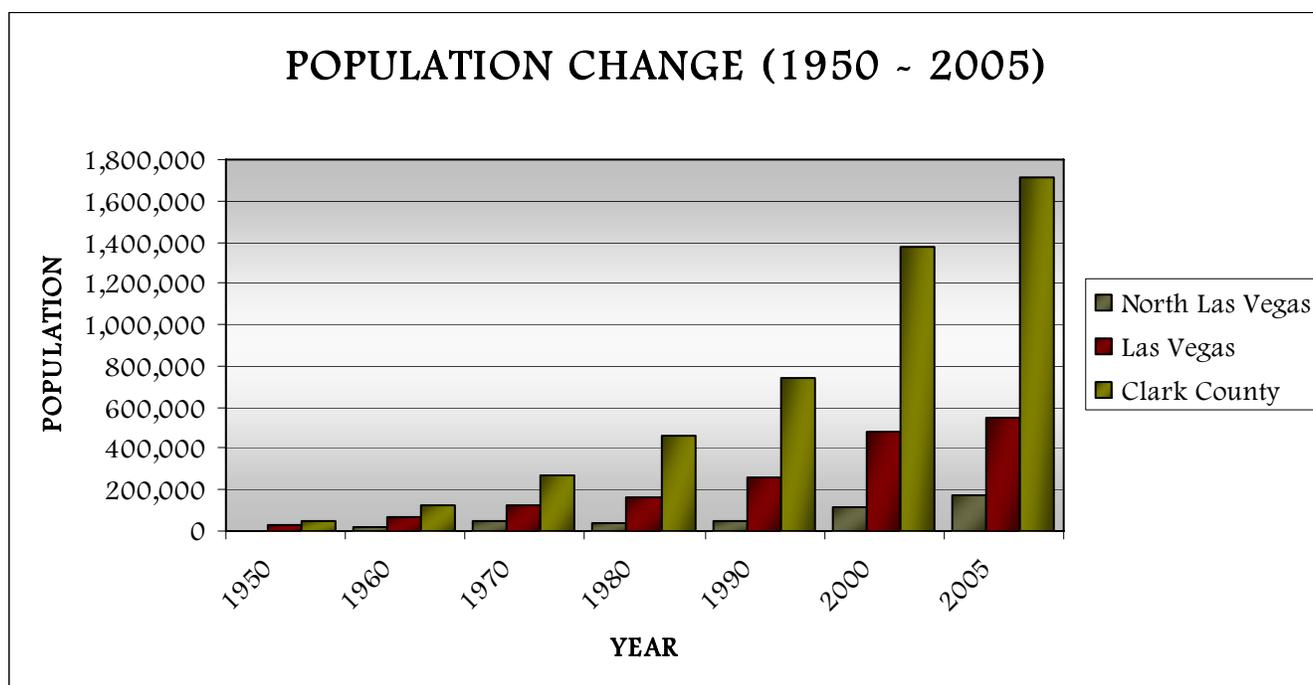


Figure 2. Population Change in North Las Vegas City, Las Vegas City, and Clark County, Nevada (U.S. Census Bureau).

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Clark County, Nevada consistent with population growth and community land-use plans and policies. In 2002, the Clark County Conservation of Public Land and Natural Resources Act (Public Law 107-282) amended the SNPLMA to expand the disposal boundary area to address the continuing increase in growth in the Las Vegas region.

The disposal boundary established by the Southern Nevada Public Land Management Act of 1998 as amended by the Clark County Conservation of Public Land and Natural Resources Act of 2002 encompasses the Las Vegas Valley in southern Clark County, Nevada. The public lands that became available for auction were predominantly located in the northern and southern portions of the disposal area. This project and preliminary alternative future analyses focus on the lands available for disposal in the north (Figure 3). The northern area encompasses the Upper Las Vegas Wash and is bordered by Nellis Air Force Base to the

east, the Desert National Wildlife Refuge to the north, and Red Rock Canyon National Conservation Area and the Las Vegas Paiute Indian Reservation to the west (Figure 4).

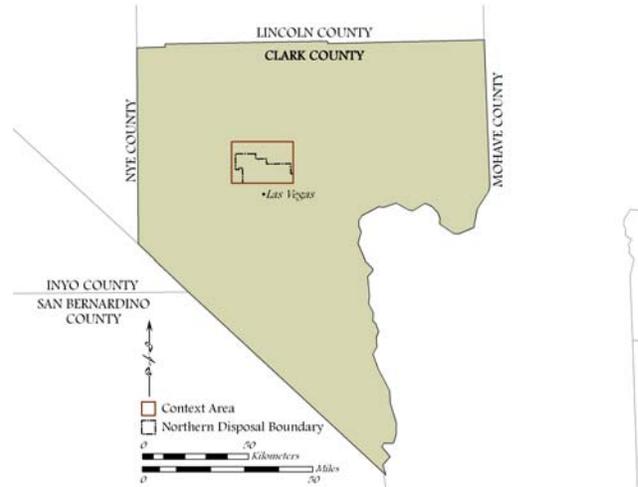


Figure 3. Disposal Boundary, Clark County, Nevada.

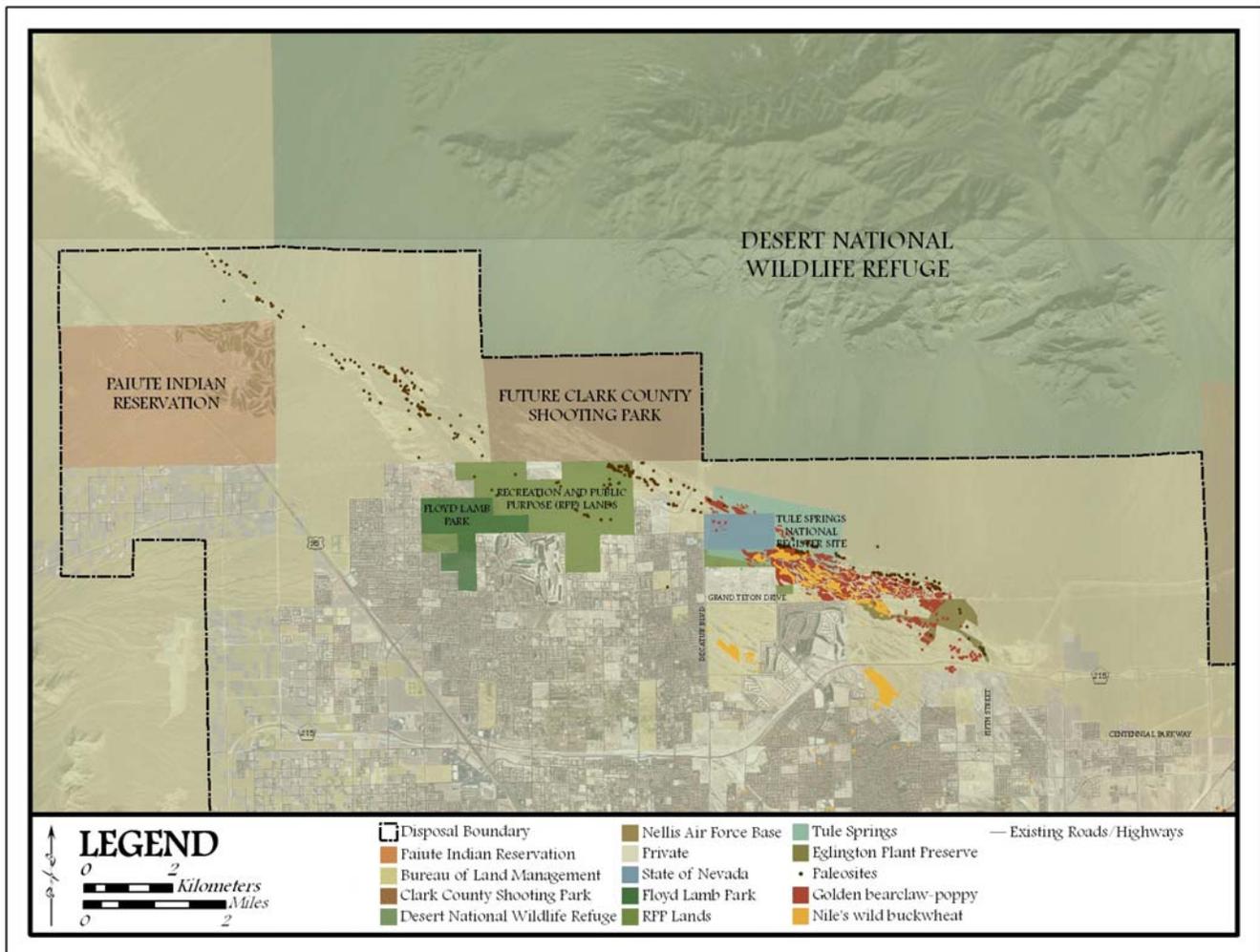


Figure 4. Upper Las Vegas Wash Conservation Transfer Area.

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While the Bureau of Land Management has been authorized to dispose of lands within Clark County consistent with population growth and community land-use plans, they are bound by other Federal legislation which has prevented the immediate auction of lands within the Upper Las Vegas Wash.

The Endangered Species Act of 1973 (16 USC 1531-1543) provides for the conservation of critical habitat and ecosystems upon which threatened and endangered species depend on for survival and continued existence. The Bureau of Land Management is also required to protect candidate, proposed, and sensitive plant species. Within the Upper Las Vegas Wash, there are two rare plant species, the Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont) and Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal), both of which are listed as sensitive species by the BLM. The Golden bearclaw-poppy is classified as critically endangered by the State of Nevada and Nile's wild buckwheat is a candidate for listing on the State of Nevada's critically endangered plant species list. Declines in the population of these two species is largely attributed to the conversion of habitat for urban land uses, off-road vehicle use, flood control infrastructure, road and utility corridors, trash dumping, and gypsum mining (Morefield, 2001).

There are several animal wildlife species which are listed as sensitive by the BLM, some of which are protected by the State of Nevada. Of critical concern is the threatened desert tortoise (*Gopherus agassizii*). The desert tortoise inhabits a range of desert environments in the southwestern United States, including southeastern California and southern Nevada. Although the BLM (*Las Vegas Valley Disposal Boundary EIS*) indicates that there is no designated critical habitat within the disposal boundary, the habitat of the desert tortoise encompasses Mojave Desert creosote bush scrub, thorn scrub, and cacti, specifically in sandy or gravelly locations. Washes, canyon bottoms, and oases also serve as habitat for the desert tortoise (MacMahon, 1985).

Cultural resources within the disposal boundary are protected by the American Antiquities Act of 1906, the National Historic Preservation Act of 1966, and the Archaeological Resources Protection Act of 1979. Review of the *Las Vegas Disposal Boundary EIS*

(Affected Environment) indicates that during a Class III field inventory, archeologists identified 100 sites, both prehistoric and historic, within the disposal area, 69 of which were not previously recorded.

The American Antiquities Act of 1906 (16 USC 431-433) seeks to protect historic and prehistoric ruins, monuments, objects of antiquity and scientific interest on lands owned or controlled by the Government of the United States by imposing misdemeanor-level criminal penalties. The National Historic Preservation Act of 1966 (16 USC 470) created the National Register of Historic Places which extends protection to historic places of State, local, and national significance. This legislation protects Tule Springs National Register Site, an archeological site which has produced substantial data relevant to the environmental history of the Great Basin. The Archaeological Resources Protection Act of 1979 (16 USC 470a-11) provides for the protection of archaeological resources on federal lands by invoking felony-level penalties for excavating, removing, damaging, or defacing any archeological resources older than 100 years on public or Indian lands.

Paleontological resources are fossilized evidence of past life on Earth. Review of the *Las Vegas Disposal Boundary EIS* (Affected Environment) indicates that 438 previously unrecorded paleontological resources were identified within the disposal boundary, the majority of which reside in fossiliferous Quaternary spring deposits in the Upper Las Vegas Wash. Although there is not a great deal of specific legislation protecting fossils other than what has been previously discussed, the Fossil Preservation Act of 1996 (HR 2943) provides for the protection, including the collection and preservation, of fossils that are on Federal lands for the present and future benefit of the people of the United States. This legislation is controversial because it encourages preservation through collection in order to reduce the loss of fossils resulting from erosion and theft.

The Las Vegas Paiute Tribe Reservation is located within the disposal area; therefore, other legislation that is relevant is the American Indian Religious Freedom Act of 1978 and the Native American Graves Protection and Repatriation Act. The American Indian Religious Freedom Act of 1978 (42 USC 1996) protects and preserves the inherent right of Native

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Americans to believe, express, and exercise their traditional religions, including access to religious sites. The Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) establishes the right of Indian tribes to claim ownership of certain cultural items, including human remains and funerary, sacred, and cultural patrimony objects and artifacts.

INTRODUCTION

The primary objective of this deliverable was to develop a range of reasonable alternative scenarios using the best professional judgment of our team prior to the completion of the field work and the acquisition of the social and demographic survey results. There are challenges with generating solid conclusions without the evaluation of field data and social survey results; therefore, the team developed a modular approach for developing alternative scenarios. The components within each module were delineated based on the available data and some preliminary field work, and they were constructed in such a way that they can be modified based on the analyses of field, social, and demographic data.

The modules encompass five categories of change in which alternatives can be efficiently constructed based on the selection of components within the categories. The categories of change focus on variations of the Las Vegas Paiute Indian Reservation buffer, the northwest portion of the Upper Las Vegas Wash, the Recreation and Public Purpose lands adjacent to Floyd Lamb Park, the southeast portion of the Upper Las Vegas Wash, and the proposed Mountain Edge Beltway. Each category presents a series of components that represent the various objectives of stakeholders, ranging from maximum development to maximum conservation.

Each component within each category is accompanied with a series of assessment metrics. The assessment metrics will assist in evaluating the impacts of the various alternative scenarios. The primary assessment metrics which the team has been asked to evaluate are (1) populations of rare plant species, (2) paleontological resources, and (3) a landscape representative of the Mojave Desert. However, there are several other assessment metrics included which will aid in making an informed and reasoned decision regarding lands available for disposal in the Upper Las Vegas Wash.

Although this modular process presents hundreds of possible combinations, it provides a systematic framework that allows the components of alternative scenarios to be evaluated independently or collectively utilizing the provided assessment metrics.

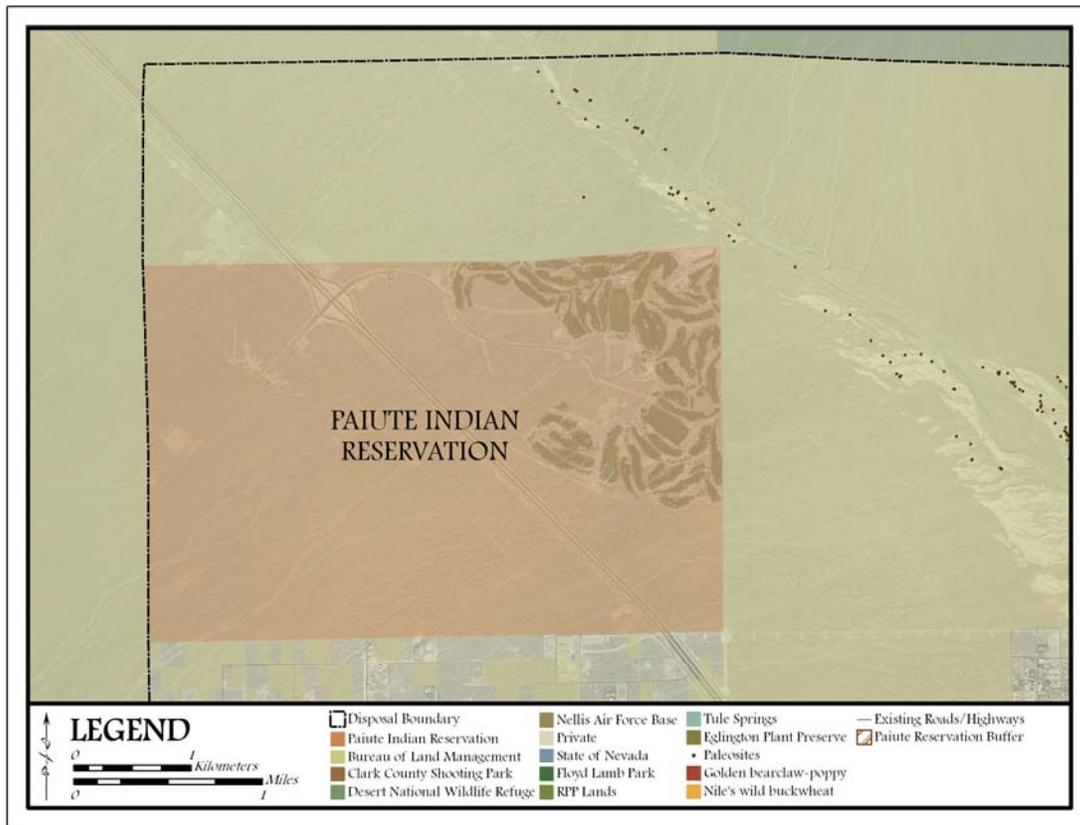
A DVD containing an ArcGIS map document and the GIS shapefiles of the components is provided so alternatives can be composed by the Bureau of Land Management and stakeholders within the Las Vegas Valley.

The GIS data used to create the base layers on the maps was provided by the Las Vegas Bureau of Land Management. Aero-Graphics provided the 2-foot resolution 2005 aerial photography.

ALTERNATIVE COMPONENTS

COMPONENT A <u>PAIUTE INDIAN RESERVATION</u>	COMPONENT B <u>NORTHWEST UPPER LAS VEGAS WASH</u>	COMPONENT C <u>RECREATION & PUBLIC PURPOSE LANDS</u>	COMPONENT D <u>SOUTHEAST UPPER LAS VEGAS WASH</u>	COMPONENT E <u>MOUNTAIN EDGE BELTWAY</u>
-A1- NO BUFFER	-B1- ACTIVE WASH	-C1- NO RPP LANDS	-D1- RARE PLANT SPECIES	-E1- NO MOUNTAIN EDGE BELTWAY
-A2- ONE-EIGHTH MILE BUFFER	-B2- PALEO RESOURCES	-C2- RPP LANDS WITH NO DESIGNATED USE	-D2- PALEO RESOURCES & RARE PLANTS	-E2- PROPOSED ALIGNMENT
-A3- ONE-QUARTER MILE BUFFER	-B3- WASH ECOSYSTEM	-C3- RPP LANDS AND PRIVATE PARCEL	-D3- WASH ECOSYSTEM I	-E3- ALTERNATE ALIGNMENT
-A4- ONE-HALF MILE BUFFER	-B4- MOJAVE DESERT ECOSYSTEM		-D4- WASH ECOSYSTEM II	
-A5- ONE MILE BUFFER			-D5- MOJAVE DESERT ECOSYSTEM I	
			-D6- MOJAVE DESERT ECOSYSTEM II	

PAIUTE INDIAN RESERVATION (A1)



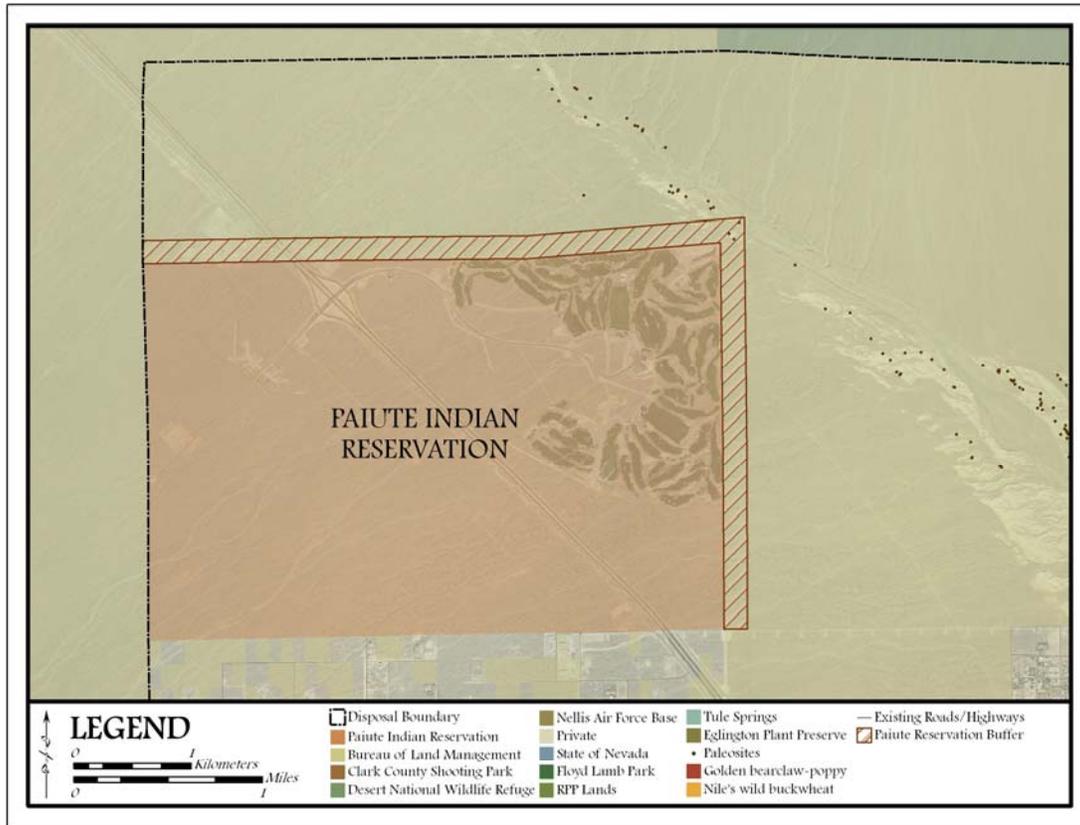
NO BUFFER (A1)

This alternative component represents the exclusion of a buffer on the north and east sides of the Paiute Indian Reservation. The absence of a buffer would not fulfill the request of the Paiute Tribe of Las Vegas, Nevada, but it would provide the greatest amount of urban development adjacent to the reservation in the northwest corner of the disposal area. The exclusion of a buffer would not provide protection from visual and social nuisances associated with the construction and existence of adjacent residential subdivisions and the associated transportation networks, and it would offer no protection of any potential Native American artifacts or burial sites within the North Las Vegas Wash. If Native American cultural sites are discovered, the Native American Graves Protection and Repatriation Act of 1990 mandates that they be protected or returned to lineal descendants or culturally affiliated Indian tribes (<http://www.cr.nps.gov/nagpra/>). Additionally, the exclusion of a buffer may impact the economic benefits of the Las Vegas Paiute Golf Resort, as the primary attraction and selling point of the resort is that it resides in the “undisturbed beauty of the Southern Nevada desert at the base of the picturesque Spring Mountains” (<http://www.lvpaiutegolf.com/>).

ASSESSMENT METRICS

- Cultural resources (Native American artifacts and burial sites)
- Visual quality (distance to residential development; vistas of wash and wildlife refuge)
- Road traffic noise (distance to roadway; speed of roadway; average vehicles per hour)
- Air quality (dust from construction sites, roads, and recreation)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

PAIUTE INDIAN RESERVATION (A2)



ONE-EIGHTH MILE BUFFER (A2)

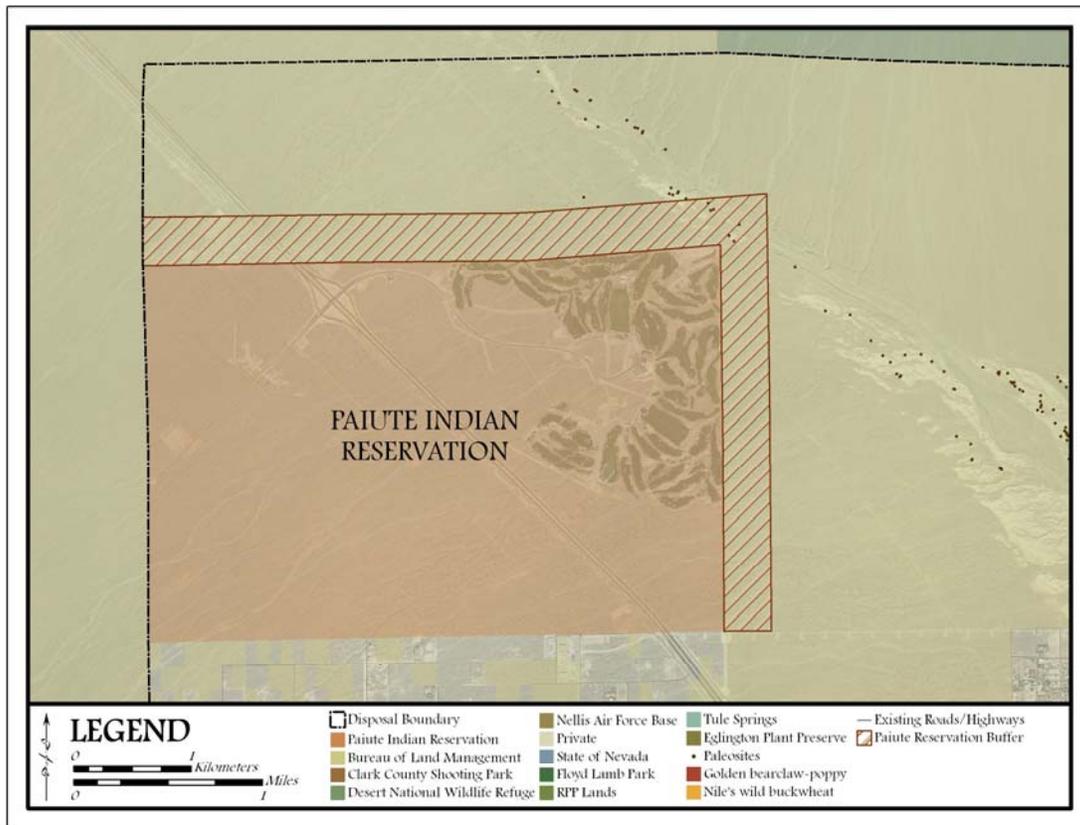
This alternative component represents a one-eighth mile (0.2 km) buffer on the north and east sides of the Paiute Indian Reservation. The existence of a one-eighth mile buffer may not fulfill the request of the Paiute Tribe of Las Vegas, Nevada, but it would provide the greatest amount of urban development adjacent to the reservation in the northwest portion of the disposal area while offering minimal protection from visual and social nuisances associated with the construction and existence of adjacent residential subdivisions and associated transportation networks. The buffer provides a moderately low amount of protection for any potential Native American artifacts or burial sites within the North Las Vegas Wash. However, a one-eighth mile buffer may not be adequate to prevent adverse social impacts within the buffer and sustain the economic benefits of the Las Vegas Paiute Golf Resort.

AREA: 415 acres (168 hectares)

ASSESSMENT METRICS

- Cultural resources (Native American artifacts and burial sites)
- Visual quality (distance to residential development; vistas of wash and wildlife refuge)
- Road traffic noise (distance to roadway; speed of roadway; average vehicles per hour)
- Air quality (dust from construction sites, roads, and recreation)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

PAIUTE INDIAN RESERVATION (A3)



ONE-QUARTER MILE BUFFER (A3)

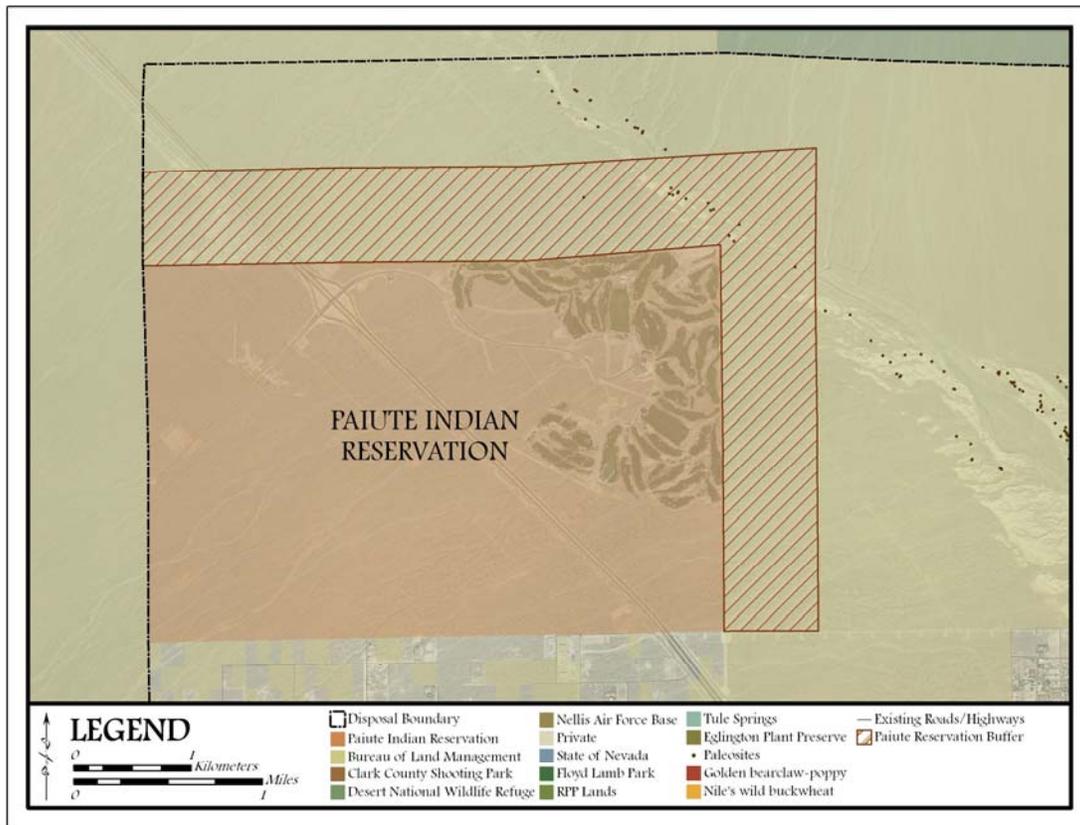
This alternative component represents a one-quarter mile (0.4 km) buffer on the north and east sides of the Paiute Indian Reservation. The existence of a one-quarter mile buffer may not fulfill the request of the Paiute Tribe of Las Vegas, Nevada, but it would provide for a moderate amount of urban development adjacent to the reservation in the northwest portion of the disposal area while providing the Paiute Tribe of Las Vegas, Nevada with a reasonable amount of protection from visual and social nuisances associated with the construction and existence of adjacent residential subdivisions and associated transportation networks. A one-quarter mile buffer may provide a moderate amount of protection for any potential Native American artifacts or burial sites within the North Las Vegas Wash and should be adequate to prevent any adverse social impacts and to maintain the economic benefits of the Las Vegas Paiute Golf Resort.

AREA: 860 acres (348 hectares)

ASSESSMENT METRICS

- Cultural resources (Native American artifacts and burial sites)
- Visual quality (distance to residential development; vistas of wash and wildlife refuge)
- Road traffic noise (distance to roadway; speed of roadway; average vehicles per hour)
- Air quality (dust from construction sites, roads, and recreation)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

PAIUTE INDIAN RESERVATION (A4)



ONE-HALF MILE BUFFER (A4)

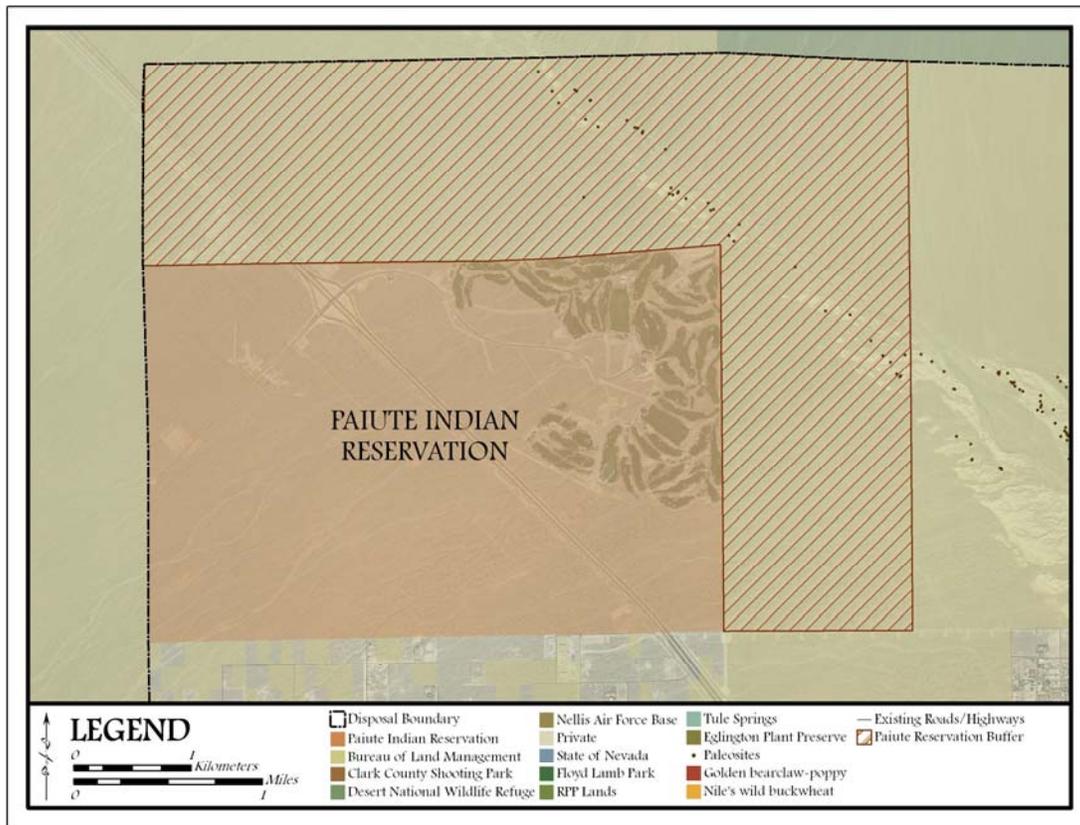
This alternative component represents a one-half mile (0.8 km) buffer on the north and east sides of the Paiute Indian Reservation. The existence of a one-half mile buffer may fulfill the request of the Paiute Tribe of Las Vegas, Nevada; however, it would provide a minimal to moderate amount of urban development adjacent to the reservation in the northwest portion of the disposal area. The existence of a one-half mile buffer should provide protection from visual and social nuisances associated with the construction and existence of adjacent residential subdivisions and associated transportation networks. The width of the buffer provides a moderately high amount of protection for any potential Native American artifacts or burial sites within the North Las Vegas Wash and may be more than adequate to prevent any adverse social impacts and to maintain the economic benefits of the Las Vegas Paiute Golf Resort.

AREA: 1,790 acres (724 hectares)

ASSESSMENT METRICS

- Cultural resources (Native American artifacts and burial sites)
- Visual quality (distance to residential development; vistas of wash and wildlife refuge)
- Road traffic noise (distance to roadway; speed of roadway; average vehicles per hour)
- Air quality (dust from construction sites, roads, and recreation)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

PAIUTE INDIAN RESERVATION (A5)



ONE MILE BUFFER (A5)

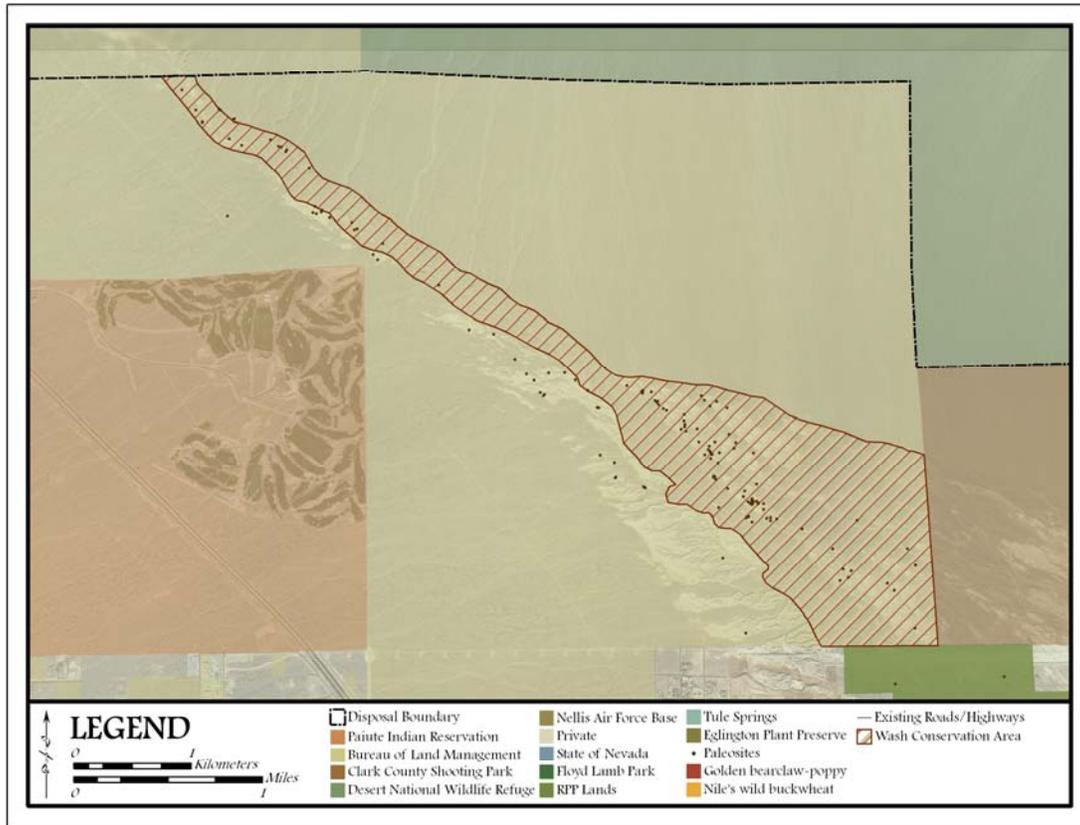
This alternative component represents a one mile buffer (1.6 km) on the north and east sides of the Paiute Indian Reservation. The existence of a one mile buffer would fulfill the request of the Paiute Tribe of Las Vegas, Nevada; however, it would provide only a minimal amount of urban development adjacent to the reservation in the northwest portion of the disposal area. Because a one mile buffer would prevent any development to the north of the reservation, it may also preserve intact plant communities representative of the Mojave Desert. The existence of a one mile buffer should provide protection from visual and social nuisances associated with the construction and existence of adjacent residential subdivisions and associated transportation networks. The width of the buffer provides the maximum amount of protection for any potential Native American artifacts or burial sites within the North Las Vegas Wash and it may be more than adequate to prevent any adverse social impacts and to maintain the economic benefits of the Las Vegas Paiute Golf Resort.

AREA: 4,026 acres (1,629 hectares)

ASSESSMENT METRICS

- Cultural resources (Native American artifacts and burial sites)
- Visual quality (distance to residential development; vistas of wash and wildlife refuge)
- Road traffic noise (distance to roadway; speed of roadway; average vehicles per hour)
- Air quality (dust from construction sites, roads, and recreation)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

NORTHWEST UPPER LAS VEGAS WASH (B1)



ACTIVE WASH (B1)

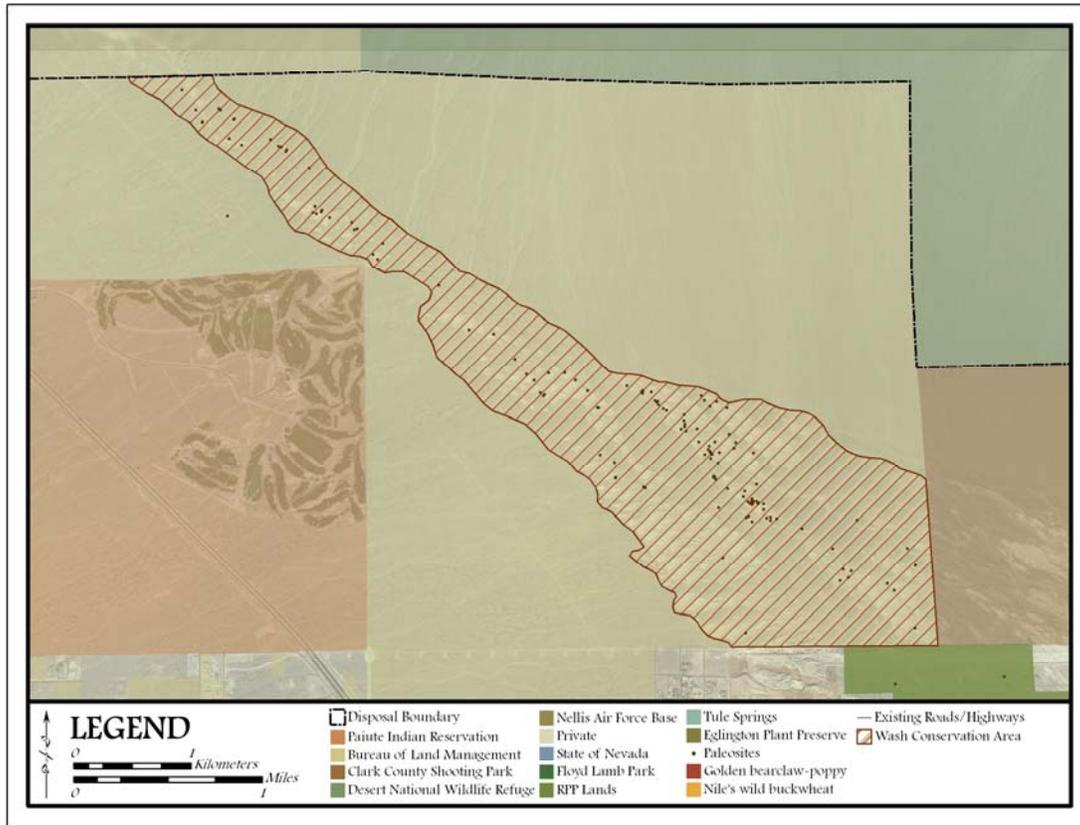
This alternative component represents the preservation of the active wash (Quaternary active wash deposits) and the adjacent floodplains. This configuration would allow the greatest amount of urban development adjacent to the northwest portion of the Upper Las Vegas Wash while preserving the minimum land necessary for natural water flow. The active wash boundary was delineated using photo interpretation methods and data derived from the United States Geological Survey (USGS) geologic and geophysical data of the Las Vegas quadrangle.

AREA: 1,211 acres (490 hectares)

ASSESSMENT METRICS

- Quaternary active wash deposits
 - Qayy [Youngest alluvium (Holocene)] - Noncemented alluvial-fan gravel and sand of intermittently active wash complexes.
- 100-year floodplain

NORTHWEST UPPER LAS VEGAS WASH (B2)



PALEONTOLOGICAL RESOURCES (B2)

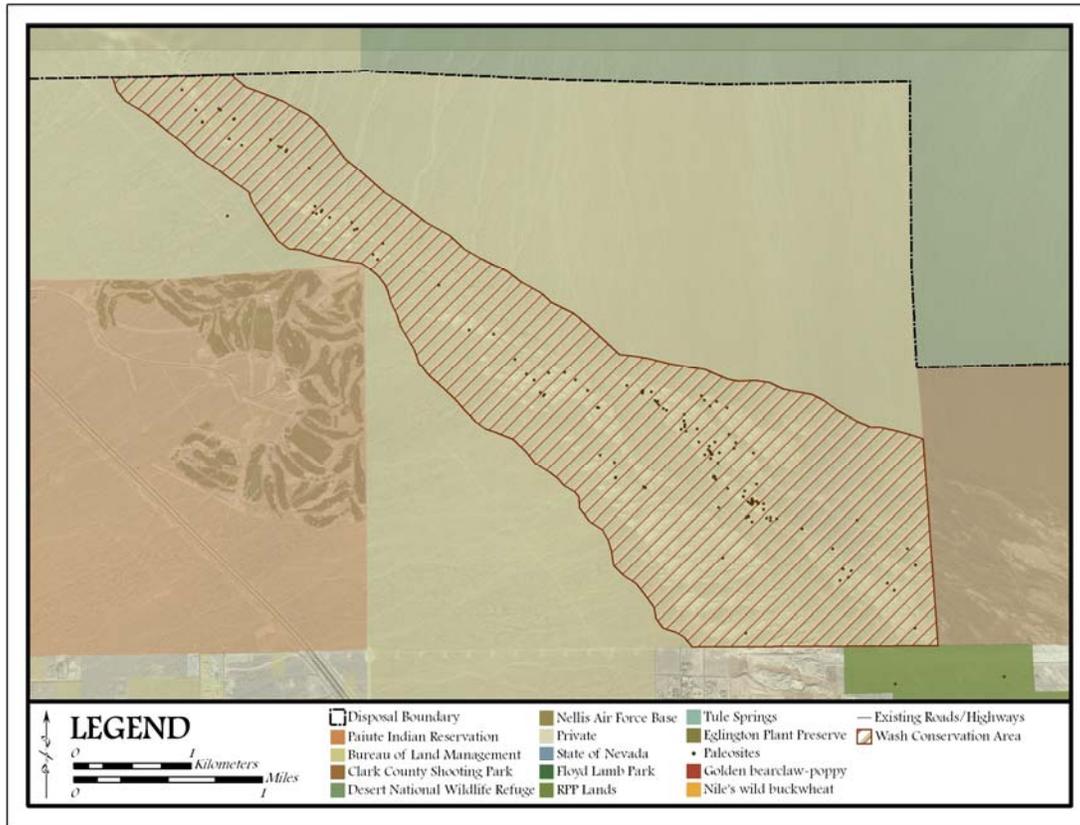
This alternative component represents the preservation of paleontological resources and the fossiliferous Quaternary spring deposits associated with fossils of late Pleistocene megafauna. This configuration would provide a moderate amount of urban development adjacent to the northwest portion of the Upper Las Vegas Wash while preserving valuable fossils that may increase the understanding of the history of life on Earth. The paleontological resources boundary was delineated using photo interpretation methods and data derived from the United States Geological Survey (USGS) geologic and geophysical data of the Las Vegas quadrangle.

AREA: 1,919 acres (776 hectares)

ASSESSMENT METRICS

- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge (late Pleistocene)] - Top 1 to 2 meters is characteristically resistant light-gray calcareous mud that is particularly cemented with calcite.
 - Qse [Young fine-grained deposits associated with past groundwater discharge (early Holocene to latest Pleistocene)] - Light-gray to light-brown unconsolidated silt, sandy silt, and mud. Locally contains aquatic and terrestrial mollusk shells and fossils of late Pleistocene megafauna, including mammoth, bison, horse, and camel.
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge (early Holocene and late Pleistocene)] - Includes units Qse and Qscd.

NORTHWEST UPPER LAS VEGAS WASH (B3)



WASH ECOSYSTEM (B3)

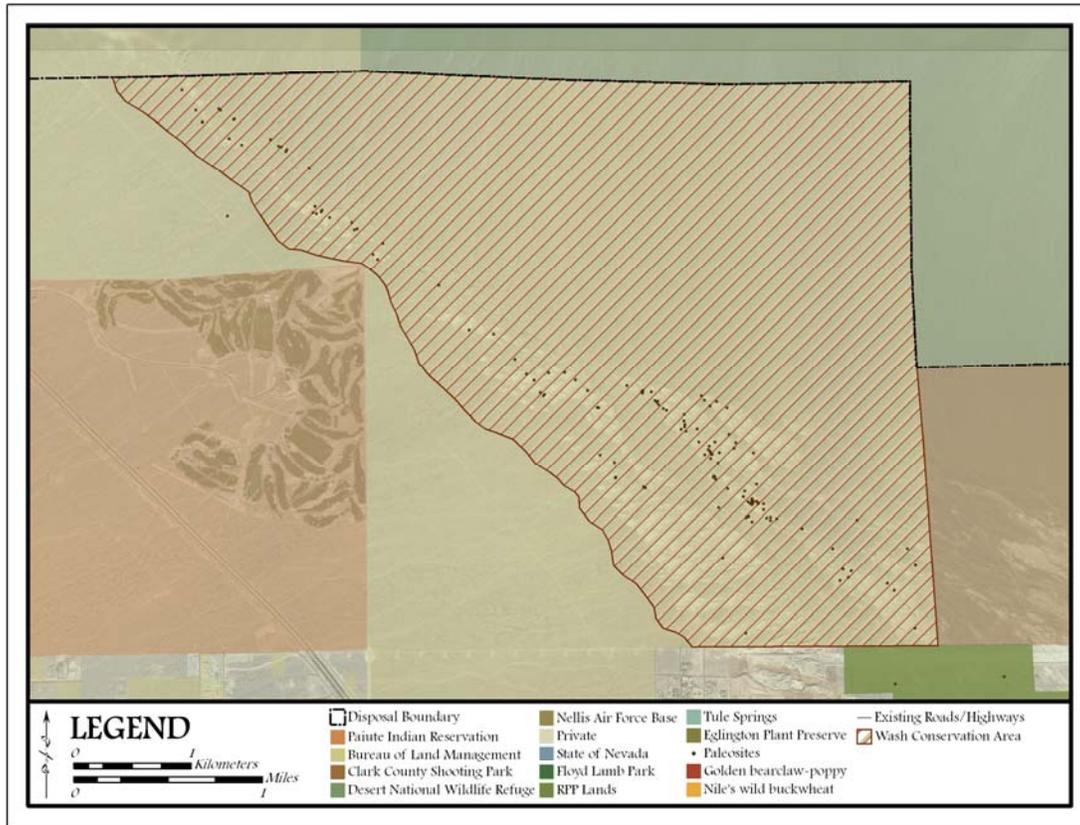
This alternative component represents the preservation of the northwest portion of the Upper Las Vegas Wash ecosystem. This includes the conservation of plant and animal communities representative of an arid wash ecosystem as well as the conservation of paleontological resources and fossiliferous Quaternary spring deposits within the wash environment. This configuration would provide a minimum to moderate amount of urban development adjacent to the northwest portion of the Upper Las Vegas Wash while preserving the ecological functioning of the wash. The wash ecosystem boundary was delineated using a combination of the active wash and paleontological resources boundaries in addition to including an ecological buffer, approximately one-tenth of a mile (0.16 km) wide.

AREA: 2,517 acres (1,019 hectares)

ASSESSMENT METRICS

- Ecological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

NORTHWEST UPPER LAS VEGAS WASH (B4)



MOJAVE DESERT ECOSYSTEM (B4)

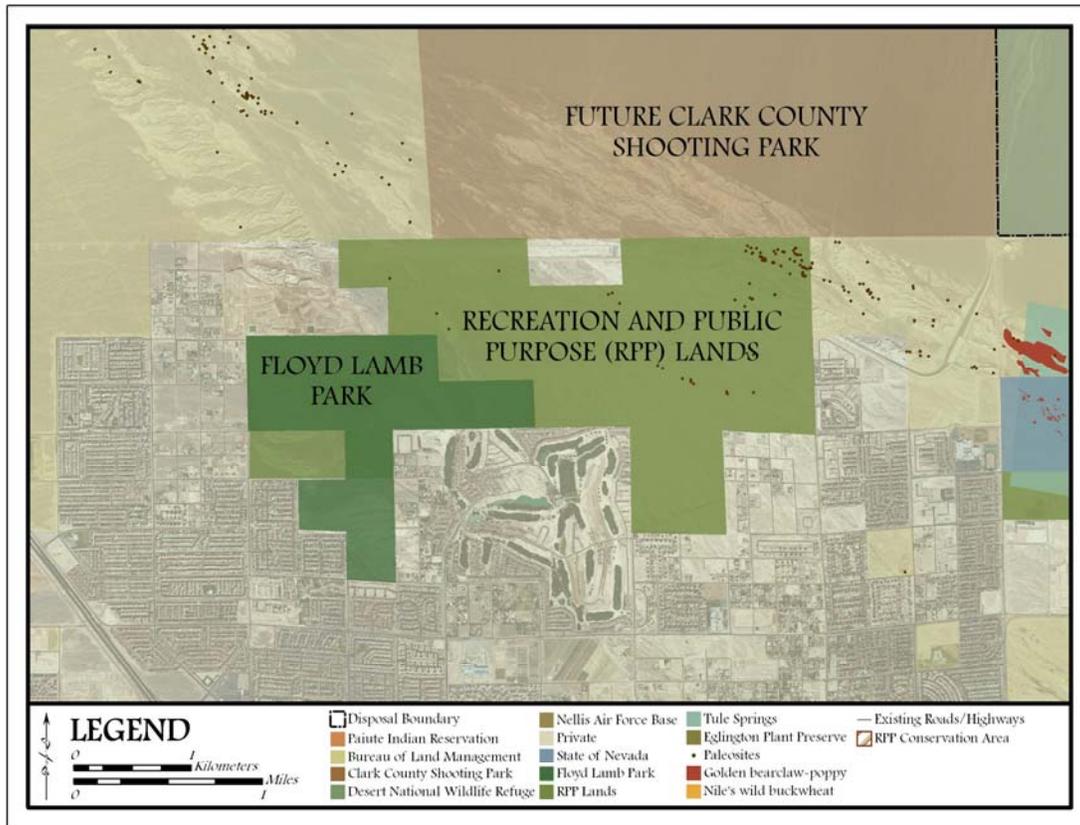
This alternative component represents the preservation of an intact portion of the Mojave Desert ecosystem that would neighbor the Desert National Wildlife Refuge. This includes the conservation of plant and animal communities representative of the Mojave Desert as well as the conservation of paleontological resources and fossiliferous Quaternary spring deposits within the Mojave Desert environment. This configuration would provide the least amount of urban development adjacent to the northwest portion of the Upper Las Vegas Wash, but it would sustain the ecological functioning of the northwest portion of the Upper Las Vegas Wash, the bajada of the Sheep Range, and a community representative of the Mojave Desert.

AREA: 5,105 acres (2,066 hectares)

ASSESSMENT METRICS

- Representative plant communities of the Mojave Desert
- Ecological and hydrological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

RECREATION AND PUBLIC PURPOSE LANDS (C1)



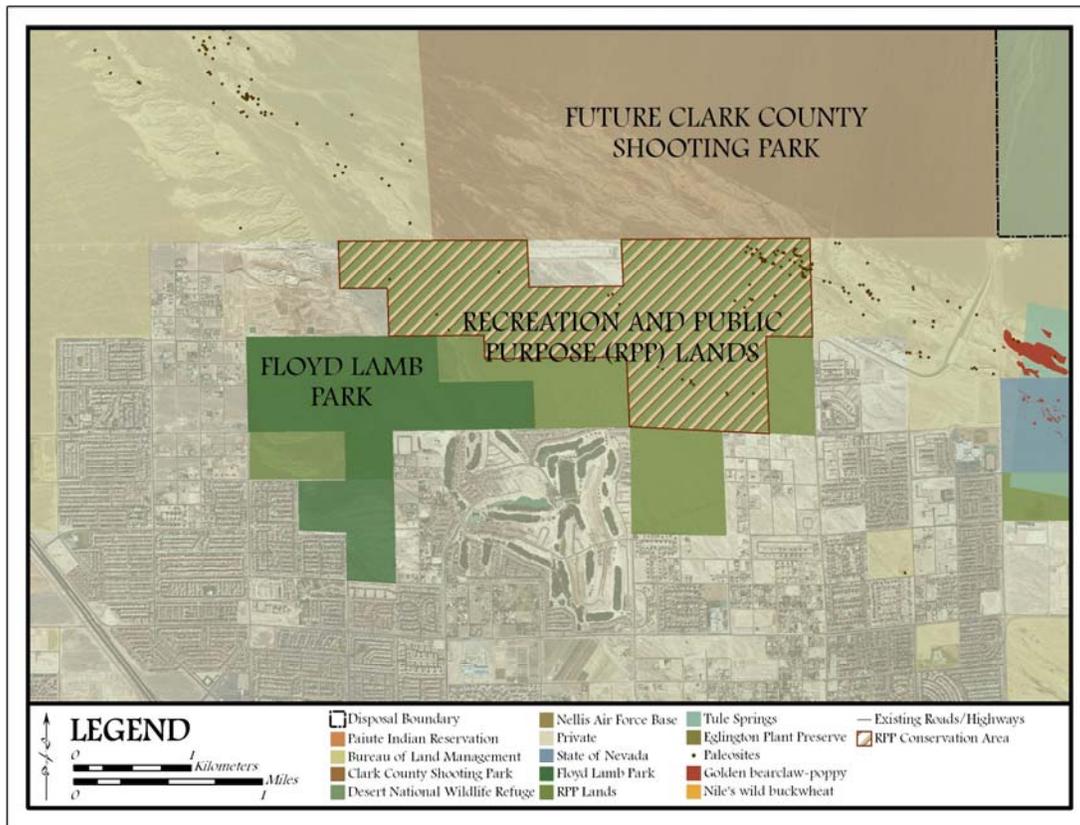
NO RECREATION AND PUBLIC PURPOSE LANDS (C1)

This alternative component represents the exclusion of Recreation and Public Purpose lands (lands leased from the Bureau of Land Management) from the designated conservation transfer area. No recommendations will be made regarding the future uses of the area. The Recreation and Public Purpose lands may indirectly serve as areas of access into the authorized wash conservation areas, but will be utilized and maintained as specified in the Floyd Lamb Park Master Plan and consistent with the plan of development amendment as approved by the Bureau of Land Management.

ASSESSMENT METRICS

- Connectivity of the Upper Las Vegas Wash
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
- Cultural resources
- Non-motorized recreation (hiking, biking, and equestrian trails)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

RECREATION AND PUBLIC PURPOSE LANDS (C2)



RECREATION AND PUBLIC PURPOSE LANDS WITH NO DESIGNATED USE (C2)

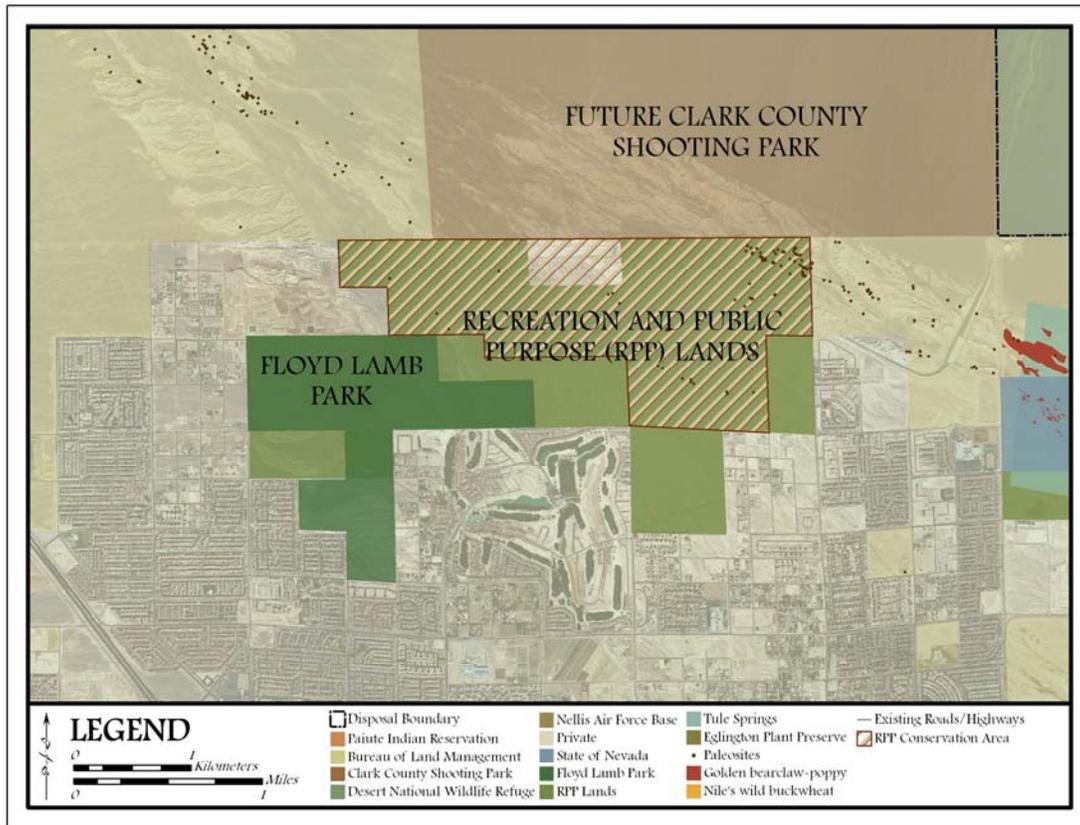
This alternative component represents the inclusion of Recreation and Public Purpose lands (lands leased from the Bureau of Land Management) which currently have no designated use or plan into the conservation transfer area. This indicates that recommendations will be made by the Las Vegas Bureau of Land Management based on the field data and social survey results regarding the future uses of the lands. The inclusion of these lands will connect the northwest and southeast wash conservation transfer areas to maintain continuity within the Upper Las Vegas Wash for ecological and recreational functions.

AREA: 988 acres (400 hectares)

ASSESSMENT METRICS

- Connectivity of the Upper Las Vegas Wash
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
- Cultural resources
- Non-motorized recreation (hiking, biking, and equestrian trails)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

RECREATION AND PUBLIC PURPOSE LANDS (C3)



RECREATION AND PUBLIC PURPOSE LANDS WITH NO DESIGNATED USE AND PRIVATELY-OWNED PARCEL (C3)

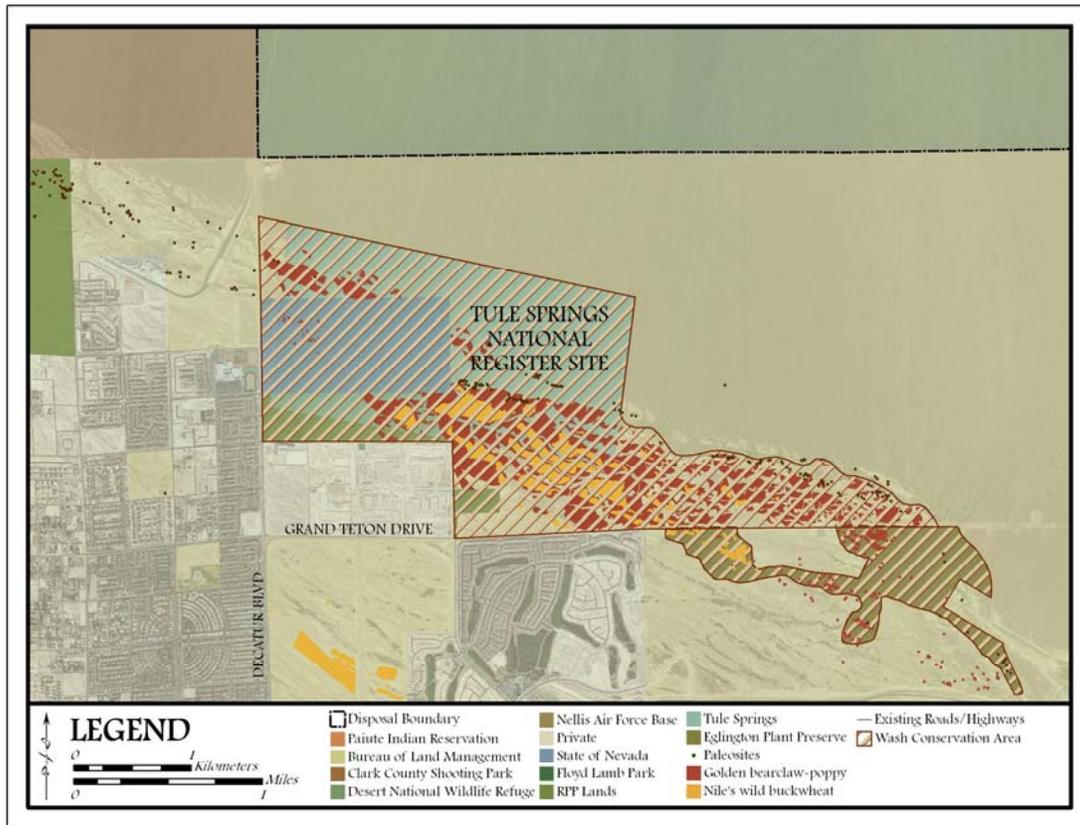
This alternative component represents the inclusion of Recreation and Public Purpose lands (lands leased from the Bureau of Land Management) which currently have no designated use or plan and the 81 acre (33 hectare) privately-owned parcel into the conservation transfer area. Although the privately-owned parcel appears land-locked by the Recreation and Public Purpose lands and the future Clark County Shooting Park, the proposed Mountain Edge Beltway may provide future access for development if constructed. Therefore, the parcel should be acquired, either purchased or exchanged for another parcel outside of the North Las Vegas Wash, to provide and potentially enhance the connectivity within the Upper Las Vegas Wash for ecological and recreational functions.

AREA: 1,069 acres (433 hectares)

ASSESSMENT METRICS

- Connectivity of the Upper Las Vegas Wash
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
- Cultural resources
- Non-motorized recreation (hiking, biking, and equestrian trails)
- Social impacts (littering; vandalism; unregulated motorized vehicle use)

SOUTHEAST UPPER NORTH LAS VEGAS WASH (D1)



RARE PLANT SPECIES (D1)

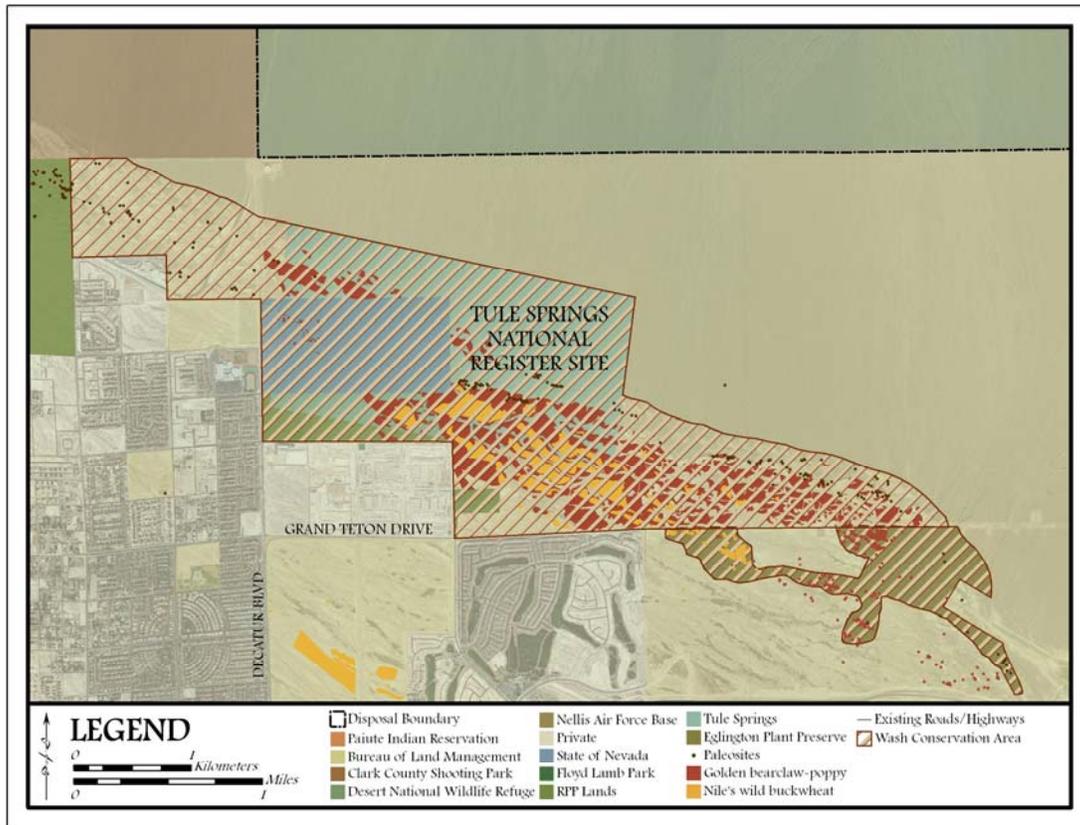
This alternative component represents the preservation of rare, sensitive, and endemic plant species with an emphasis on preserving the Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont) and Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal) within the Upper Las Vegas Wash. This configuration would provide the greatest amount of urban development adjacent to the southeast portion of the Upper Las Vegas Wash while maintaining the habitat required for viable populations of rare plant species. The rare plant species boundary was delineated based on previously surveyed populations of the Golden bearclaw-poppy and Nile's wild buckwheat.

AREA: 622 acres (251 hectares); **TOTAL AREA:** 2,157 acres (873 hectares) [includes Tule Springs National Register Site, State Land, Recreation and Public Purpose Lands, and Eglington Plant Preserve]

ASSESSMENT METRICS

- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)

SOUTHEAST UPPER NORTH LAS VEGAS WASH (D2)



PALEONTOLOGICAL RESOURCES AND RARE PLANT SPECIES (D2)

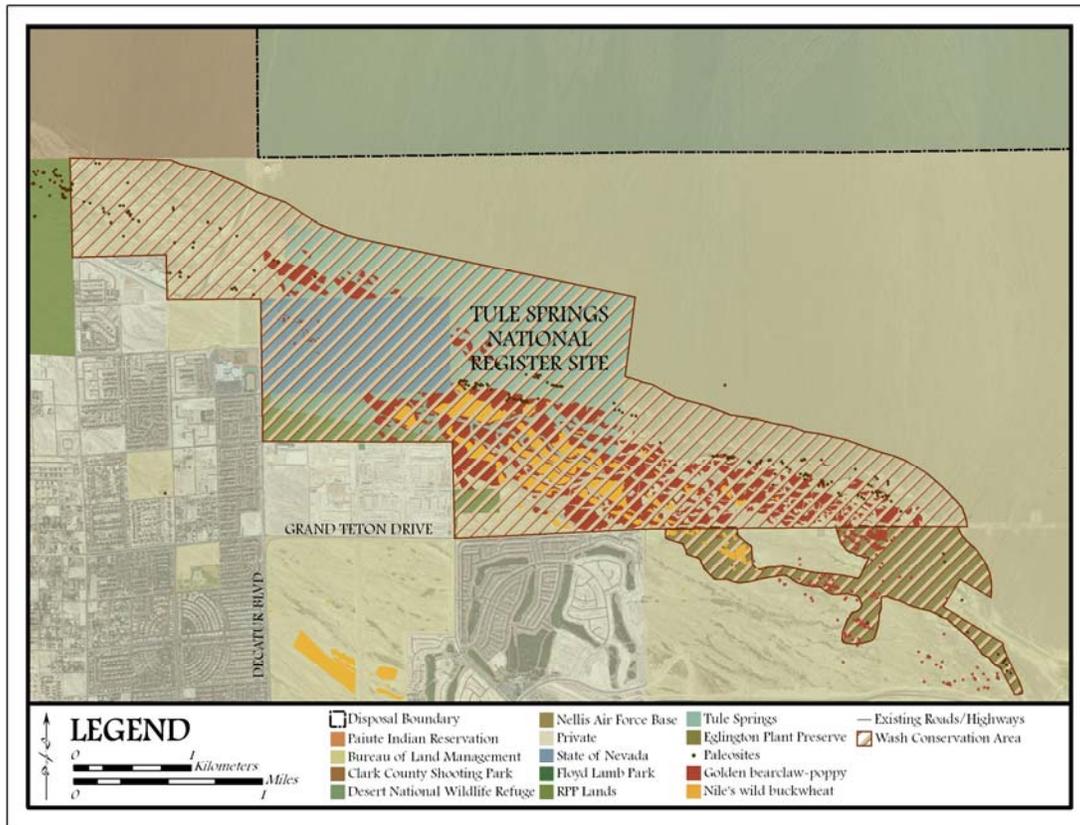
This alternative component represents the preservation of paleontological resources and the fossiliferous Quaternary spring deposits associated with fossils of late Pleistocene megafauna and the preservation of rare, sensitive, and endemic plant species with an emphasis on preserving the Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont) and Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal) within the Upper Las Vegas Wash. This configuration would provide the greatest amount of urban development adjacent to the southeast portion of the Upper Las Vegas Wash while maintaining the habitat required for viable populations of rare plant species and preserving valuable fossils that may increase the understanding of the history of life on Earth. The paleontological resources and rare plant species boundary was delineated based on previously surveyed paleosites and populations of the Golden bearclaw-poppy and Nile's wild buckwheat, as well as photo-interpretation methods based on data derived from the United States Geological Survey (USGS) geologic and geophysical data of the Las Vegas quadrangle.

AREA: 1,067 acres (431 hectares); **TOTAL AREA:** 2,602 acres (1,053 hectares) [includes Tule Springs National Register Site, State Land, Recreation and Public Purpose Lands, and Eglington Plant Preserve]

ASSESSMENT METRICS

- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)

SOUTHEAST UPPER NORTH LAS VEGAS WASH (D3)



WASH ECOSYSTEM I (D3)

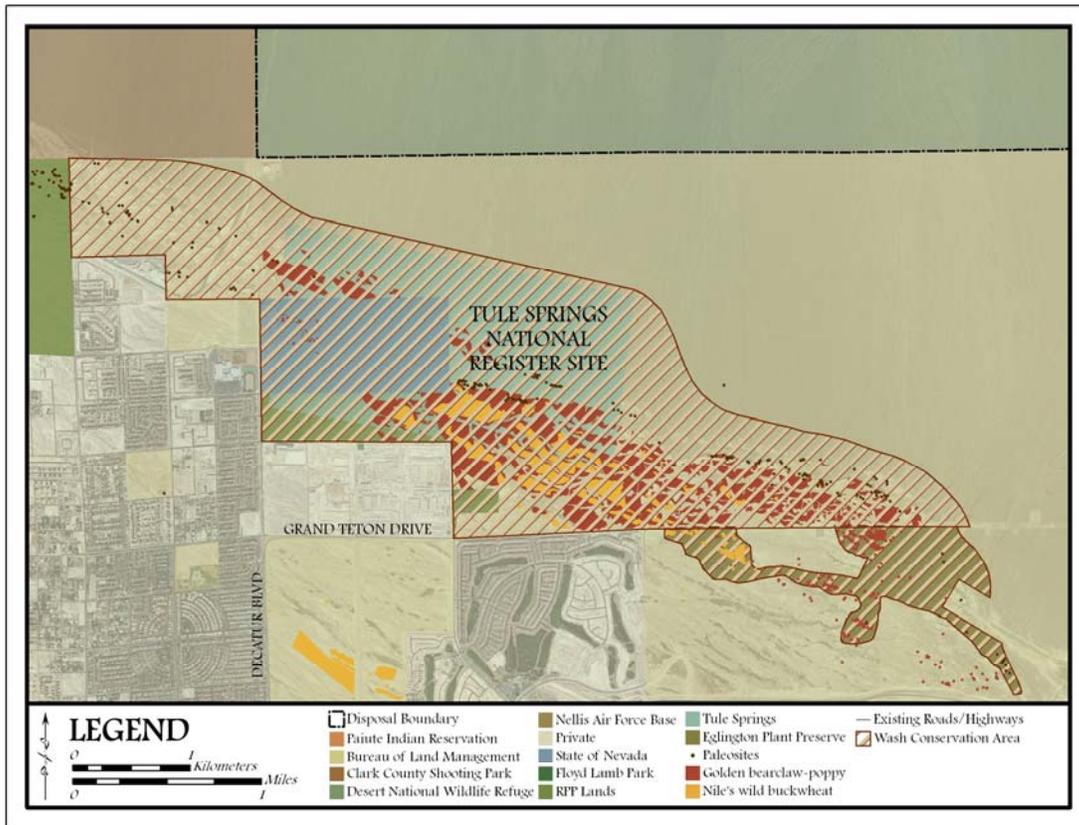
This alternative component represents the preservation of the southwest portion of the Upper Las Vegas Wash ecosystem. In addition to the elements preserved in component D2, this component incorporates the conservation of the ecological functioning of the wash ecosystem and conservation of plant and animal communities representative of an arid wash ecosystem. This is displayed by including an ecological buffer, approximately one-tenth of a mile (0.16 km) wide. This configuration would provide a moderate amount of urban development adjacent to the southeast portion of the Upper Las Vegas Wash while preserving sustained populations of rare plants, conserving valuable fossils that may increase the understanding of the history of life on Earth, and maintaining the ecological functioning of the wash.

AREA: 1,255 acres (508 hectares); **TOTAL AREA:** 2,790 acres (1,130 hectares) [includes Tule Springs National Register Site, State Land, Recreation and Public Purpose Lands, and Eglington Plant Preserve]

ASSESSMENT METRICS

- Ecological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

SOUTHEAST UPPER NORTH LAS VEGAS WASH (D4)



WASH ECOSYSTEM II (D4)

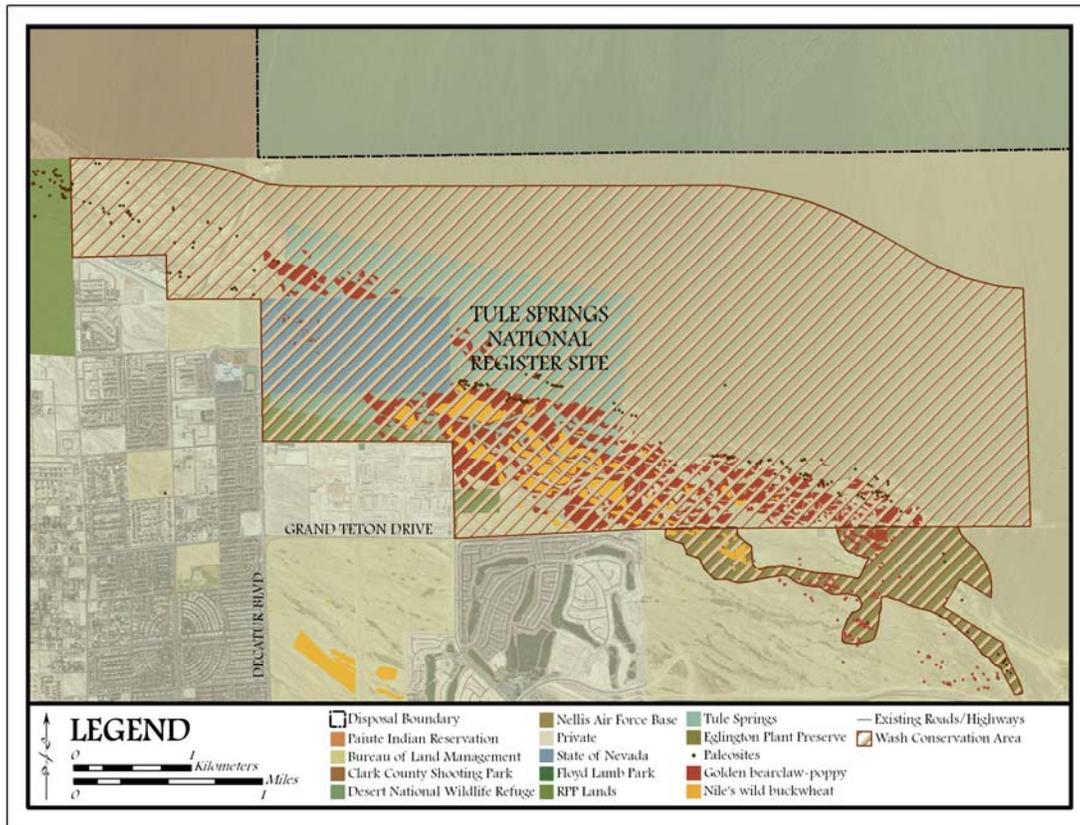
This alternative component represents the preservation of the southwest portion of the Upper Las Vegas Wash ecosystem. This component incorporates an enlarged wash conservation area which encompasses a portion of the lower bajada in order to preserve the plant and animal communities of the wash ecosystem, populations of rare plant species, and paleontological resources and fossiliferous Quaternary spring deposits within the wash environment. This configuration would provide a minimum to moderate amount of urban development adjacent to the southeast portion of the Upper Las Vegas Wash, but would sustain populations of rare plants, conserve valuable fossils that may increase the understanding of the history of life on Earth, and maintain the ecological functioning of the wash (see component E3).

AREA: 1,405 acres (569 hectares); **TOTAL AREA:** 2,940 acres (1,190 hectares) [includes Tule Springs National Register Site, State Land, Recreation and Public Purpose Lands, and Eglington Plant Preserve]

ASSESSMENT METRICS

- Ecological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

SOUTHEAST UPPER NORTH LAS VEGAS WASH (D5)



MOJAVE DESERT ECOSYSTEM I (D5)

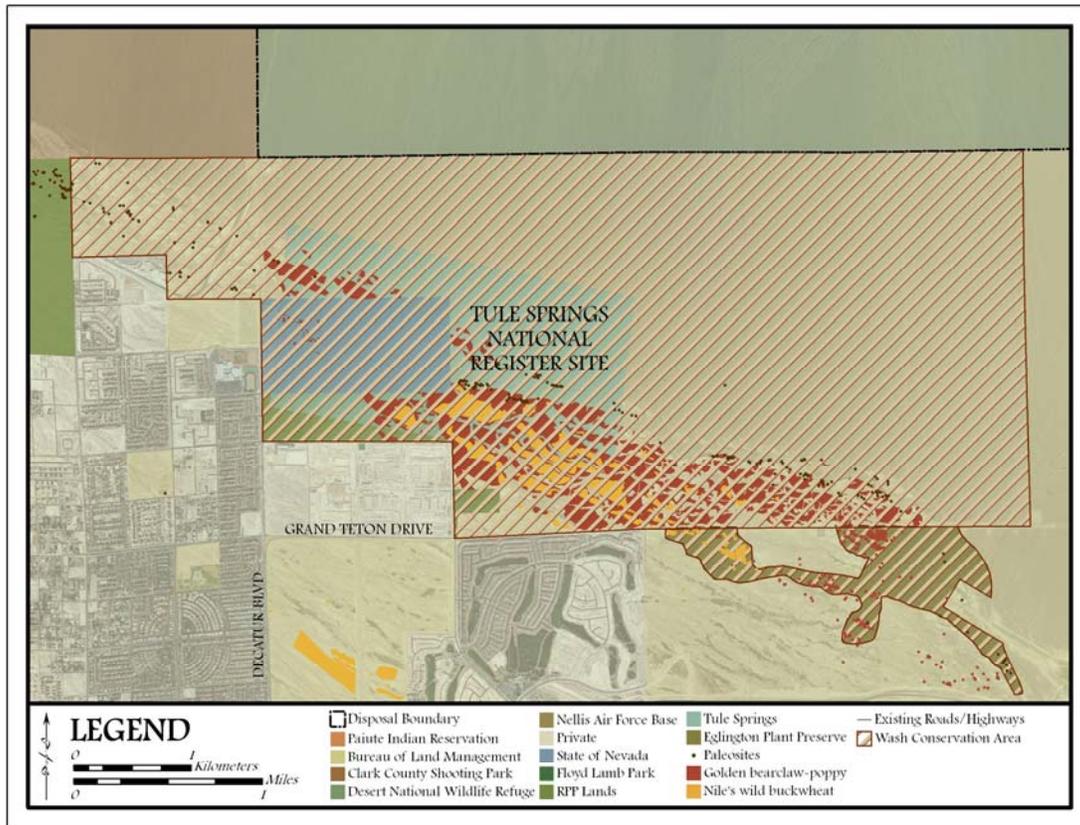
This alternative component represents the preservation of an intact portion of the Mojave Desert ecosystem which would be bound by the proposed Mountain Edge Beltway (see component E2). This component includes the conservation of plant and animal communities representative of the Mojave Desert, as well as the conservation of rare plant species, paleontological resources and fossiliferous Quaternary spring deposits within the southeast portion of the Upper Las Vegas Wash. This configuration would allow a minimal amount of urban development, but it would sustain the ecological functioning of the southeast portion of the wash and a community representative of the Mojave Desert.

AREA: 3,309 acres (1,339 hectares); **TOTAL AREA:** 4,844 acres (1,961 hectares) [includes Tule Springs National Register Site, State Land, Recreation and Public Purpose Lands, and Eglington Plant Preserve]

ASSESSMENT METRICS

- Representative plant communities of the Mojave Desert
- Ecological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

SOUTHEAST UPPER NORTH LAS VEGAS WASH (D6)



MOJAVE DESERT ECOSYSTEM II (D6)

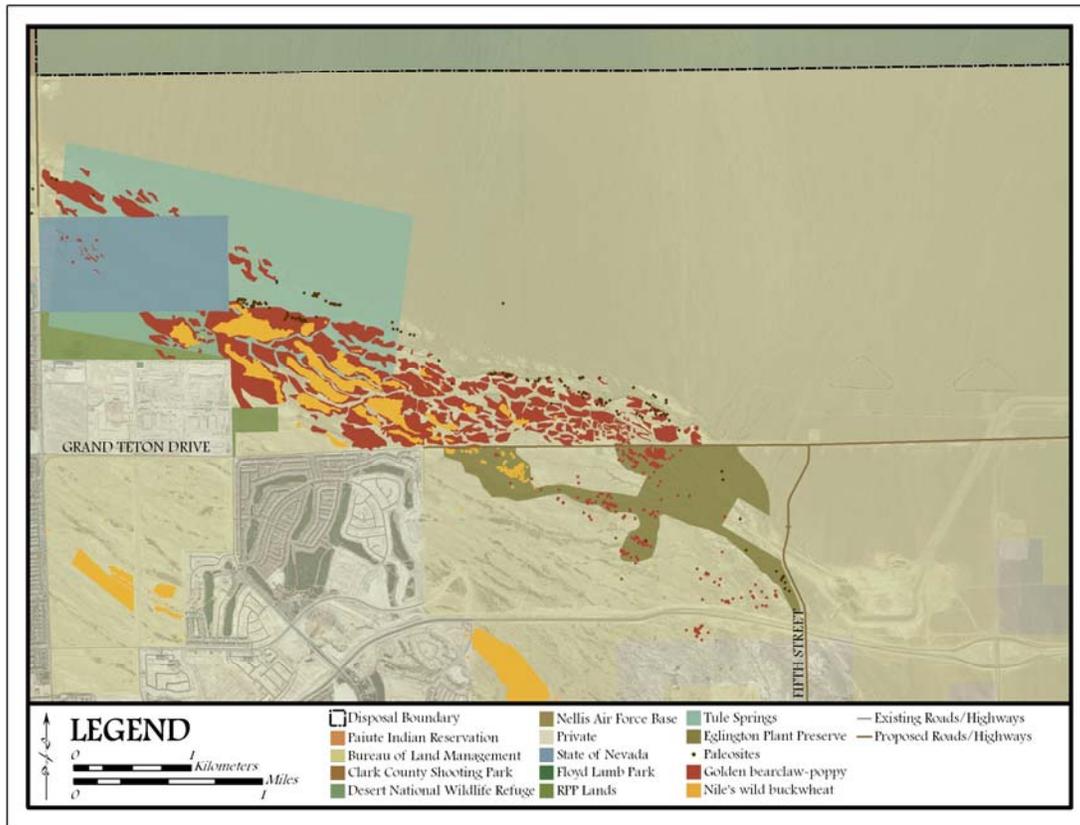
This alternative component represents the preservation of an intact portion of the Mojave Desert ecosystem which would be connected to the wildlife refuge (see component E1). This component includes the conservation of plant and animal communities representative of the Mojave Desert, as well as the conservation of rare plant species, paleontological resources and fossiliferous Quaternary spring deposits within the southeast portion of the Upper Las Vegas Wash. This configuration would provide the least amount of urban development, but it would sustain the ecological and hydrological functioning of the southeast portion of the wash and the bajada of the Sheep Range and a community representative of the Mojave Desert.

AREA: 4,047 acres (1,637 hectares); **TOTAL AREA:** 5,582 acres (2,259 hectares) [includes Tule Springs National Register Site, State Land, Recreation and Public Purpose Lands, and Eglinton Plant Preserve]

ASSESSMENT METRICS

- Representative plant communities of the Mojave Desert
- Ecological and hydrological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

MOUNTAIN EDGE BELTWAY (E1)



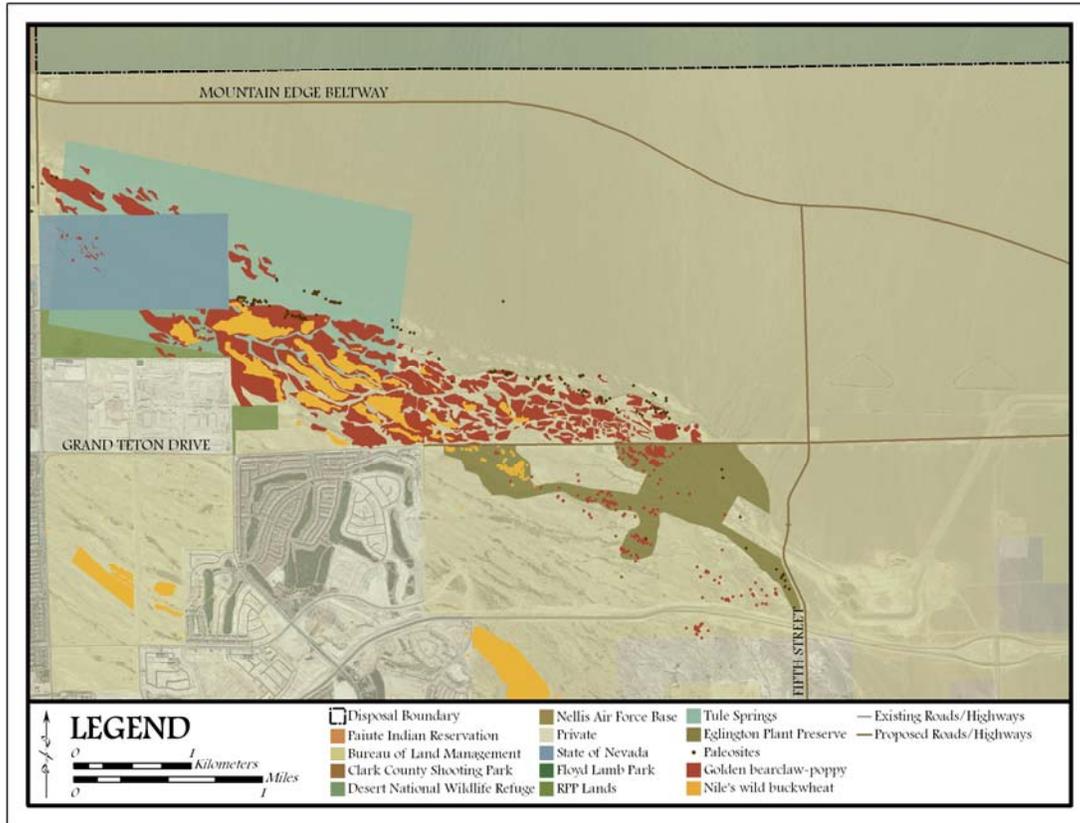
NO MOUNTAIN EDGE BELTWAY (E1)

This alternative component represents the exclusion of future roads and highways (i.e. Mountain Edge Beltway) north of Grand Teton Drive in the area adjacent to the southeast portion of the North Las Vegas Wash. This component may be paired with Mojave Desert Ecosystem II (D6).

ASSESSMENT METRICS

- Representative plant communities of the Mojave Desert
- Ecological and hydrological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Benth var. *nilesii* Reveal)
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

MOUNTAIN EDGE BELTWAY (E2)



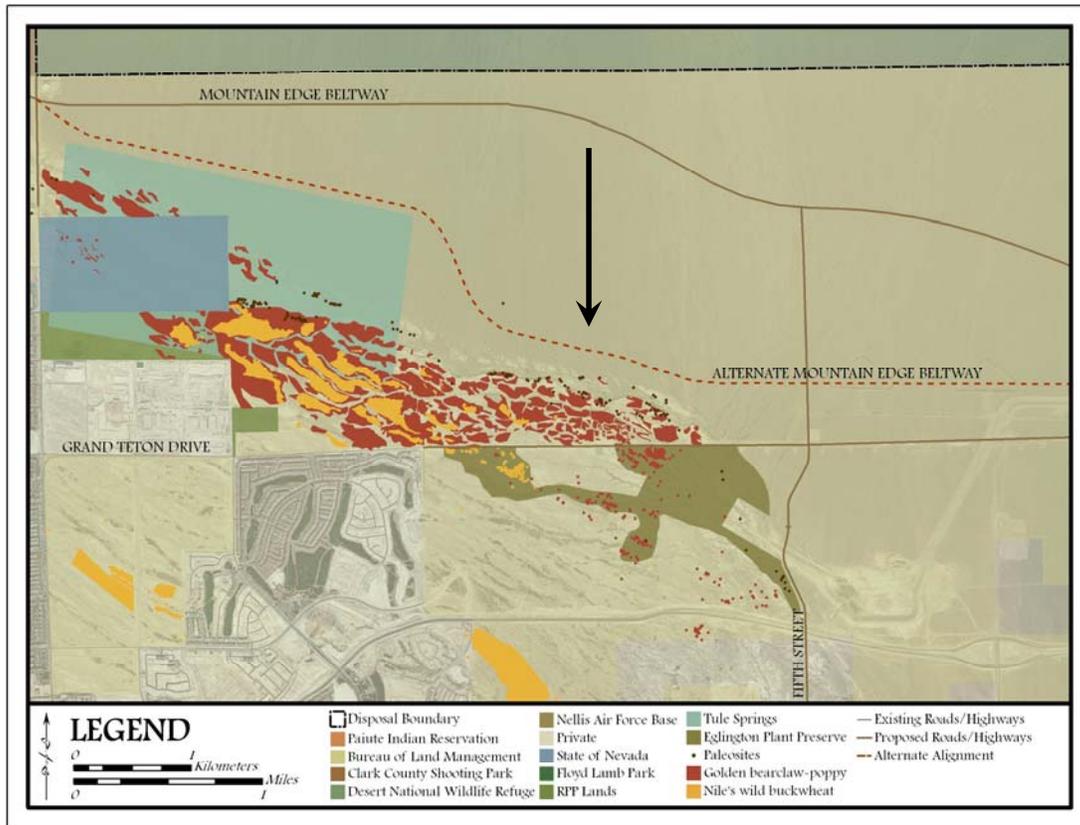
PROPOSED ALIGNMENT (E2)

This alternative component represents the proposed alignment of Mountain Edge Beltway and the extension of Fifth Street. This component was considered by the Utah State University team because a major transportation artery is necessary for public safety if development is to occur in the area. However, roads bisecting the wash or areas of concern may cause irreparable harm. This component may be paired with components Rare Plant Species (D1), Paleontological Resources and Rare Plant Species (D2), Wash Ecosystem I (D3), Wash Ecosystem II (D4), or Mojave Desert Ecosystem I (D5).

ASSESSMENT METRICS

- Ecological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]

MOUNTAIN EDGE BELTWAY (E3)



ALTERNATE ALIGNMENT (E3)

This alternative component represents an alternate alignment of Mountain Edge Beltway. The realignment of this proposed beltway was considered for the purpose of preserving the southeast portion of the Upper Las Vegas Wash while providing public safety. The alternate alignment can serve two scenarios to ensure the wash will be protected from encroachment of future urban land uses. The beltway may be utilized as an access barrier or it may be used as a limited access road with high-end, low-density housing in the developable parcels south of the beltway. As an access barrier, the beltway may not only protect the wash, but it may provide scenic views of the Las Vegas Valley over the wash. This component may be paired with the Wash Ecosystem II (D4). As a limited access road, it can protect the wash with high-end, low-density housing serving as a social barrier. This scenario may be paired with the Rare Plant Species (D1), Paleontological Resources and Rare Plant Species (D2), or Wash Ecosystem I (D3). Other alignments may be considered by stakeholders to achieve similar objectives.

ASSESSMENT METRICS

- Ecological functioning of the wash ecosystem
- Paleontological resources
 - Fossiliferous Quaternary spring deposits
 - Qscd [Intermediate fine-grained deposits associated with past groundwater discharge]
 - Qse [Young fine-grained deposits associated with past groundwater discharge]
 - Qsu [Undivided young and intermediate fine-grained deposits associated with past groundwater discharge]
 - Maintenance of Tule Springs National Register Site
- Golden bearclaw-poppy (*Arctomecon californica* Torrey and Frémont)
- Nile's wild buckwheat (*Eriogonum corymbosum* Bentham var. *nilesii* Reveal)
- Quaternary active wash deposits
 - Qayy [Youngest alluvium]
- Visual quality (views of the Upper Las Vegas Wash and the Las Vegas Valley from the beltway)

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