Environmental Assessment



# DARPA Grand Challenge

nda

Linda Hansen California Desert District Manager

#### US Department of the Interior Bureau of Land Management



ní le Merion

Grand Challenge Program Manager

US Department of Defense Defense Advanced Research Projects Agency



December 2003



# United States Department of the Interior BUREAU OF LAND MANAGEMENT

CALIFORNIA DESERT DISTRICT 22835 Calle San Juan de los Lagos Moreno Valley, CA 92553-9046 (909) 697-5200 www.ca.blm.gov



IN REPLY REFER TO: 1791 (CA 068.02)

December 9, 2003

Dear Reader:

Enclosed is the Environmental Assessment (EA) for the Defense Advanced Research Projects Agency's (DARPA) Grand Challenge. DARPA and the Bureau of Land Management (BLM) have cooperatively prepared this EA, as federal co-lead agencies, in accordance with the National Environmental Policy Act (NEPA). This EA includes assessment of four action alternatives and the No Action Alternative.

The purpose of the DARPA Grand Challenge is the military field test of autonomous robotic vehicle technology. The Grand Challenge would be conducted in OHV areas and on designated open routes in the Mojave and Colorado Desert region.

This document is being sent to you for public review and comment prior to the Bureau making its decisions on the proposal. This is your opportunity to provide any input of concern to you. All comments must be received by close of business Friday, January 28, 2004. Please provide information on how to be contacted if you would like to follow-up to resolve or clarify issues, including closures that may affect you. At the end of the comment period, a decision record will be prepared for the Grand Challenge.

Please provide your comments to:

The Bureau of Land Management California Desert District Office 22835 Calle San Juan de los Lagos Moreno Valley, CA 92553-9046 Attn: DARPA Comment Coordinator

Thanks for your interest in your public lands.

Sincerely,

Linda Hansen District Manager

#### UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

#### ENVIRONMENTAL ASSESSMENT

CONTROL NO .:	CA-680-03-58
CASE FILE/SERIAL NO.:	CACA 45788/Section 302, FLPMA MOA
PROPONENT:	Dept of Defense, DARPA
BLM LEAD OFFICE:	Barstow Field Office 2601 Barstow Road Barstow, CA 92311

#### Background:

DARPA has requested to utilize public lands and routes to test research vehicles for the advancement of military technology. A Memorandum of Agreement has been signed identifying primary and support agency roles and responsibilities for analysis and conduct of an event. Both federal agencies are participating as co-leads to complete the NEPA analysis and supporting documentation. The Bureau of Land Management has assumed primary oversight for completion of the NEPA document to agency standards, and DOD, DARPA has assumed primary oversight for consultation on the project with the U.S. Fish and Wildlife Service.

#### Proposed Action:

DARPA proposes to conduct a field test of autonomous robotic vehicle technology in OHV areas and open designated routes in the Mojave and Colorado Desert, in order to advance this technology. The field test is designed to be completed during one day of daylight hours, but provisions are included for contingency dates. A federal closure would be imposed on affected routes and areas during the event. Activities in support of the field test include those associated with a start area, finish area, two spectator areas, media observation points, safety and environmental monitors. Each test vehicle will be under the ownership and control of DARPA during the military field test, and will be closely followed by a control vehicle to ensure that the test vehicle stays on the designated route, and does not pose a safety or environmental threat.

#### Location of Proposed Action:

The Grand Challenge is located within OHV Open Areas in the Mojave and Colorado Desert region of California and Nevada and designated open routes connecting those areas. Route networks comprising the alternatives cover approximately 1,200 miles of routes. The selected route length would be based on the specific route segments selected, with a start point near Barstow and an ending in the vicinity of Las Vegas.

#### Conformance with Applicable Land Use Plan:

This proposed action is subject to the following Land Use Plans: *California Desert Conservation Area Plan, 1980, (CDCA) as amended* and *Las Vegas Resource Management Plan (LVRMP, 1998)*. The acreage and routes are located in Multiple-Use Class Limited (L), Moderate (M), and Intensive (I) Use areas. Class L lands are managed to provide for generally lower-intensity, carefully controlled multiple use resources, while ensuring that sensitive values are not significantly diminished. Class M lands are managed to provide for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development, while conserving desert resources and mitigating damage to those resources which permitted uses may cause. Class I lands are managed to provide for sensitive natural and cultural values and mitigation of impacts on resources, including rehabilitation of impacted areas, insofar as possible.

# TABLE OF CONTENTS

CHAPT	ER 1 INTRODUCTION	1-1
1.1	Purpose and Need for the Grand Challenge	
1.2	Conformance with Land Use Plans	1-2
СНАРТ	FR 2 ALTERNATIVES	2-1
2.1		
2.1	The Grand Challenge Elements Common to All Action Alternatives	
2.2	Description of Grand Challenge Elements Common to All Action Alternatives	
2.5	Northarn Network Alternative 1	
2.4	Control Notwork Alternative 2	
2.5	Central Network Alternative 2	
2.0	Combined Network Alternative 4	2-14
2.7	No Action Alternative	
2.0	Alternatives Considered and Eliminated From Further Analysis	
2.9	Anematives Considered and Emminated Floin Further Analysis	
CHAPT	ER 3 AFFECTED ENVIRONMENT	
3.1	Introduction	3-1
3.2	General Setting	
3.3	Vegetation	
3.4	Threatened & Endangered, and Sensitive Plant Species	
3.5	Wildlife	
3.6	Areas of Critical Environmental Concern (ACEC)	3-12
3.7	Air Quality	3-16
3.8	Cultural Resources	3-17
3.9	Water Quality	3-18
3.10	Wastes, Hazardous or Solid	3-18
3.11	Safety and Law Enforcement	3-18
3.12	Utilities	3-18
3.13	Recreation and Access	3-19
3.14	Scenic Values	3-19
3.15	Wetlands/Riparian Values	3-19
CHAPT	ER 4 ENVIRONMENTAL CONSEQUENCES	
4.1	Introduction	
4.2	Northern Network Alternative 1	4-1
4.3	Central Network Alternative 2	4-17
4.4	Southern Network Alternative 3	4-25
4.5	Combined Network Alternative 4	4-31
4.6	No Action Alternative	4-37
4.7	Cumulative Impacts	4-41
	r	
СНАРТ	ER 5 DOCUMENT SUPPORT	5-1
5 1	Dronorara of the Environmental Assessment	۲ د د. ۲ ۱
3.1	riepaters of the Environmental Assessment	

# LIST OF EXHIBITS

Affected Areas	1-3
Waypoint Spacing	2-3
Route Networks	2-7
ACECs	3-9
	Affected Areas

# LIST OF TABLES

Table 2-1	Estimated Vehicles, Persons and Locations Related to Grand Challenge		
	Activities	2-10	
Table 5-1	Contributors to the Document	5-1	
Table 5-2	Persons Contacted	5-2	

# CHAPTER 1 INTRODUCTION

This environmental assessment (EA) addresses the proposal by the Defense Advanced Research Projects Agency (DARPA)<sup>1</sup> to conduct an event known as the Grand Challenge for Autonomous Ground Vehicles. The Grand Challenge consists of a series of events (phases) starting in Los Angeles California on March 8, 2004 and concluding in Las Vegas on March 14, 2004. This EA covers the field testing and analysis phase of the Grand Challenge traversing off-highway vehicle (OHV) areas, designated open routes, and public roads in the Mojave and Colorado Desert region on March 13, 2004 (see Exhibit 1). This EA has been prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended per the President's Council on Environmental Quality (CEQ) NEPA regulations.

The majority of lands in the Mojave Desert region are public lands managed by the U.S. Bureau of Land Management (BLM), the National Park Service (NPS), and the Department of Defense (DOD). Because of the predominance of BLM land, any route traversing the region would be, in part, on BLM lands. Therefore, BLM and DARPA have completed a Section 302 Federal Land Policy and Management Act (FLPMA) Memorandum of Agreement for the permit of this event by another federal agency on public lands, subject to the completion of this environmental assessment, identification of measures to prevent unnecessary and undue degradation of resources, and a finding of no significant impact. DARPA is working cooperatively with representatives from the Barstow (lead office), Needles, and Las Vegas field offices of the BLM in order to conduct the field testing and analysis phase of the Grand Challenge in the Mojave Desert region.

# 1.1 PURPOSE AND NEED FOR THE GRAND CHALLENGE

The concept for the Grand Challenge is to generate widespread interest and appeal among grassroots American developers, inventors, futurists and suppliers in the development of robotic technology for unmanned ground vehicles. The Challenge was designed to meet two goals: (1) to tap into the ingenuity, creativity, and energy of innovative science enthusiasts who do not traditionally participate in defense development; and (2) to find ground-breaking solutions that will accelerate the production of these autonomous systems. The success of the Challenge will significantly reduce the risk to American armed service members by accelerating autonomous technology development.

The need for the Grand Challenge stems from Congressional authority in the National Defense Authorization Act which provides that, "It shall be a goal of the Armed Forces to achieve the fielding of

<sup>&</sup>lt;sup>1</sup> DARPA is a Department of Defense agency with the mission to develop imaginative, innovative and often high-risk research ideas offering a significant technological impact that will go well beyond the normal evolutionary developmental approaches; and, to pursue these ideas from the demonstration of technical feasibility through the development of prototype systems.

unmanned remotely controlled technology such that by 2015, one-third of the operational ground combat vehicles of the Armed Forces are unmanned" (Act for Fiscal Year 2001, S.2549, Section 217). Towards this end Congress has provided for, "... cash prizes in recognition of outstanding achievement that are designed to promote science, mathematics, engineering, or technology education in support of the missions of the U.S. Department of Defense" (Act for Fiscal Year 2003, H.R. 4546, Section 23746).

DARPA has established the following criteria to meet their objectives for the Grand Challenge field event:

- 1. Terrain types over which the vehicle will be tested must simulate a realistic military application.
- 2. Distance traveled must assess endurance of the vehicle under a realistic military scenario.
- 3. The event should attract innovators to participate beyond those usually attracted by Department of Defense projects. Considerations for attracting event participants include:
  - Proximity to a regional technology center;
  - Recognized location/destination venue;
  - Cash prize/competition;
  - Co-location with DARPA's technology convention; and
  - Easily accessible.

The Mojave and Colorado Desert region offers a unique environment that satisfies these criteria. It provides a wide variety of technically challenging terrain that approximates realistic military applications. It provides adequate distance to encompass the endurance testing goals and runs between two major metropolitan cities that are appealing destinations. Due to the pioneering and innovative nature of the Southwest, it is expected that a large number of the teams will be based in this area. This, along with being co-located near DARPA's technology conference in Los Angeles, encourages grassroots teams to participate.

# **1.2 CONFORMANCE WITH LAND USE PLANS**

The California Desert Conservation Area (CDCA) Plan, 1980, as amended, is the overriding BLM land use plan for the affected area in California. The Las Vegas Resource Management Plan (LVRMP) is the overriding BLM land use plan for the affected area in Nevada. On BLM lands, the Grand Challenge is restricted to existing public routes between southern California and Nevada. The event has been structured to include competitive portions where allowed and a navigational challenge on designated open routes and public roads.

In California, the competitive portions of the route are wholly contained within OHV areas that allow competitive events, while the navigational routes use only BLM "approved routes of travel" and public roads (The California Desert Conservation Area (CDCA), 1980, as amended, pg. 71). The Grand Challenge has been planned in accordance with the CDCA Plan, which describes multiple-use classes for



25280001 | EA\Ex1\_Affected\_Area.mxd

DARPA GRAND CHALLENGE

lands in the area and provides additional guidance on permitted activities. The event crosses lands designated as Class L (Limited Use), Class M (Moderate Use) and Class I (Intensive Use) as defined in Table 1, "Multiple Use Class Guidelines" in chapter 2 of the CDCA Plan, 1980, as amended.

The competitive portions of the event are authorized on Class I where, "Motorized-vehicle play is allowed in areas designated 'open.' All aspects of competitive events will be permitted except where specific mitigations are stipulated by the authorized officer" (CDCA Plan, Chapter 2, Table 1). The navigation portion of the event will occur on Class I, M, and L lands which allow, "Non-competitive vehicle touring and events as well as competitive events on specified recreation routes which have been delineated and designated in the CDCA Plan" (CDCA, as amended by NEMO and NECO, December, 2002).

Additional resource management parameters have been developed that amend or propose to amend the CDCA Plan, including the draft West Mojave Habitat Conservation Plan (2003), the Northern and Eastern Mojave Plan (2002), and the Northern and Eastern Colorado Plan (2002). These plans revise the boundaries for certain types of management areas, and provide additional guidance for resource management. The Grand Challenge conforms to all requirements in these plans.

The Las Vegas Resource Management Plan (1998) establishes management areas and provides guidance for resource management. The Grand Challenge will conform to all requirements in this plan, and other relevant plans that govern the affected area in Nevada.

# THIS PAGE INTENTIONALLY LEFT BLANK

# CHAPTER 2 ALTERNATIVES

#### 2.1 THE GRAND CHALLENGE

The Grand Challenge is comprised of a series of events or phases further described below. All of the proposed action alternatives focus on the field testing phase (Phase 4) in which unmanned autonomous vehicles traverse portions of the Mojave and Colorado Desert regions. Each action alternative is described in Sections 2.4 through 2.7, including setup and operation for Phase 4 activities.

**<u>Phase 1 - Technical Paper</u>**. All participants must submit a technical paper describing the vehicle they plan to enter consistent with rules for safety and environmental considerations. DARPA will review the technical paper to ensure the vehicle design complies with the technical requirements and will conduct site inspections for each participant.

**Phase 2 - DARPA Tech Conference.** The Grand Challenge is being promoted to prospective participants in conjunction with DARPA's periodic technology conference. The 2004 Conference will be held in Anaheim the same week as the Grand Challenge field testing phase.

**Phase 3 - Qualification Inspection and Demonstration (QID).** All vehicles will be inspected, tested and required to demonstrate the ability to navigate safely at the California Motor Speedway. The Speedway provides a controlled environment to ensure vehicles are qualified to begin Phase 4, the field testing phase. The QID will confirm which vehicles are safe, able to navigate around obstacles, comply with performance testing, and operate consistent with the Challenge safety and control requirements. Any vehicle posing a safety or environmental threat will be disqualified. Following QID qualified vehicles will be transported to the starting area for the field test phase.

**Phase 4 - Field Testing Phase.** Following a final safety inspection at the selected starting area, qualified autonomous robotic vehicles would traverse the Mojave and Colorado Desert regions on a pre-determined route. This phase would be supported by a comprehensive safety control system including field spotters, control vehicles, a Challenge Operations Center, and law enforcement personnel from numerous agencies.

<u>Phase 5 - Showcase of Challenge Vehicles</u>. Following Phase 4, Challenge Vehicles would be showcased in Las Vegas, Nevada.

# 2.2 DESCRIPTION OF GRAND CHALLENGE ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

The Grand Challenge would involve the operation of up to 25 autonomous robotic vehicles traversing the Mojave and Colorado Desert regions along a specific route. The field test and analysis phase of the Grand Challenge (Phase 4) is currently scheduled in 2004 for March 13 during daylight hours, with continuation to the 14<sup>th</sup> if necessary to complete the event. Backup dates for field testing in 2004 include March 20 and March 21. The backup dates would be used if the event could not be held or completed due to time constraints, environmental or weather conditions or if safety measures were not fully functional. Possible dates for field testing in 2005 through 2007 will be determined following the 2004 event, but would occur within the parameters of the Memorandum of Agreement between the BLM and DARPA. All Challenge Vehicles would operate in BLM designated OHV areas classified for Intensive Use, on BLM designated open routes in areas classified for Intensive, Moderate or Limited use or on public roads. Relevant areas would be closed to the public during operation of the event and re-opened as the portion of the event occurring in these areas is completed.

DARPA will have complete control over all Challenge Vehicles, including the ability to start and stop navigation and operation of the vehicle at any time. When navigating, Challenge Vehicles would be unmanned and fully autonomous, with navigation controlled by an onboard computer. Sensors would interpret the environment, and based on what is sensed, the onboard computer would control the navigation of the vehicle along the specified route.

Vehicles would navigate from point to point (waypoint) as defined in a computer file that identifies the route to be followed and other navigational parameters. Each waypoint is a specific location on the ground, similar to latitude and longitude. The specific route is defined by a series of waypoints. The spacing between each waypoint varies depending on the road characteristics including how straight or irregular the roadway is, and the varying terrain and elevation. The more complex the roadway, the more waypoints are required to properly define it. Exhibit 2 identifies the number of waypoints needed to define various route segments. The computer file also defines the width of each road segment that the vehicle is able to operate within between waypoints. On approved routes of travel and public roads the maximum width is the roadway. In open areas, the widths may be much greater, allowing vehicles to determine their own route and evaluate the best way to get between two waypoints. The computer file defines speed limits for each route segment based on safety factors including terrain, local jurisdiction speed limits, and road obstacles, such as rail road crossings and utility infrastructure, so that speed limits would be matched to terrain and obstacles. On public roads in towns, local speed limits will be observed. The maximum speed limit on roadways would be 75 miles per hour (mph), and 25 mph in critical habitat areas. No speed limit will be defined in open areas, except where necessary to minimize hazards due to potential impacts with road obstacles.



<sup>25280001 |</sup> EA\Ex2\_Waypoint\_Spacing.mxd | 12/08/2003

Based on these parameters, the average maximum speed for Challenge Vehicles over the course of the event is expected to be approximately 35 mph.

In addition to the operation of the Challenge Vehicles there would be a number of people and other vehicles associated with the event. There would be start and finish areas with DARPA staff, participant staging, event logistics (i.e., media, medical, etc.), and spectators. Along the route there would be control vehicles, stationary route monitors, media and spectator viewing areas, route marking teams, administrative sweeps, desert tortoise sweeps, road crossing/closure crews, and communications network support. These activities are more fully described in Section 2.2.1 below.

Helicopter or other aircraft may be used to observe and document the event. DARPA Staff in helicopters would also be able to provide additional information to the ground staff. Aircraft would be flown at an elevation so that no ground disturbance would be created. Federal Aviation Administration guidelines will be followed, including obtaining the appropriate FAA clearance, if required. Aircraft would not be used in the event of hazardous weather conditions.

# 2.2.1 Grand Challenge Activities and Operation Support

Each of the activities associated with the field testing phase and common to all action alternatives is described below. The specific number of people and vehicles associated with each activity is identified in Table 2-1. Operations support would be needed for each day the field testing phase is conducted. No new surface disturbance will be permitted by the Grand Challenge event. All activities will occur within the footprint of existing high-use areas, including BLM-designated open areas, BLM-designated routes, private lands, and paved public roads.

**Start Area Site.** The start site would contain team staging, parking, support and logistics, spectator seating, restrooms and trash collection. DARPA staff would establish designated parking and crowd control to constrain all activity to private land, where applicable, in cooperation with local law enforcement. Restrooms or portable toilets would be provided consistent with BLM requirements.

**Route Marking.** Forty-eight hours prior to the event and within 24 hours following the event, DARPA personnel in administrative vehicles would traverse portions of the route to put in place and remove route markings and protective barriers. Route markers would be used in certain areas to ensure that vehicles can identify or sense the route boundaries; such areas might include railroad rights-of-way, sensitive/critical habitats, utility infrastructure, etc. Markers would consist of staking and possibly raised snow fencing and would be placed in the roadway, so that no new disturbance would occur. All route markings and protective barriers would be removed within one day of the completion of the event. Authorized

biologists approved to handle desert tortoises would support the route marking teams to monitor for desert tortoises and desert tortoise burrows.

Administrative Sweeps. DARPA staff in administrative vehicles would traverse the route in advance of Challenge Vehicles to verify all safety and logistics measures, and to monitor for the presence of desert tortoises consistent with the protective measures.

**Desert Tortoise Sweeps.** Authorized desert tortoise biologists (approved by the U.S. Fish and Wildlife Service [Service or USFWS] to handle desert tortoise) would precede the Challenge Vehicles by no more than an hour as part of conducting rolling sweeps of the selected route in order to ensure that desert tortoise are not on the road when vehicles come through. A biologist would monitor any desert tortoise encountered until all vehicles associated with the event are clear of the relevant route segment.

**Challenge Vehicle/Control Vehicle Operation.** Challenge Vehicles would traverse a specific route from start to finish. To ensure that vehicles stay on the route, a control vehicle would follow each Challenge Vehicle from the start to the finish. The control vehicle following the Challenge Vehicle would have the ability to stop the vehicle if it were to leave the roadway or pose a safety or environmental threat. Two to four people would be in the control vehicle following the Challenge Vehicle.

**Route Monitors.** Route monitors would be positioned adjacent to the route at specified points to observe Challenge Vehicle operation and assist in monitoring and control. The positions would be selected to allow for a good vantage point. Monitors would observe vehicles to ensure proper operation and ensure that there are no safety obstacles such as a pedestrian, unauthorized vehicle, or encroachment beyond the roadway. They would also be able to visually identify the presence of a desert tortoise on the route and relay the information to the Control Vehicles. Monitoring locations for each route segment are identified in Exhibit 3. Only those positions along the actual route used for the event would be utilized. Route monitors will access their positions by first using available paved roads, and then unpaved access roads. Depending on the specific position, it may be necessary to drive on the route. The intent is to minimize use of unpaved roads, and minimize miles traveled on the route. Monitors would park off the route or adjacent to the route in existing disturbed areas or in an area where the roadway is very wide.

**Media Observation Points.** Observation points would be designated where the route intersects major public roads for team member and media representatives to monitor the event. Each observation point would be located on or adjacent to existing major roads with adequate shoulder parking or within OHV areas. Observation points would be controlled by DARPA staff to ensure that only designated team members and media are present, and to ensure that attendees remain in the observation point area. Media observation points for each route network are identified in Exhibit 3. Only those positions along the actual route used for the event would be utilized.



25280001 | Ex3\_Route\_Networks.mxd | 09/25/2003

**Spectator Viewing Areas.** In addition to the start and end areas, up to two media observation points would also serve as spectator areas where routes intersect paved roads that provide sufficient informal parking areas. DARPA staff would control both people and parking in this area for safety and trash control. Private land owners will be consulted for use of property, where applicable.

**Recreational and Road Closures.** Affected OHV areas, designated open routes, and public roads would be closed to the public preceding and during operation of the event, and re-opened as the portion of the event occurring in these areas is completed. Road closures would be posted and orchestrated in coordination with local law enforcement agencies. Road closures would be staffed and road closure personnel would reach their assigned crossings via the public roads and would not traverse the event route.

While it is recognized that the final numbers of closure points and needed resources could vary depending upon the selected route, below is a rough estimate of the type and amount of equipment and personnel needed to safely control a route during the Grand Challenge Event. For most closure points, only one or two flagmen will be needed. It is also assumed that sawhorse barricades and freestanding trail markers will be used to block off roads. No equipment or material is expected to result in ground disturbance beyond setting sawhorses or freestanding trail markers on top of the soil surface.

The final decision on which roads will be closed will be made after a final route has been selected and that route further analyzed by DARPA, the BLM, California Highway Patrol and the San Bernardino County Sheriff's Department. However, it is anticipated that there would be approximately 55 to 60 closure points along a given route, requiring up to 90 sawhorse barricades, 65 trail markers, and 60 flagmen/personnel. Authorized desert tortoise biologists would support closure personnel by monitoring for desert tortoise and desert tortoise burrows at each closure point.

**Communications Network**. A communications network would be provided over the entire route used for the Grand Challenge to allow all members of the DARPA staff, including support personnel and authorized desert tortoise biologists in the field, to communicate with the command center as well as with each other during the event. The network would be achieved by installing a temporary communication repeater on existing communication towers. In addition, up to six trucks equipped with temporary communications equipment would be parked along roadways near the route.

**Finish Area Site.** The finish site would provide support required for DARPA staff and spectators. DARPA staff, in cooperation with local law enforcement and other authorities would establish designated parking and crowd control to constrain all activity to private land, where applicable.

#### TABLE 2-1 ESTIMATED VEHICLES, PERSONS AND LOCATIONS RELATED TO GRAND CHALLENGE ACTIVITIES

Activity	Vehicles <sup>1</sup>	People	Location			
Start Area	3 / 0	100 DARPA staff	On private property.			
	100 / 0	250 team members				
	150 / 0	2,000 spectators				
Route Marking	5 / 5	20 DARPA Staff	On route.			
Administrative Sweeps	3 / 3	9 DARPA Staff	On route.			
Desert Tortoise Sweeps	10 / 10	10 DARPA staff 20 Authorized desert tortoise biologists	On and adjacent to route.			
Challenge Vehicle /	25 / 25		On route.			
Control Vehicle Operation	25 / 25	100 in control vehicles				
Route Monitors	20 / 20	100 route monitors	Elevated view of route at up to 50 locations. Route monitors will access each location on foot.			
Media Observation Points	10 / 0	10 DARPA Staff	Observation points within short			
	25 / 0	50 team representatives	distance of road to provide vantage			
	30 / 0	60 media representatives	point. Parking on the shoulder of major public roads at 10 specific locations.			
Spectator Viewing Area	5/0	20 DARPA Staff	Adjacent to paved highways with			
	8070	200 specialors	locations.			
Road Closures/Crossings	50 / 0	100 DARPA Staff	Road intersections, OHV area			
		50 BLM staff and Law Enforcement	intersections and other high traffic public areas.			
Communication Network	6 / 0	12/0	Adjacent to paved highway with			
			ample existing parking at six locations.			
Finish Area	3 / 0	75 DARPA staff	On private property.			
	100 / 0	250 team members	1 1 1 7			
	500 / 0	2,000 spectators				
Total	436 / 88 <sup>2</sup>	2,809 / 254 <sup>2</sup>				
Notes: <sup>1</sup> The first number indicates the number of vehicles or people associated with the activity. The second number indicates the number of vehicles or people that would be allowed on the route at some point in support of field testing phase or as a participating vehicle.						

This number has been adjusted to account for overlap in vehicles and staff associated with the event. For instance persons and vehicles at the start area are also expected at the finish area or other activity areas.

# 2.3 DEVELOPMENT OF ALTERNATIVES AND ROUTE SEGMENT SELECTION

Consistent with the purpose and need for the Grand Challenge, the Mojave and Colorado Desert regions meet the criteria established by DARPA for the field testing phase. Given the propensity of BLM lands in this area, DARPA conferred with the BLM and began identifying route segments and areas that would be appropriate for the field testing phase of the event. The National Park Service was also contacted about routes through the Mojave National Preserve. Only one route will actually be used to conduct the field test, but it will only be announced to participants two hours prior to the start of the event. This ensures that the participants do not pre-run the route, and that the event is a test of navigation technology. Route

segments were identified with the BLM's input and alternatives were developed with consideration of the following items consistent with the criteria for the objectives for the Grand Challenge field testing phase identified in Section 1.1:

- Provides operational challenge in terms of varied terrain consistent with a realistic military application (criteria 1). Under a realistic military application vehicles are likely to encounter a variety of terrain conditions including unsurfaced roads, navigational obstacles such as stream crossings, mud, fine sand, steep roadways, and rocky surfaces.
- Provides operational challenge in terms of a semi-linear distance and traverse that pushes the limits and difficulty of operating vehicles, consistent with a realistic military application. Practical distance should be at least 100 miles, consistent with vehicle being delivered in a safe area and traversing into hostile territory (criteria 2). Repeated segments of looped courses, which could be memorized by the vehicle's computer /sensing technologies, would not contribute to the testing of the technology.
- *Includes at least one competitive segment (criteria 3a).* The competitive component is important to attract potential innovators that would not otherwise be interested in defense projects. This also allows for observation of the vehicles' navigational response to other vehicles.
- Allows for traverse generally between the vicinity of Metropolitan Los Angeles and the vicinity of Las Vegas, Nevada (criteria 3b, c). This would effectively tie the events/phases of the Grand Challenge together. It would also be accessible to a regional technology center for autonomous vehicle technology in southern California.
- Variety of route segments which allow the level of difficulty to be tailored to the capability of qualified vehicles (criteria 4a). Since the Grand Challenge is testing an emerging technology, the capability of the Challenge Vehicles that will qualify to participate is speculative. Having a variety of terrain options provides flexibility that would enable the route to be selected based on the capability of the vehicles.
- Specific start and end locations that support logistics for the event including: ample lodging for participants and support personnel, communications infrastructure, accessibility to major highways, and significant area to allow staging, parking, etc. (criteria 4b).

Based on these criteria, DARPA and the BLM jointly developed alternatives further described in Sections 2.4 through 2.9, including those alternatives considered but eliminated from further consideration. All action alternatives include the use of OHV areas, open routes, and public roads.

# 2.4 NORTHERN NETWORK ALTERNATIVE 1

Approval of the Northern Network Alternative would allow the Grand Challenge field test to be conducted along a route within a northern network of route segments. The proposed network is further described below and identified in Exhibit 3.

# 2.4.1 Description of the Northern Network

The northern network begins on the open desert floor in the Stoddard Valley OHV area. Leaving Stoddard Valley, the network crosses Route 247 and proceeds northeast over Daggett Ridge. It veers back to the northwest on Camp Rock Road (connection to southern network), following Pendleton Road to Nebo Road to National Trails Highway. East of Daggett the northern network leaves National Trails Highway (connection to central network) and continues on a north-east power line road to a rail road right-of-way. The northern network follows the rail road (connection to central network) to Hacienda Drive, at which point it crosses Interstate 15 (I-15) and intersects a north-east power line road. Where the power line road intersects Route 127, the upper branch of the network heads north on Route 127 while the lower branch continues on the power line road and arrives at Primm Nevada from the southwest. The upper branch follows Route 127 to Route 178 to Route 372 to Route 160, which crosses I-15 south of Las Vegas. It then intersects Old Las Vegas Boulevard south and follows local trails and roads to arrive at Primm Nevada. A middle branch deviates from the upper branch at Furnace Creek Road, proceeding to Furnace Creek Road to Excelsior Mine Road, and either reconnecting to the lower branch on the eastwest power line or heading east on Kingston Road to Route 161 which crosses I-15 north of Primm and rejoins the upper branch.

In terms of navigation difficulty, route segments within the northern network contain terrain conditions ranging from level to very steep, and smooth to highly rugged and rocky, with the most rugged conditions in the southeastern half of the route. Soil terrain conditions on unpaved route segments range from a hard packed surface to medium grained sand near the Mojave River. This route is considered difficult in terms of terrain conditions (rugged, steep, rocky) and moderate in terms of navigational obstacles (terrain, sandy soil conditions).

# 2.4.2 Suitability of the Northern Network Alternative 1

This alternative would be suitable for a vehicle with moderate to high endurance and navigational capability. Vehicles with low endurance and navigational capability would not be suitable for unpaved roads in the eastern portion of the network. In the event that vehicles of such capability were qualified, a large portion of the specific route (upwards of 50%) would be limited to paved roadways. Such a high portion of paved roadways would not be highly useful in evaluating the vehicle technology. Based on these conditions the Northern Network Alternative 1 would be moderately suitable towards meeting the purpose and need of the Grand Challenge.

# 2.5 CENTRAL NETWORK ALTERNATIVE 2

Approval of the Central Network Alternative would allow the Grand Challenge field test to be conducted along a route within a central network of route segments. The proposed network is further described below and identified in Exhibit 3.

# 2.5.1 Description of the Central Network

The central network begins on the open desert floor in the Stoddard Valley OHV area. Leaving Stoddard Valley, the network crosses Route 247 and proceeds northeast over Daggett Ridge. It veers back to the northwest on Camp Rock Road (connection to southern network), following Pendleton Road to Nebo Road to National Trails Highway. East of Daggett, the central network splits into an upper and lower branch. The upper branch continues on a north-east power line road to a rail road right-of-way, which it follows northeast to Afton Canyon. Upon exiting the canyon it proceeds through the Rasor OHV area, departing via either Basin Road or Rasor Road. Via Basin Road this branch picks up the Arrowhead Trail to the west and joins the northern network on an east-west power line road. Via Rasor Road the upper branch of the central network follows the Arrowhead Trail and power line roads to the northeast, through Baker and over Clark Mountain. From that point it continues into Primm from the southwest, or joins Route 164 and connects to the lower branch.

The lower branch of the central network continues on National Trails Highway from Daggett to the southeast. It can connect to the southern route network via Amboy or Cadiz Roads, or continue on National Trails Highway to either Goffs Road (connection to southern route) or Mountain Springs Road. From there it heads north along a north-south power line road and intersects Route 164 near Searchlight. Route 164 heads back to the west and the lower branch either reconnects to the upper branch southwest of Primm, or enters Primm from the southeast via Nipton Desert Road and a rail road right-of-way.

In terms of navigation difficulty, route segments within the Central network contain terrain conditions ranging from level to moderately steep, and smooth to moderately rugged. Soil terrain conditions on unpaved route segments range from hard packed surface to very fine sand/silt. Navigational obstacles specific to this network include wet stream crossings and very fine sand and potentially mud, depending on weather conditions. This route is considered moderate in terms of terrain conditions (moderately rugged, moderately steep) and difficult in terms of navigational obstacles.

# 2.5.2 Suitability of the Central Network Alternative 2

This alternative would be suitable for a vehicle with moderate to high endurance and navigational capability. Vehicles with low endurance and navigational capability would not be suitable for unpaved roads in the north-central portion of the network. In the event that vehicles of such capability were

qualified, a large portion of the specific route (upwards of 75%) would be limited to paved roadways. Such a high portion of paved roadways would not be highly useful in evaluating the vehicle technology. Based on these conditions the Central Network Alternative 2 would be moderately suited towards meeting the purpose and need of the Grand Challenge.

# 2.6 SOUTHERN NETWORK ALTERNATIVE 3

Approval of the Southern Network Alternative would allow the Grand Challenge field test to be conducted along a route within a southern network of route segments. The proposed network is further described below and identified in Exhibit 3.

# 2.6.1 Description of the Southern Network

The southern network begins on the open desert floor in the Stoddard Valley OHV area. It can depart Stoddard Valley either to the northeast or south. The northeastern departure proceeds south on Route 247 to Lucerne Valley, or crosses Route 247 and proceeds northeast over Daggett Ridge and south on Camp Rock Road to Lucerne Valley. The southern departure from Stoddard Valley utilizes the Lucerne Valley Cutoff to Route 247, or follows Stoddard Wells Road toward Victorville and Route 18 to Lucerne Valley. From Lucerne Valley the southern network continues southeast on Route 247 into Yucca Valley, where it intersects Route 62 east to Twenty-Nine Palms. In Twenty-Nine Palms the southern network connects to the central network via local roads and Amboy Road, or continues east on Route 62. Off of Route 62 the southern network can head north on Iron Mountain Road or Cadiz Road (connection to central route), follow a north-south power line road to Goffs Road (connection to central route), and head east to Route 95. Alternately, it can continue on Route 62 to Vidal Junction and travel north on Route 95 directly. Route 95 continues north to Searchlight, where the southern network can connect to the central network via Route 164, or continue north into Henderson, southwest on Route 146 to Old Las Vegas Boulevard, and south along local trails and roads to arrive at Primm Nevada.

In terms of navigation difficulty, route segments within the southern network contain terrain conditions ranging from level to moderate, and smooth to moderate. Soil terrain conditions on unpaved route segments range from a hard to a medium packed surface. This network contains the largest portion of paved roads compared to the Northern Network Alternative 1 and Central Network Alternative 2. This route is considered easy to moderate in terms of terrain conditions (moderate) and easy in terms of navigational obstacles.

# 2.6.2 Suitability of the Southern Network Alternative 3

This alternative would be suitable for a vehicle with moderate endurance and low navigational capability. Vehicles with high endurance and high navigational capability would not be challenged by this route

consistent with a realistic military application due to the high proportion of paved roadways (upwards of 90%). Such a high portion of paved roadways would not be highly useful in evaluating the vehicle technology. Based on these conditions the Southern Network Alternative 3 would be poorly suited towards meeting the purpose and need of the Grand Challenge.

# 2.7 COMBINED NETWORK ALTERNATIVE 4

Approval of the Combined Network Alternative would allow the Grand Challenge field test to be conducted on any of three routes within the combined network, with an allowance for the use of two routes in subsequent years, subject to changing conditions.

#### 2.7.1 Description of the Combined Network

The Combined Network is comprised of the combined network of route segments for the Northern, Central and Southern Networks described under the previous alternatives 1, 2, and 3, respectively.

#### 2.7.2 Suitability of the Combined Network Alternative 4

This alternative would provide a wide variety of terrain conditions from level to steep, smooth to rugged and rocky. This alternative would provide the most flexibility in defining a route that can be best matched to the quality of the qualified vehicles participating in the Grand Challenge, compared to the other alternatives. As a result, the Combined Network Alternative 4 would be highly suited towards meeting the purpose and need of the Grand Challenge.

#### 2.8 NO ACTION ALTERNATIVE

Under this alternative, the Grand Challenge would not be conducted on BLM lands.

#### 2.9 ALTERNATIVES CONSIDERED AND ELIMINATED FROM FURTHER ANALYSIS

Other alternatives were considered but eliminated because they did not meet criteria related to the purpose and need for the Grand Challenge identified in Section 1.2, or were otherwise infeasible. A brief discussion of each alternative considered and the basis for eliminating them follows.

#### 2.9.1 Johnson Valley to Parker Dam

Under this alternative the field test would be held on a route network using the Johnson Valley OHV area, the Parker Strip Recreation Area and additional trails both northwest and east of the Recreation Area. Routes considered included a traverse from Johnson Valley to the Parker Dam area. The starting area for

this alternative lacks the necessary infrastructure to support logistics, seriously hindering the feasibility of this alternative. The extended route could not realistically be completed in one day.

#### 2.9.2 Mojave National Preserve Route

This alternative would include route segments through the Mojave National Preserve (Preserve), including paved roadways. DARPA met with National Park Service (NPS) officials to discuss a potential route through portions of the Preserve. The NPS indicated that any routes through the Preserve would be inconsistent with the mission and management goals for the Preserve.

#### 2.9.3 Military Installation Route

This alternative would include route segments either through or entirely contained within Military Installations in the Mojave and Colorado Desert regions. There are a number of security limitations associated with use of military lands which would hinder operation of the field test phase. Such limitations would require advance screening of organizers, participants, spectators, and press. These limitations would not only hamper the operation from a logistical standpoint, but would also be contrary to the purpose and need in that it is likely to dissuade some of the non-Department of Defense innovators the Grand Challenge has been designed to attract. Military security requirements could also prohibit the inclusion of the public and non-traditional innovators. The primary purpose and use for the military lands in the Mojave and Colorado Desert regions is to provide training for military personnel. The lands are used extensively, and on a nearly daily basis, and on a regular rotating schedule. The Grand Challenge field testing would interfere with training operations of the military. The potential presence of hazards such as sharp metal fragments or live ammunition is also of concern.

# 2.9.4 Off-Highway Vehicle Area Alternative

This alternative would allow the Grand Challenge field test to be conducted in up to two OHV areas in the Mojave and Colorado Desert regions. Areas considered include Stoddard Valley, Johnson Valley, Rasor and/or an area near Primm Nevada. A recreational closure would be imposed for the area(s) used during the event, closing up to 75 percent of two OHV areas or 100 percent of one. Conducting the field test phases exclusively within the OHV areas would not be consistent with Challenge goals for a realistic military application because they are generally homogenous in their terrain and lack sufficient area to provide enough distance for a semi-linear traverse. As a result this alternative would not be consistent with the purpose and need for the Grand Challenge.

# CHAPTER 3 AFFECTED ENVIRONMENT

#### 3.1 INTRODUCTION

This chapter describes the existing environmental conditions for the area of potential affect (APE) for the proposed DARPA project and alternatives. Information in this chapter represents the environmental baseline conditions against which all alternatives will be compared in Chapter 4, to identify potential impacts that may result from alternatives, and provide a basis for comparison of impacts. An APE is a geographical area in which potential environmental effects to a resource value, including use, would be reasonably likely to occur, and may vary for different resource values.

NEPA and CEQ regulations, as well as BLM and DOD procedures for implementing NEPA, specify that an EA should focus on those resource values potentially subject to impact. In addition, these guidance documents indicate that the level of analysis to any given resource value should be commensurate with the level of potential conflict or affect anticipated for that resource value and consistent with other environmental laws. Critical elements of the human environment must be analyzed in an EA, unless they are either not present in the APE, or present but not affected. These facts should be documented.

- <u>Energy</u>. The Grand Challenge field test is a short-term event that does not support any activities that would have a direct or indirect adverse impact on energy development, production, supply or distribution. Both the design of the route through field surveys, and the safety control measures that will be employed should ensure that energy infrastructure would not be jeopardized.
- <u>Environmental Justice</u>. The Grand Challenge field test is a short term event that does not support any activities that would result in environmental impacts to low-income or minority populations that are disproportionately high or adverse as compared to the impacts on the general population.
- <u>Farmlands Prime/Unique</u>. Particular route segments traverse active farmlands within the APE. Impacts to farmlands would be limited to the temporary traverse by vehicles on existing roadways, and would not affect the continued use of these lands for agriculture.
- <u>Floodplains</u>. A number of route segments traverse floodplains in the Mojave and Colorado desert regions. The Grand Challenge field test is a short term event that does not involve any construction or modification to the land. Impacts to floodplains would be limited to the temporary traverse by vehicles on existing roadways, and would not result in any increase in runoff or other adverse affect to floodplains.
- <u>Ground Water</u>. The Grand Challenge field test is a short-term event that is not water consumptive, and ground water levels would not be affected.
- <u>Wild & Scenic Rivers</u>. The Grand Challenge field test is a short-term event that would not have a direct or indirect adverse impact either on designated wild & scenic rivers or on the suitability of eligible rivers for subsequent designation.

• <u>Wilderness</u>. Particular route segments may run adjacent to boundaries, but vehicles would not leave routes, and would remain outside of wilderness.

# **3.2 GENERAL SETTING**

Exhibit 1 identifies the areas of the Mojave and Colorado Desert regions potentially affected by the Grand Challenge field test (Phase 4). The event would use a specific route derived from one or more networks, previously described in Chapter 2 for each action alternative. The event would be operated on paved and unpaved roadways and open areas. The networks start outside of Barstow, California, in Stoddard Valley, and trend generally eastward ending in the vicinity of Primm or Jean, Nevada. Most of the network traverses undeveloped BLM lands. Some segments pass through populated towns and cities (see Exhibit 3 for examples).

The Mojave and Colorado Desert regions are characterized by arid conditions with low precipitation. The dominant vegetation in these regions is creosote bush scrub; however, variations in elevation, local precipitation patterns, and landform contribute to the development of other vegetation types. Route segments in the northern half of the APE traverse a series of mountain ranges separated by broad alluvial valleys which include valley floors, playas and dry lake beds. Route segments in the southern half of the APE traverse less varied terrain which is fairly homogenous in elevation and vegetation. A number of route segments in the central portion of the APE cross the Mojave River, which is the predominant hydrologic feature in the Mojave Desert. The River spans from the base of the eastern San Bernardino Mountains near Hesperia, eastward through Afton Canyon, and terminates at Soda Lake within the Mojave National Preserve. Most of the water flow in the river is subterranean.

#### 3.3 VEGETATION

The networks start outside of Barstow in Stoddard Valley within Mojave creosote bush scrub, the dominant plant community in this portion of the Mojave Desert. The various networks change in elevation as they move eastward towards and into Nevada. At the lowest elevations, particularly in association with the numerous playas and dry lake beds, desert saltbush scrub replaces the Mojave creosote bush scrub and is the second most prevalent plant community that would occur along any of the proposed routes. Together these two plant communities, Mojave creosote bush scrub and desert saltbush scrub, comprise over 70 percent of the natural occurring vegetation. Criss-crossing the networks, particularly on the valley floor, are numerous desert dry washes. Within these linear habitats that are usually crossed at perpendicular angles by the various networks are the Mojave wash scrub and Mojave riparian forest plant communities. Together these two desert dry wash plant communities account for less than 10 percent of the natural vegetation. Within the eastern portion of the networks and at higher elevations, the Mojave creosote bush scrub plant community is replaced by Mojave mixed woody scrub and Mojavean juniper woodland and scrub. These two plant communities comprise the remaining

20+ percent of the natural occurring vegetation within the various networks. These plant communities are listed below and are described in order of abundance, following the widely accepted descriptions provided in Holland's *Preliminary Descriptions of the Terrestrial Natural Communities of California* (1986 and 1992 update).

# 3.3.1 Mojave Creosote Bush Scrub

As stated above, this creosote-dominated desert scrub community is the dominant plant community found within the various networks and occupies the majority of the networks, being replaced by other plant communities, as defined below, as the result of elevation changes or changes in other physical parameters along the networks (e.g., the presence of a desert dry wash). It is characterized by widely spaced shrubs separated by bare ground. During spring months the bare ground is filled with a variety of annual grasses and wildflowers. This community is found in areas with eroded soils with very little moisture such as slopes, fans, and valleys. The most common plant species occurring within this community are creosote bush (*Larrea tridentate*), bursage (*Ambrosia dumosa*), desert cassia (*Cassia armata*), yucca (*Yucca schidigera*), and cheesebush (*Hymenoclea salsola*).

#### 3.3.2 Desert Saltbush Scrub

The saltbush scrub plant community is found in association with the creosote bush scrub plant community, generally occurs at lowest elevations along the edge of playas and dry lake beds, and is the second most predominant plant community within the networks. This community is dominated by species of saltbush (*Atriplex*). Upslope areas have desert holly (*A. hymenolytra*), shadscale (*A. confentifolia*), bursage, and winter fat (*Krascheninnikovia*). Closer to the edge of the desert playas, this community is dominated by allscale (*A. polycarpa*), fourwing saltbush (*A. canescens*), mesquite (*Prosopis pubescens*), and alkali sink habitat. The alkali sink habitat is often the first plant community encountered off the edge of the desert playa and includes bush seepweed (*Suaeda moquinii*), greasewood (*Sarcobatus vermiculatus*), iodine bush (*Allenrolfea occidentalis*), mixed saltbush (*Atriplex* sp.), and salt grass (*Disticlis spicata*).

# 3.3.3 Mojave Wash Scrub

This low-growing open shrub community can be found in sandy bottoms of wide canyons, arroyos, and braided washes that criss-cross, usually at perpendicular angles, through the various networks. The Mojave wash scrub represents the third most common plant community. Species within these washes have evolved to withstand flooding as well as long, dry periods. Common species include cat's claw acacia (*Acacia gregii*), allscale, and black-banded rabbitbrush (*Chrysothamnus paniculatus*).

# 3.3.4 Mojave Mixed Woody Scrub

The Mojave Mixed Woody Scrub community consists of a mixture of shrubs characteristic of midelevations of the Mojave Desert. It is found primarily in the eastern portions of the networks along the California/Nevada border. Joshua tree (*Yucca brevifolia*) is a conspicuous overstory in this community. Common shrubs are smooth horsebrush (*Tetradymia glabrata*), spiny menodora (*Menodora spinescens*), cheesebush (*Hymenoclea salsola*), box thorn (*Lycium andersonii*), green ephedra (*Ephedra nevadensis*), and four-wing saltbush. Blackbrush (*Coleogyne ramossissima*) becomes the dominant shrub at higher elevations, often forming pure stands on drier south or southwest-facing slopes. Blackbrush intergrades with sagebrush (*Artemisia* sp.) at higher elevations.

# 3.3.5 Mojave Riparian Forest

The Mojave Riparian Forest is riparian habitat that occurs throughout the networks in association with the various drainages crossing the area, including the Mojave River. It is characterized by fairly open streamside forest dominated by cottonwood (*Populus fremontii*), willows (*Salix gooddingii* and *S. laevingata*), and arrowweed (*Pluchea siercea*), with an understory of Torrey saltbush (*Atriplex torreyi*) and slender willow (*Salix exiqua*). Other species typically found in this habitat are Tamarisk (*Tamarix* sp.), rabbit brush (*Chrysothamnus* sp.), and greasewood.

# 3.3.6 Mojavean Juniper Woodland and Scrub

This open woodland occurs in the eastern portion of the networks and at higher elevations. It is dominated by juniper (*Juniperus californicus*) with an open shrubby understory. Typical shrubs found in the understory are great basin sage (*Artemesia tridentata*), blackbush (*Coleogyne ramosissma*), and Joshua trees (*Yucca brevifolia*).

# 3.3.7 Non-Native Invasive Species

OHV activity is known to spread non-native invasive species by transporting seeds. The spread of invasive species may displace native species, including species that are threatened, endangered and otherwise sensitive within the Mojave and Colorado Desert regions. Whole vegetative communities may be transformed affecting vegetation communities and the wildlife dependent on these habitats.

# 3.4 THREATENED & ENDANGERED, AND SENSITIVE PLANT SPECIES

Two federal or state listed or BLM-sensitive plant species are known to occur within the vicinity of the proposed network and are further described below.

# 3.4.1 Mojave Monkey Flower

This BLM-sensitive plant species is a restricted endemic whose entire range is within the western Mojave Desert. It is found in Joshua tree woodland and creosote bush scrub communities. It favors granitic soils and is most often found on gravelly banks of slopes above washes that are not subject to regular water flows. It is an annual species that blooms from April to June. Several populations are in or adjacent to the Stoddard Valley OHV open area and in the vicinity of Daggett, California.

# 3.4.2 White-margined Beardtongue

White-margined beardtongue occurs in southern Nevada, western Arizona, and in the western Mojave Desert in San Bernardino County, California. This BLM Sensitive plant species is isolated from its primary ranges and is found in the sand fields and washes north or Pisgah Crater in the southern Mojave Desert. There are also 15 populations in southern Nevada, predominantly clustered near Las Vegas, with twelve from Clark County and three from Nye County.

White-margined beardtongue is an herbaceous perennial plant that flowers from March to May (Munz, 1974), occurring at elevations from 2,000-3,000 ft. (700-1000 m.) in alkaline soil (Scogin, 1989). In California, this plant occurs in fine alluvial sand in a wide canyon within a creosote bush scrub community. In Nevada, the plants prefer the base of hills and mountains in wind-blown sand dune-like areas, but are also found in deep loose sand in wash bottoms.

# 3.5 WILDLIFE

The routes associated with the event traverse a variety of plant communities that provide habitat for various wildlife species. Wildlife expected to occur within the habitats the routes traverse include several species of reptiles such as the zebra-tailed lizard, western whiptail lizard, side-botched lizard, desert iguana, sidewinder rattlesnake, and speckled rattlesnake. Common avian species associated with the varied habitats include horned lark, greater roadrunner, Le Conte's thrasher, black-throated sparrow, common raven, phainopepla, blue grosbeak, ash-throated flycatcher, western kingbird, blue-gray gnatcatcher, Bewick's wren, rock wren, as well as raptors such as red-tailed hawk, prairie falcon, and golden eagle. Numerous small mammals exist in habitats crossed by the routes including canyon, cactus and deer mice, antelope ground squirrel and round-tailed ground squirrel, kangaroo rats, pocket mice, black-tailed hare and desert cottontail. Large mammals common to the region include badger, ringtail, kit fox, bobcat, coyote, and mule deer.

# 3.5.1 Threatened & Endangered & BLM-Sensitive Wildlife Species

Several sensitive wildlife species could occur on the proposed routes or within the immediate vicinity of the routes. State and federally listed and BLM-sensitive animals include the following, further described below:

- California and federally listed threatened desert tortoise;
- California listed threatened Mohave ground squirrel; and
- California listed species of special concern, and BLM-sensitive Mojave fringe-toed lizard.

#### **Desert Tortoise**

The desert tortoise is a large, herbivorous reptile found in portions of the California, Arizona, Nevada, and Utah deserts. It also occurs in Sonora and Sinaloa, Mexico. In California and southern Nevada, the desert tortoise occurs primarily within the creosote, shadscale, and Joshua tree series of Mojave scrub, and the Lower Colorado River subdivision of Sonoran desert scrub. Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from 2 to 8 inches, diversity of perennials plants is high, and production of ephemerals is high (Luckenbach 1982, Turner and Brown 1982, Schamberger and Turner 1986). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. In California and southern Nevada, desert tortoises are typically associated with gravelly flats or sandy soils with some clay, but are occasionally found in windblown sand or in rocky terrain (Luckenbach 1982). Desert tortoises have been found in the California desert from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of about 1,000 to 3,000 feet (Luckenbach 1982, Schamberger and Turner 1986).

Desert tortoises are most active in California and southern Nevada during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rainstorms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert.

On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise endangered (50 Federal Register 49868). In its final rule, dated April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 Federal Register 12178). The Critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah is identified in a final rule published February 8, 1994 (59 Federal Register 5820). Following the recommendations of the desert tortoise recovery team, the final rule designating critical habitat established six recovery units over the range of the Mojave population of the desert tortoise. Within recovery units, the Service defined at least one critical habitat unit patterned after the desert wildlife management area (DWMA) concept recommended by the recovery team. A final recovery plan for the desert tortoise was published by the Service in June 1994.

Critical habitat is defined as the specific areas within the geographical range occupied by the species at the time it is listed on which are found those physical or biological features which are essential to the conservation of the species and which may require special management considerations or protection.

The desert tortoise was listed in response to loss and degradation of habitat caused primarily by numerous human activities including urbanization, agricultural development, military training, recreational use, mining, and livestock grazing. The loss of individual desert tortoises to increased predation by common ravens (*Corvus corax*), collection by humans for pets or consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to the Service's listing of this species. During the summers of 1998 and 1999, biologists associated with the West Mojave Coordinated Management Plan surveyed over 2,400 transects over a large area of the western Mojave Desert. These transects failed to detect sign of desert tortoises in large portions of the Mojave Desert where desert tortoises were previously considered to be common. Although these data have not been fully analyzed and compared with previously existing information to date, they strongly suggest that the factors mentioned above have caused a widespread decline in the numbers of desert tortoises in the western Mojave Desert.

Each of the action alternatives include segments which pass through at least one area designated as critical habitat or recommended DWMA, as identified in the Service recovery plan, subsequently in the BLM resource management plans, or plan amendments to the CDCA Plan. Critical habitat units (CHU) and DWMAs within the Western and Eastern Mojave Recovery Units that are traversed by segments of the networks include the Superior-Cronese DWMA and CHU and the Ord Rodman DWMA and CHU in the Western Mojave Recovery Unit; the Shadow/Ivanpah Valley CHU and Area of Critical Environmental Concern (ACEC), Piute/Fenner Valley CHU and ACEC, and the Piute/Eldorado CHU and ACEC in the Eastern Mojave Recovery Unit; and the Chemehuevi CHU and ACEC in the Northern Colorado Recovery Unit. These areas are further described in the Northern and Eastern Mojave Desert Management Plan (NEMO, 2002), the Northern and Eastern Colorado Desert Coordinated Management Plan (WMCMP, 2003).

# Areas of Critical Environmental Concern

The BLM has designated four Areas of Critical Environmental Concern (ACECs) within the Mojave Desert for conservation and recovery of desert tortoise. The ACEC designation indicates to the public that the area's values have met the BLM's ACEC importance and relevance criteria and BLM has established measures to protect those values. The four desert tortoise ACECs that are crossed by routes proposed for the DARPA Grand Challenge include: Piute/Eldorado ACEC, Shadow Valley ACEC, Ivanpah Valley ACEC and Piute-Fenner ACEC. See Exhibit 4 which identifies the location of these ACECs. These areas are further described in the NEMO and the LVRMP.

# Large-Scale Translocation Study Site

Established by Clark County, Nevada in 1997, the Desert Tortoise Translocation Project Area occurs on BLM administered lands southwest of Jean, Nevada. The Project area, known as the Large-Scale Translocation Study Site (LSTS) covers approximately 22,600 acres and is bounded on the north by State Route 161, the east by I-15, the west by the Spring Mountains, and the south by a tortoise proof fence a few miles north of the Nevada/California state line. The translocation effort was initiated to: 1) relocate desert tortoises displaced as the result of construction and development projects in Clark County, Nevada; 2) provide a means to relocate healthy pet desert tortoises turned in by Clark County residents so as to discourage residents from turning their potentially diseased tortoises out into the wild; 3) study the techniques and viability of translocating desert tortoises to the wild; and 4) to accommodate the large number of displaced tortoises brought in through the County's pick-up service. During a 5-year period between 1997 and 2002, a total of 3,674 tortoises were relocated to the project site (U.S. Bureau of Land Management, 2003a).

# Mohave Ground Squirrel

The known range (Gustafson 1993) of the Mohave ground squirrel (MGS) is bounded to the south by the San Gabriel and San Bernardino mountains, to the east and southeast by the Mojave River, to the west by Palmdale and Lancaster, to the west and northwest by the Sierra Nevada, to the north by the Coso Range and Olancha, and to the northeast by the Avawatz and Granite mountains on the Fort Irwin National Training Center. The known range of the MGS is probably associated with elevation, rainfall patterns, temperature, suitable plant communities and substrates, topographical barriers, and other factors. The California Natural Diversity Data Base (CNDDB) has reported MGS from an elevation range of 1,800 to 5,000 feet (548-1,524 meters). Route segments from the Southern Network, which are also included in the Combined Network, traverse MGS habitat to the south and southeast of Barstow.

The MGS is one of two members of the subgenus *Xerospermophilus*, which also includes the round-tailed ground squirrel (*Spermophilus tereticaudus*) of the eastern Mojave and Sonoran deserts (Hall 1981; Nowak 1991). The MGS measures 8.3-9.1 inches (32-38 mm) in total length, 2.2-2.8 inches (57-72 mm) in tail length, and 1.3-1.5 inches (32-38 mm) in hind foot length (Hall 1981), which helps differentiate it from the smaller antelope ground squirrel (*Ammospermophilus leucurus*) and the considerably larger California ground squirrel (*Spermophilus beecheyi*). Of these four species, the MGS is the only one found entirely within the western Mojave Desert.

The MGS exhibits a strongly seasonal cycle of activity and torpor (like hibernation), emerging from dormancy as early as January, but more typically in mid-February or March (Leitner and Leitner 1996). Aestivation generally begins sometime between July and September, buy may begin as early as April or May during drought conditions (Leitner, et al., 1995).



The MGS generally occurs in flat to moderate terrain and is not found in steep terrain. Substrates in occupied habitats have ranged from being very sandy to, less frequently, very rocky (Best 1995, Wessman 1977). The MGS is considered to be absent, or nearly so, on dry lakebeds, lava flows, and steep, rocky slopes (Clark 1993).

The primary threats to MGS are thought to be cross-country travel by off-highway vehicles and road use. While some theorize that MGS are too fast to be injured by vehicles, there is anecdotal evidence that mortality to MGS has been caused by vehicle crushing.

# Mojave Fringe-toed Lizard

The Mojave fringe-toed lizard (MFTL) is endemic to southern California and a small area of western Arizona. It is restricted to aeolian sand habitats in the deserts of Los Angeles, Riverside, and San Bernardino Counties in California and La Paz County in Arizona (Van Denburgh, 1922; Smith, 1946; Schmidt, 1953; Norris, 1958; Pough, 1974; Stebbins, 1985). Nearly all localities are associated with present-day and historical drainages and associated sand dune complexes of the Mojave and Amargosa Rivers (Norris, 1958). Route segments for each action alternative traverse areas inhabited by MFTL.

The MFTL is a medium-sized lizard with fringe-toes and other physical features adapted for living in sand habitats. It is distinguished from other species of fringe-toed lizards by the presence of crescent-shaped markings on the throat (Cope, 1895; Heifetz, 1941; Schmidt and Bogert, 1947; Norris, 1958; de Queiroz, 1989). Physical adaptations have allowed the MTFL to achieve considerable speeds on the sand surface (Stebbins, 1944; Norris, 1958; Carothers, 1986), and bury themselves in the sand (Stebbins, 1944; Smith, 1946; Norris, 1958; Carothers, 1986).

Seasonal activity occurs between March and October, with hibernation occurring between November and February (Mayhew, 1964a, 1964b). Daily activity patterns are temperature dependent (Miller and Stebbins, 1964).

MTFL are restricted to areas with fine sand including both large and small dunes, margins of dry lakebeds and washes, and isolated pockets against hillsides (Stebbins, 1944, 1985; Smith, 1946; Norris, 1958). These areas are generally within creosote scrub desert between elevations of 300-3,000 ft (90-910 m; Norris, 1958; Stebbins, 1985).

Threats to MFTL include direct disturbances from habitat loss or damage from urban development, offhighway vehicles, and agriculture, and indirect disturbances from the disruption of the dune ecosystem source sand, wind transport, and sand transport corridors.

# **3.6** AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

The BLM has designated several "Areas of Critical Environmental Concern" (ACECs) within the Mojave Desert. The ACEC designation indicates to the public that an area's values have met BLM's ACEC importance and relevance criteria and the BLM has established measures to protect those values. The ACECs that are potentially crossed by routes for the DARPA Grand Challenge include: Piute/Eldorado ACEC, Afton Canyon ACEC, Cronese Lake ACEC, Clark Mountain ACEC, Salt Creek Hills ACEC, Amargosa River ACEC, Kingston Range ACEC, Halloran Wash, Manix ACEC, Shadow Valley ACEC, Ivanpah Valley ACEC and Piute Fenner ACEC. These areas are further described in site-specific ACEC management plans, the NEMO and the LVRMP. Exhibit 4 identifies the location of these ACECs. A brief summary of each ACEC follows.

#### 3.6.1 Piute/Eldorado ACEC

This desert tortoise conservation area is the only tortoise management area within Nevada in the East Mojave Recovery Unit and has been designated by the BLM as an ACEC. It is adjacent to corresponding habitat in California. The area suffered rapid declines in population levels of desert tortoise between 1979 and 1983 and has stabilized more recently (U.S. Bureau of Land Management, 1998). Route segments of the Central Network traverse the northern portion of this ACEC on Highway 164 eastward towards searchlight, and along the west margin of this ACEC on an unpaved north/south transmission road roughly paralleling Highway 95. Route segments of the Southern Network traverse the north-south length of this ACEC on Highway 95.

# **3.6.2** Afton Canyon ACEC

The Afton Canyon protects a portion of the riparian community of the Mojave River, the scenic values of the canyon, and the adjacent desert habitat in the Cady Mountains, which is occupied habitat for bighorn sheep and contains nest sites for prairie falcon and golden eagle. Open routes through this ACEC remain, but have been re-routed and constrained to provide maximum protection to natural resources (U.S. Bureau of Land Management, 2003b). Route segments of the Central Network traverse the center of this ACEC on the Mojave Road through this ACEC. The route is very sandy in spots and there are two Mojave River water crossings on this route which can get deep after large spring storms. This makes it difficult to for vehicles to traverse the route in a few spots without a good four-wheel drive system, and may make the Betty Ford River crossing impassable at times. Given the time constraints of the event, weather conditions may dictate whether this route is feasible.

# **3.6.3** Cronese Basin ACEC

The BLM designated the Cronese Lakes, north of I-15 between Barstow and Baker, as an ACEC in 1980. The purpose of this ACEC is to protect valuable cultural and natural resources, including the ephemeral wetlands present on the lakes, which serve as stopover points for migratory water birds and nesting sites for many species during very wet years. Mesquite hummocks and desert willow washes add to the biological importance, and the dunes and sand sheets are occupied habitat for the MFTL. The desert tortoise is found in low densities (U.S. Bureau of Land Management, 2003b). Route segments of the Central Network traverse the southern margin of this ACEC on an unpaved transmission road just inside the boundary of this ACEC.

#### 3.6.4 Clark Mountain ACEC

The Clark Mountain ACEC was established to preserve the diverse flora and fauna in this high elevation area. Among the fauna present is the largest relict stand of white fir in the CDCA Plan area. Clark Mountain also has evidence of prehistoric aboriginal occupation, an old town site, and is considered to have spiritual significance to Native Americans. The area contains diverse avian and reptilian populations, including desert tortoise. The Clark Mountain ACEC was designated prior to the establishment of the Mojave National Preserve. When the Preserve was established, most of this ACEC became part of the Preserve. Only a small portion of the northernmost and southernmost areas of the ACEC remain (U.S. Bureau of Land Management, 2002). Route segments of the Northern Network traverse the northernmost portion of this ACEC on unpaved roadways along the southern margin. Route segments of the Central Network traverse the center of the southernmost portion of this ACEC on unpaved transmission roads.

# 3.6.5 Manix ACEC

The Manix ACEC, located about 20 miles northeast of Barstow along the Mojave River, was established in 1990 by the BLM to protect paleontological and cultural resources. This site also contains blow sand habitat for the MFTL and the terminus of the Mojave Road (U.S. Bureau of Land Management, 2003b). Route segments of the Central Network traverse the northern edge of this ACEC on unpaved roadways along the adjacent rail road right-of-way.

#### 3.6.6 Salt Creek Hills ACEC

This ACEC is 2,205 acres in size and is located along Highway 127 north of Baker, California. It was established by the BLM for its value to area wildlife and for its prehistoric and historic resources (U.S. Bureau of Land Management, 2002). The Northern Network will remain on paved roads along the
southern boundary of this ACEC. Route segments of the Northern Network traverse the southern and western edge of this ACEC on Highway 127.

### 3.6.7 Amargosa River ACEC

The Amargosa River ACEC is a 9,206-acre conservation area outside of Shoshone, California, and was established by the BLM for wildlife values, sensitive vegetation and riparian habitats, as well as scenic values (U.S. Bureau of Land Management, 2002). The Northern Network will remain on paved roads as it crosses over the narrow neck that separates the two halves of this ACEC. Route segments of the Northern Network traverse the western edge of this ACEC on Highway 127, and the central portion of this ACEC on Old Spanish Trails Highway, a paved roadway.

### 3.6.8 Kingston Range ACEC

The BLM established the 19,620-acre Kingston Range ACEC east of Tecopa, California, to protect sensitive wildlife habitats. The Northern Network will remain on paved roads as it passes through the center of this ACEC (U.S. Bureau of Land Management, 2002). Route segments of the Northern Network traverse the western portion of this ACEC on Old Spanish Trails Highway, a paved roadway.

### 3.6.9 Halloran Wash ACEC

This 1,860-acre ACEC was established by the BLM in 1980 to protect sensitive cultural resources found in Halloran Wash at the south end of Shadow Valley just north of I-15 (U.S. Bureau of Land Management, 2002). The Central Network traverses along the southern boundary of this ACEC on unpaved transmission line roads.

# 3.6.10 Shadow Valley ACEC

The Shadow Valley desert tortoise conservation area is one of three tortoise management areas identified by the BLM for protection of desert tortoise in the East Mojave in California. The valley has been designated Critical Habitat by the Service. It is contiguous with lands managed for viable desert tortoise populations to the south, across I-15, in Mojave National Preserve. This area, in conjunction with areas of the Mojave National Preserve, represents a unique genetic unit within California. Desert tortoise densities in this area currently range from low (5 per square mile) to moderate (50 per square mile). There has been moderate and increasing tortoise die-off from disease in this area in recent years (U.S. Bureau of Land Management, 2002). The Central Network traverses along the southern boundary of this ACEC on unpaved transmission line roads.

# 3.6.11 Ivanpah Valley ACEC

Ivanpah Valley desert tortoise conservation area is one of three tortoise management areas identified by the BLM for protection of desert tortoise in the East Mojave in California. The valley has been designated as Critical Habitat by the Service. It provides high-density desert tortoise habitat in upper Ivanpah Valley. The area is contiguous with lands managed for viable desert tortoise populations to the south and west in Mojave National Preserve and provides a corridor to public lands further east that are managed by BLM's Las Vegas District, thus serving as a critical linkage between these areas (U.S. Bureau of Land Management, 2002). The Central Network traverses along the southern boundary of this ACEC on Nipton Road, which is paved.

### **3.6.12 Piute-Fenner ACEC**

The Piute-Fenner ACEC is the third desert tortoise conservation area identified for protection and recovery of desert tortoise in the East Mojave in California. The valley has been designated Critical Habitat by the Service. Piute and Fenner Valleys lie approximately west of the Colorado River, south and west of the California State line, and south of Bullhead City. This area is heterogeneous in vegetation and topography, and includes parallel mountain ranges divided by valleys, dry lakes, and bajadas. The Central Network will traverse along the northern boundary of this ACEC on an unpaved, north-south transmission line road, and through the ACEC on Goffs Road, a paved roadway. The Central and Southern Networks traverse along the western boundary of this ACEC on an unpaved, north-south transmission line road, and on paved Goffs Road.

#### **3.6.13** Superior-Cronese Proposed ACEC

The Superior-Cronese ACEC is proposed in the Draft West Mojave Coordinated Management Plan (2003) for the protection and recovery of desert tortoise. It is located in the western Mojave Desert, bordered on the west by Cuddeback Dry Lake, on the north by the southern end of Superior Valley, on the east by West Cronese Dry Lake, on the south by I-15. This area has been designated critical habitat by the Service, and is diverse in topography and vegetation. It includes numerous dry lakes and springs and parts of several mountain ranges. Desert tortoises occur in patchy concentrations throughout the area. Densities are thought to be depressed as a result of a number of human impacts and disease (U.S. Bureau of Land Management, 2003b). The Northern Network traverses the eastern portion of this ACEC on an unpaved transmission line road.

# 3.6.14 Ord-Rodman Proposed ACEC

The Ord-Rodman ACEC is proposed in the Draft West Mojave Coordinated Management Plan (2003) for the protection and recovery of desert tortoise. It is located southeast of Barstow and lies approximately south of Interstate 40, east of Highway 247, west of Argus Mountain, and north of the central portion of the Fry Mountains. Elevations range from about 2,500 feet in Stoddard Valley to over 6,000 feet in the Ord Mountains. Distribution of desert tortoise is patchy. The Ord-Rodman ACEC has a long history of grazing by cattle and domestic sheep. Collecting, vandalism, road kills, disease, drought, OHV activities, mining, excessive raven predation and other human-related impacts have also contributed to significant population declines (U.S. Bureau of Land Management, 2003b). The Northern and Central Network traverses the western portion of this ACEC on an unpaved transmission line road. The Southern Network also traverses the center of this ACEC on an unpaved road.

### 3.6.15 Chemehuevi ACEC

The Chemehuevi ACEC was established by the BLM for the protection and recovery of desert tortoise in the Northern Colorado Desert. It is contiguous (across Interstate 40) with the Mojave National Preserve and Piute Valley ACEC (U.S. Bureau of Land Management and California Department of Fish and Game, 2001). The Central Network traverses the western portion of this ACEC on paved roadways north and south of Interstate 40. The Southern Network traverses the north-south length of this ACEC on an unpaved transmission line road.

# 3.7 AIR QUALITY

The APE for air quality includes the Mojave Desert Air Basin (MDAB) in California, and the Ivanpah Valley Air Basin (IVAB) and Las Vegas Valley Air Basin (LVAB) both in Nevada. Air Quality Management Districts implement the Federal Clean Air Act, as well as state and local standards for air quality. The Mojave Desert Air Basin is regulated by the Mojave Desert Air Quality Management District (MDAQMD), and the Clark County Department of Air Quality Management regulates the IVAB and LVAB.

These air basins do not meet federal air pollution standards for some criteria pollutants established by the federal EPA. The MDAB is out of attainment with California and federal standards for ozone. However, the primary source of ozone for this region is the South Coast Air Basin, due to urbanization of these areas. Due to the temporary nature of the event, it does not contribute to urbanization, and is not considered to be a significant contributor to ozone in the Air Basin. The LVAB is out of attainment with Federal standards for carbon monoxide (CO). The primary source is combustion due to the rapid expansion of development in this basin. The event is temporary and does not contribute to urbanization, nor is it a significant source of CO.

The MDAB and the LVAB are both in non-attainment of the federal standards for  $PM_{10}$  (particulate matter under 10 microns in size). Primary sources of  $PM_{10}$  are naturally occurring dust picked up by winds; fugitive dust sources such as construction and demolition activities; OHV travel; unpaved public roads and parking lots; industrial activities; OHV open areas; and military activities. Both the MDAB and LVAB have been designated non-attainment areas for  $PM_{10}$  which warrant special considerations and controls. The BLM has implemented a Fugitive Dust/ $PM_{10}$  Emissions Control Management Strategy in cooperation with the MDAQMD, for lands administered by the BLM and within the MDAB non-attainment area. The purpose of the Fugitive Dust/ $PM_{10}$  Control Management Strategy is to implement regulations and control strategies that will bring the MDAB non-attainment area into compliance with the Clean Air Act.

### **3.8 CULTURAL RESOURCES**

Cultural resources refer to prehistoric and historical resources, all of which are found in the Mojave and Colorado Desert regions. Throughout the cultural history of this region, human activities have been closely tied to the distribution of natural resources and other aspects of the natural setting, including water sources, vegetation, wildlife habitat, and certain lithic (rock) materials. Therefore, the distribution of cultural resources is strongly tied to the location of these critical resources. Both short-term and long-term climatic fluctuations have likely affected the intensity of land use over time. Natural topography influenced the location of trails and land use patterns. Dynamic alluvial and aeolian (wind) forces also determined the integrity of preservation of archeological sites over time.

Prehistoric resources found in the region include cairns, rock circles, chert outcrops, fire-affected rock concentrations, flaking stations, lithic scatters, quarries, rock shelters, camps and trails. Historic type sites include the political boundaries (California/Nevada), cairns, camps, roads, structures, trails, trash scatters, mining, railroad components, irrigation structures, and transmission lines.

#### 3.8.1 Native American Religious Concerns

Religious sites important to Native American religion are located within the Mojave and Colorado Desert regions. The BLM initiated consultation with the following tribes in October 2003.

- Chemehuevi;
- Colorado River Indian Tribe;
- Las Vegas Piute; and
- Timbisha Shoshone.

No substantial issues about the event have been raised by any tribes/parties.

### **3.9 WATER QUALITY**

The APE for water quality includes the staging areas used to support the event including the start, finish, media, and spectator areas, and the route segments proximate to the Mojave River (see Exhibit 3).

The Clean Water Act prohibits the discharge of pollutants into surface waters. The Mojave River is the predominant water body in the Mojave Desert. The River spans from the base of the eastern San Bernardino Mountains near Hesperia, eastward through Afton Canyon, and terminates at Soda Lake within the Mojave National Preserve. Most of the water flow in the river is subterranean. In Afton Canyon, the water is forced to the surface by shallow bedrock providing an extensive riparian oasis in the middle of a predominantly arid and waterless region.

The primary water quality impairment of concern in the APE is turbidity (sediment suspended in the water), which inhibits the growth of algae and other microorganisms. Turbidity is creating by either stirring up sediment within the water body, or more commonly, from sediment being carried into the water body through storm flows. Sediment sources include natural geologic processes and human induced erosion.

#### 3.10 WASTES, HAZARDOUS OR SOLID

The APE for solid waste (trash) and hazardous waste (vehicle fluid waste) is the staging areas used to support the event including the start, finish, media and spectator areas.

#### 3.11 SAFETY AND LAW ENFORCEMENT

The APE for safety and law enforcement includes all staging areas (start, finish, media, and spectator areas), areas where roadways intersect the network, and any other roadways that will be affected by the recreational closure of the specific route to be used. Affected law enforcement agencies include the California and Nevada Highway Patrol, the San Bernardino County Sheriff's Department, the Las Vegas Metropolitan Police Department and the BLM.

# 3.12 UTILITIES

The APE for utilities are the utility corridors that the networks follow or traverse, most notably, the Boulder Corridor in the Northern Network, the northernmost east-west route within the Central Network roughly paralleling the north side of the I-15, and a north-south corridor roughly paralleling Highway 95 and continuing southward in the Central and Southern Networks. The two east-west corridors include above-ground and buried utilities. Since the Grand Challenge does not involve any ground excavation or construction, this assessment focuses on the above-ground utilities, including the power conveyance lines

of Southern California Edison, Los Angles Department of Water and Power and Metropolitan Water District.

### 3.13 RECREATION AND ACCESS

The APE for recreation and access includes the start and finish areas and all roadways to which use or access will be affected by the recreation closure, including the route networks, portions of intersecting roadways near the route, portions of ACECs near the route, and portions of the OHV areas to be used for the event. Potentially affected OHV areas include Stoddard Valley, Johnson Valley and Rasor, as well as an open lakebed area in Nevada near Primm.

The APE is situated between two major population centers, Metropolitan Los Angeles and Las Vegas, and provides an easily accessible, uncrowded recreation experience. The types of recreation that occur along the potential network are highly varied but may include the following activities: unorganized OHV recreation including cross-country riding in OHV areas, trail use and technical four-wheel drive exploring on public lands routes, organized OHV events; camping; sightseeing; wildlife observation; photography; hiking; equestrian use, target shooting; hunting; rock climbing; land sailing; rock hounding; and model rocket and airplane flying. Some of these activities go hand-in-hand.

Other types of access are provided by the network. Specific leases, easements and rights-of-way, as well as mining claims and plans of operation are held on public lands. In addition mining exploration occurs on public lands. Local residents and visitors utilize certain network segments to access private lands and visit businesses located in rural areas.

#### 3.14 SCENIC VALUES

The Grand Challenge field test would be predominantly conducted within undeveloped areas of the Mojave and Colorado Desert regions that have moderate to high scenic values. Some of the event travels through ACECs and wilderness corridors in areas recognized for their scenic qualities, among other values.

#### 3.15 WETLANDS/RIPARIAN VALUES

A number of route segments cross the Mojave River, which is the predominant hydrologic feature in the Mojave Desert. The River spans from the base of the eastern San Bernardino Mountains near Hesperia, eastward through Afton Canyon, and terminates at Soda Lake within the Mojave National Preserve. Most of the water flow in the river is subterranean. In Afton Canyon, the water is forced to the surface by shallow bedrock providing an extensive riparian oasis in the middle of a predominantly arid and waterless

region. Other riparian areas traversed by route networks include Manix Wash and Halloran Wash. The Northern Network traverses the Armagosa River on paved roadways.

# CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

#### 4.1 INTRODUCTION

Chapter 4 presents the environmental impacts of each of the five alternatives described in Chapter 2. These include the following:

- Northern Network Alternative 1;
- Central Network Alternative 2;
- Southern Network Alternative 3;
- Combined Network Alternative 4; and
- No Action Alternative.

Impacts to resource values and uses are addressed for each alternative, consistent with resource values found in the area of potential affect and discussed in Chapter 3, the Affected Environment. The following assumptions are made with respect to the impacts analysis:

- 1. Outside of areas designated Open for off-highway vehicle (OHV) use, vehicles will be specifically confined to designated open routes and parking on adjacent disturbed shoulders, and the event is a non-competitive (endurance/navigational) challenge and will have specified speed limits, which vary depending on resource sensitivity, State law or community ordinance.
- 2. Within areas designated Open for OHV Use, the event is not confined to designated routes, is competitive, and resource-specific limitations may be identified.

#### 4.2 NORTHERN NETWORK ALTERNATIVE 1

#### 4.2.1 Vegetation

Potential direct impacts to vegetation include crushing by vehicles or pedestrians associated with the activities of the Phase 4 field test identified in Section 2.2.1. The Northern Network includes 415 miles of open routes comprised of existing paved and unpaved roadways. For practical purposes actual route lengths would be approximately 200 miles. Damage to vegetation would be limited to vegetation found within existing open, unpaved roadways, consistent with regular roadway use, since operation of the challenge vehicles and supporting vehicles are confined to the roadway at all times.

Competitive segments would be conducted in established OHV or other identified open areas. Vehicles would use their sensing capability to determine the best route to follow and cross-country travel or off-road driving may be allowed. In OHV open areas crushing of vegetation by challenge vehicles and the following control vehicles would be of a similar magnitude consistent with normal recreation use in the

Stoddard Valley OHV Area and the OHV area in Nevada, as discussed in the OHV activity plan and the Resource Management Plans.

Support vehicles operating on or near the event route would not leave existing roadways and would park in one of the following areas: 1) to one side of an intersecting roadway (within the roadway) intersecting the event route, 2) on existing disturbed shoulders adjacent to either the event route or on an intersecting roadway, 3) to one side of the event route on the roadway, where the roadway width is greater than 20 feet. Therefore, impacts to vegetation from support vehicles and pedestrians would be limited to vegetation present in roadways and adjacent disturbed areas.

Route marking and road barriers would be placed within the roadways so that vegetation adjacent to the route would not be disturbed. Individual plants could be crushed by pedestrian route monitors accessing their monitoring locations, or tortoise monitors, observing tortoises off the route. Up to 50 monitoring locations would each be staffed by two people. Twenty tortoise monitors are estimated.

Staging areas including the start and finish, spectator and media viewing areas would be established in existing commercial or disturbed areas, which substantially lack vegetation. Staging areas would be directly impacted by pedestrian and vehicle areas, set up of temporary seating and ancillary facilities such as portable toilets and trash receptacles. Staging areas would be patrolled at all times by DARPA staff to ensure that use of these areas would be controlled and confined to the existing disturbed areas, and to ensure proper removal of all facilities following the conclusion of activities.

Challenge Vehicles may come from any geographic location in the United States. Vehicles may transport seeds on their tires, and spread non-native seeds during the Challenge Event. Challenge Vehicles tires would be washed at the qualification inspection and demonstration (QID) to remove all seeds prior to vehicles arrival at the start location in order to prevent the spread of non-native invasive species.

# Threatened & Endangered, and Sensitive Plant Species

The BLM-sensitive Mojave monkey flower potentially occurs in the Stoddard Valley OHV area that would be used for the Event under all of the action alternatives. This Mojave monkey flower is an annual species which develops each year and is reduced to seed after the blooming period of April through June. Plants may be crushed by Challenge and support vehicles during operation of the event, which would be held in March when plants may be developing. Outside of the open area, vehicle operation would be restricted to the roadway so that plants would not be impacted. Mitigation that could reduce effects to the monkey flower populations in this designated OHV open area include restriction of vehicles to designated roadways or survey to identify specific populations prior to the event, and development of avoidance measures. See Section 4.2.13 for survey and avoidance measures that are proposed to minimize impacts to Mojave monkey flower.

The white-margined beardtongue is found in the vicinity of the Northern Network in Nevada. However, the network in this vicinity is comprised of paved roads, and would not impact this BLM-sensitive plant.

# 4.2.2 Wildlife

Potential direct impacts to small mammal and reptile species associated with the activities of the Grand Challenge field test identified in Section 2.2.1 include crushing by vehicles or pedestrians, and indirect impacts include the crushing of burrows. Wildlife injury and mortality would be largely limited to animals found within or traversing roadways and staging areas (start, finish, media, observation areas).

Competitive segments would be conducted in established OHV areas or equivalent. Crushing of small wildlife species by challenge vehicles and the control vehicles that follow challenge vehicles would be expected to be of a similar magnitude consistent with early spring recreation use anticipated in an OHV area. These impacts are summarized in the various bioregional plans. Large raptors, other birds such as burrowing owls, and mammals such as desert kit fox are not anticipated to be substantially affected by this one-day event. Impacts specific to desert tortoise, MGS and MFTL are discussed below.

# Threatened & Endangered, and Sensitive Wildlife Species

# Desert Tortoise

A biological assessment (BA) has been submitted to the Service, under the Section 7 consultation process by DARPA. The BA identifies potential impacts to the federally and state threatened desert tortoise that could result from selecting the Northern Network Alternative 1, and identifies protective measures that would be implemented to minimize impacts. Information from the BA is summarized herein. The USFWS renders a biological opinion on the effects of the event on the desert tortoise, including required terms and conditions for authorization of the event that would be incorporated in the decision.

At the time of year that the Grand Challenge would be held, desert tortoises may be active above ground, or may be inactive within their burrows. Weather conditions would be a major factor on the potential for encounters with desert tortoises by event participants and support vehicles. If it is cold the day that the robotic vehicles traverse the chosen route, few if any desert tortoises may be foraging about above ground. If it is warm, desert tortoises may be very active.

Within the Stoddard Valley OHV area, the OHV area in Nevada, and the roads of the Northern Network, desert tortoises would not be able to get out of the way of robotic and support vehicles, as the tortoises are slow moving. Direct impacts may include the loss of individual desert tortoise through crushing of animals above ground or in their burrows by event vehicles or through contact with event personnel or spectators.

Indirect impacts could come about through habitat degradation from soil compaction and loss of vegetation caused by event vehicles operating off-road in OHV areas. Although most robotic vehicles that would be entered in the event have rubber tires, tracked vehicles are not precluded from entering. Tracked vehicles, if any such vehicles are developed, would result in greater surface disturbance. All surface disturbances would be confined to existing road surfaces (not including road berms) except in OHV areas where off-road activity would be permitted.

Adverse effects are not anticipated within Category I or critical habitat, where the event is constrained to the width of the roadway, and other measures are in place. Confining vehicles to existing roads and trails except in designated OHV areas, and the strict control of the robotic and support vehicles by DARPA, as defined under the event description, further reduces the potential for adverse effects to desert tortoise.

The Northern Network traverses 11 miles of unpaved roadway in BLM Category 1 Habitat, and 46.7 miles of unpaved roadway in USFWS Critical Habitat.

This is during the non-competitive portion of the route, and, as with dual-sport events that are annually authorized through this area during the fall, strict speed limits and other measures for conservation and protection of desert tortoise have been developed (See Section 4.2.13).

# Mohave Ground Squirrel

The Northern Network does not traverse the known range of the MGS and operation of the Grand Challenge in the Northern Network would not be expected to impact MGS.

# Mojave Fringe-toed Lizard

The Northern Network traverses habitat of the MFTL which is present in sand habitats throughout the Mojave Desert. Direct impacts may include the loss of individual lizards through crushing of animals by event and support vehicles, or through direct contact with event personnel and spectators. Species activity is dependent on the temperature, but may be present in March when the event would be held.

# 4.2.3 Areas of Critical Environmental Concern

Specific segments of the Northern Network traverse the ACECs identified below on designated open roadways. In all ACECs, Grand Challenge activities would include traverse by Challenge and support vehicles on roadways and pedestrian tortoise monitors adjacent to roadways as needed. No staging areas, or public or media viewing areas are located within any of the ACECs, except Shadow Valley, which has one media location where it intersects Excelsior Mine Road.

### **Clark Mountain ACEC**

The Northern Network would traverse the northern portion of this ACEC over approximately 4 miles of unpaved open road. Grand Challenge activities in this ACEC would also include pedestrian route monitors to view the Challenge vehicles as they traverse the area. Two monitoring points are planned, with a total of four pedestrian monitors. Because of the high elevation, little desert tortoise activity is anticipated. Use of open roads is consistent with the ACEC Plan. Pedestrian activities may result in crushing of vegetation and cultural resources, soil compaction, and startling or disturbance of any wildlife present along roadways. Because of the temporary nature of the event, it would not impact the scenic value, value as an outdoor laboratory, historical importance, or spiritual importance to Native Americans, nor adversely impact the existing uses in the ACEC.

#### Salt Creek Hills ACEC

The Northern Network would traverse the southern boundary of this ACEC over approximately 3 miles of paved road. No event monitoring areas are located in this ACEC. Use of open roads is consistent with the ACEC Plan. Pedestrian activities may result in crushing of vegetation and cultural resources, soil compaction, and startling or disturbance of any wildlife present along roadways. Because of the temporary nature of the event, it would not impact the resource values for which this ACEC was designated.

#### Amargosa River ACEC

The Northern Network would traverse this ACEC over approximately 3 miles of paved road. No event monitoring areas are located in this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC was designated.

#### Kingston Range ACEC

The Northern Network would traverse this ACEC over approximately 6 miles of paved road. No event monitoring areas are located in this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC was designated.

#### Shadow Valley ACEC

The Northern Network would traverse this ACEC over approximately 11 miles of unpaved road. There is one event monitoring area and one media area located within this ACEC, at the junction of the

transmission line and Excelsior Mine Road. Use of open roads is consistent with the ACEC Plan. Location of a media area, or similar activity, within this area is not specifically identified provided for in the management plan for this ACEC; however, tortoise densities are low in the area that would be traversed by the Northern Network. In addition, Section 4.2.13 identifies desert tortoise protection measures. Therefore, the event is not anticipated to impact the resource values for which this ACEC was designated (protection of desert tortoise as a Desert Wildlife Management Area [DWMA]).

# Superior-Cronese Proposed ACEC

The Northern Network would traverse this ACEC proposed in the West Mojave Coordinated Management Plan over approximately 25 miles of unpaved road. There is one event monitoring area located within the northeastern portion of this proposed ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC is proposed. Tortoise protection measures identified in Section 4.2.13 would provide additional protection for tortoise within this proposed ACEC.

### Ord-Rodman Proposed ACEC

The Northern Network would traverse this ACEC proposed in the Draft West Mojave Coordinated Management Plan (2003) over approximately 10 miles of unpaved road. There are two event monitoring areas located within the northwestern portion of this proposed ACEC. Use of open roads is consistent with the proposed ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC is proposed. Tortoise protection measures identified in Section 4.2.13 would provide additional protection for tortoise within this proposed ACEC.

# 4.2.4 Air Quality

Air Quality impacts associated with the Grand Challenge include emissions of Federal EPA criteria pollutants, primarily  $PM_{10}$ . Indirect impacts result from fugitive dust that is caused by soil disturbance from Grand Challenge activities on unpaved surfaces. Since Grand Challenge activities would occur within the MDAB and LVAB non-attainment areas for  $PM_{10}$ , this air quality impact analysis focuses on the generation of  $PM_{10}$  emissions. These impacts are generally most concentrated in staging areas and dissipate substantially within a few hours of the event, although some smaller particles will remain airborne for up to 72 hours on a typical spring day. Wind conditions are a factor for adverse affects. Vehicle exhaust emissions are insubstantial as compared to normal highway traffic in the high desert on a typical spring weekend.

Grand Challenge activities within the LVAB non-attainment area would occur on paved roadways and would not generate fugitive dust emissions within this air basin. With the Grand Challenge confined to

paved roadways within the LVAB, the Clark County Department of Air Quality Management does not require reasonably available control measures for PM<sub>10</sub> emissions.

For activities within the MDAB, the BLM Fugitive Dust/  $PM_{10}$  Emissions Control Strategy for the Mojave Desert Planning Area outlines procedures for Clean Air Act conformity determinations for activities within the  $PM_{10}$  non-attainment areas. These include  $PM_{10}$  emissions calculations for activities on unpaved roads. Factors such as soil moisture, soil composition, vehicle speed, vehicle weight, distance traveled, and the number of vehicles on dirt roads all contribute to the amount of  $PM_{10}$  generated. The  $PM_{10}$  emissions calculations within the BLM Fugitive Dust/ $PM_{10}$  Emissions Control Strategy have default values for many of these variables. These default values are: 15 percent silt content in soil, 3 tons average weight of vehicles, and 347 average dry days per year. The average speed of all vehicles on unpaved roads during the Grand Challenge is expected to be 35 miles per hour. Using these values, 2.95 pounds of  $PM_{10}$  per vehicle mile traveled would be generated.

The Northern Network comprises the longest distance on unpaved roads and would generate a total of approximately 16.55 tons of  $PM_{10}$  as a result of Grand Challenge activities on unpaved roads. These activities include approximately 50 challenge vehicles, 5 route marking vehicles, and 13 administrative and desert tortoise sweeps traveling 126.9 miles each; 20 route monitor vehicles traveling 104.4 miles each; and 50 vehicles associated with temporary road closures traveling 10 miles each. In the MDAB, Reasonably Available Control Measures are applied above 15 tons/day of  $PM_{10}$ . Approximately 12 miles of unpaved segments are outside of the MDAB (in the IVAB), so that  $PM_{10}$  emissions in the MDAB would be less than 16.55 tons of  $PM_{10}$  in the MDAB.

DARPA consulted with MDAQMD to discuss feasible control measures that would reduce short-term PM<sub>10</sub> emissions (personal communication with Alan DeSalvio, MDAQMD, 12/2/03). Measures discussed include watering, application of temporary surface hardener, and speed reductions. Application of water or a temporary surface hardener (application) in dusty areas can be effective in reducing dust emissions over the short term. Application should be minimized because water may attract desert tortoise to the activities areas for the event negatively impacting desert tortoise. Accordingly, application over the entire route was not considered as a viable measure due to potential impacts to tortoise. Application in staging areas including the start area and two spectator areas would be effective since most of the activity in these areas would take place over a 4-hour period of time. Application in this area would be of a manageable size, and tortoise monitors are already planned for these areas. Reductions in speed would further reduce PM<sub>10</sub> emissions. Speed limits already constrain operation of the Grand Challenge in desert tortoise critical habitat areas, railroad right-of-ways, and other areas for safety considerations. A reasonable average speed (approximately 35 mph) is necessary in order for the event to be completed within a reasonable time-frame. Additional speed limit constraints would jeopardize the average speed necessary to make the event feasible, and would be contrary to the proposed action. Dust would also be minimized at the spectator areas through strict traffic and pedestrian control measures which will limit travel by pedestrians and vehicles. Since the two spectator areas are located adjacent to paved roadways, travel on unpaved surfaces will be controlled and minimized. See Section 4.2.13 for reasonably available control measures that will minimize impacts to air quality.

### 4.2.5 Cultural Resources

A Cultural Resources Assessment has been prepared for the DARPA Grand Challenge, including a records search and review, and selected field investigation.

Potential direct impacts to prehistoric or historical resources associated with the event include crushing, or disturbance by vehicles or pedestrians. Impacts would be limited to OHV areas, unpaved roadways, areas immediately adjacent to unpaved roadways where pedestrian monitoring may occur, and staging areas (start, finish, media locations).

The area traversed by the Northern Network has a high potential for concentrations of cultural resources due to the presence of past water sources, lithic resources, and other concentrated resources in this network. Unpaved segments of the Northern Network are primarily associated with the access roads of the Boulder Corridor, an extensive utility corridor which includes transmission lines and supporting access roads for a number of utilities. As a result of this utility work, extensive study, and site specific cultural investigation have been conducted in this area. Resources uncovered during excavation for utilities have been recorded and placed in repositories for the conservation of these resources. The extensive evaluation and development of utilities and past removal of sensitive resources in the Boulder Corridor minimizes the likelihood that impacts would result from use of the roadways in the Northern Network. However, substantial cultural resources may still be present outside the roadways and utility development footprint, and could be impacted by pedestrian activities. See Section 4.2.13 for measures to minimize impacts on cultural resources.

#### Native American Religious Concerns

The area traversed by the Northern Network has a high potential for Native American sacred sites to be located nearby, due to the occurrence of natural resources in this area (water sources, areas of higher elevation). Sacred sites can vary in scale from specific locations, to a particular mountain or area. Disturbance from event operations near sacred sites would be limited to traverse by vehicles on open routes, and pedestrian monitoring activities. Access to sacred sites during operation of the event may be limited if the site would normally be accessed via a route segment. Native American and public access to a sacred site may be temporarily precluded if the site would normally be accessed via a vehicle and route segment that is being closed for the Grand Challenge event.

### 4.2.6 Water Quality

Water quality impacts associated with the Grand Challenge include the potential release of automotive fluids and contributions to the turbidity (suspended sediment creating clouding) in water bodies. Potential sources of vehicle fluids include Challenge Vehicles, support vehicles, spectator vehicles and fueling areas. Vehicle fluids released into the environment can be carried by stormwater runoff into waterways, thereby polluting those waters. Turbidity in water bodies can inhibit the growth of algae and other microorganisms which provide food for fish, birds, and other organisms. Given the scarcity of water resources in the desert, it is especially important to protect them.

### Vehicle Fluids

Challenge Vehicles would be required to be in quality working order, free from any fluid leaks, in order to participate in the field test. Vehicles would be inspected at the qualification inspection and demonstration (see Chapter 2) and on the morning of the field test to ensure proper operation. Any vehicles not in proper condition would be disqualified from participating in the field test. Cardboard oil catchers would be placed under the Challenge Vehicles stored overnight at the start area for protection of the environment and as a tool for detecting any potential fluid leaks. All Challenge Vehicles must arrive at the event fully fueled.

Support vehicles would be similarly required to be maintained in good condition, free from leaks. A fuel area, including a portable 40-foot tractor trailer fuel station would be established at the start area for support vehicles only. Thereafter, support vehicles would obtain fuel from commercial establishments. The fuel area would have full containment capability for any spills or overflows that could occur.

A Spill Prevention and Cleanup Plan is being prepared by DARPA and will be submitted for BLM review and approval, and would be in place prior to the event. Consistent with this plan, sufficient spill prevention and clean up materials would be placed at all staging areas of the event including the start and finish areas. Any release would be immediately cleaned up, including affected soils, and disposed of at an appropriate facility. Care would be taken to minimize ground disturbance during any cleanup.

# Turbidity

The event is likely to contribute to turbidity in two ways: 1) vehicles crossing a stream or river may stir up sediments in the water, and 2) vehicles may increase erosion in dry washes or areas proximate to water bodies, so that the loose sediment is more readily transported to the water bodies in subsequent storm flows.

The Northern Network traverses the Mojave River (River) just northeast of Daggett, California. Water flow in this segment of the River is usually subterranean, though small pools would form here during or just following large storm events. Given the subterranean nature of the water flows on this segment any increase in turbidity would be limited to puddles of water where the roadway crosses the River.

# 4.2.7 Wastes, Hazardous or Solid

# Trash

DARPA staff, media and spectators would generate trash in staging areas where people may be congregated for extended periods of time. Trash is a concern because it diminishes the visual appeal of the desert environment, and because it attracts ravens which prey on young desert tortoise. DARPA would provide covered trash bins in all staging areas including the start, finish, media and spectator areas, would monitor containers to ensure no overflowing, and sweep the area for trash at the close of the event.

# Hazardous Waste

In the event a vehicle fluid is released, hazardous waste would be generated from the clean up of this substance. A Spill Prevention and Cleanup Plan is being prepared by DARPA and will be submitted for BLM review and approval, and would be in place prior to the event. The plan will specify the proper disposal method and location consistent with California and Nevada regulation for oil and hazardous wastes.

# 4.2.8 Safety and Law Enforcement

Safety and law enforcement issues associated with the Grand Challenge include: 1) law enforcement support and potential hazards associated with implementing a recreation and access closure on the Challenge route, and 2) the risk of a collision with a Challenge Vehicle.

DARPA has been working with law enforcement officials (LE) to plan the closure of the event route, and identify the support that would be needed for the event. LE would be notified in advance of the specific route within the authorized network to be used for the event. DARPA staff would coordinate with LE to effect actual closure of the route, so that no vehicles unrelated to the event would be able to travel on the route while the event is in progress. Major roadways, especially highways that intersect the route would remain open until the event approaches a specific segment. At that time the road crossing would be closed until it is safe to reopen. Depending on how spread out the Challenge Vehicles are, some segments may be opened intermittently for traffic to cross to assure private land access and other needed access by non-participants in the event. In other areas, where traverse is not essential, segments would remain closed until all Challenge Vehicles have crossed that segment, or have been disqualified. With the

expertise of professional law enforcement officials involved, road closures are expected to be highly effective, so that the public remains outside of the closure, or in designated areas, and hazards would be minimized.

Challenge Vehicles would operate unmanned and fully autonomous. Vehicles would be able to sense their environment, but not see for a distance down the route. This scenario makes the Challenge Vehicles a potential hazard to people and private property. This was understood early in the planning stages for the Grand Challenge, so that measures to ensure public safety have been planned into the event.

A significant adverse impact would result if a Challenge Vehicle were to collide with a person, or damage private property. The following strategies have been developed to ensure safety of people and private property.

A comprehensive system is planned to ensure public safety during operation of the Grand Challenge. All Challenge Vehicles would be equipped with a wireless emergency stop (E-Stop) system. This system will communicate three distinct signals to the Challenge vehicles using established technology:

- 1. A "run" signal allowing the vehicle to operate. A run signal will only be issued if DARPA staff can clearly observe the vehicles and the route before them to ensure the Challenge Vehicle has a clear path in which to operate.
- 2. A "stop" signal that overrides the "run" signal to command the Challenge Vehicle's onboard computers to bring the vehicle to a controlled stop.
- 3. A "disable" signal that overrides all other signals to bypass the Challenge Vehicle's onboard computers and disrupt vehicle propulsion to bring it to a stop.

The E-Stop system uses line-of-sight communications. By design, the Challenge Vehicles would stop themselves if they are out of the radio line-of-sight. As a result there is no probability that the vehicles would ever be operating without being under the direct supervision of a DARPA monitor.

Each Challenge Vehicle will be immediately followed by a control vehicle which will observe the vehicles at all times to ensure that they stay on the route, and do not pose a safety or environmental threat. In addition, there will be pedestrian route monitors positioned along the route for addition observation where control vehicles may not have a clear view of the path before the Challenge Vehicles. A central command center would receive constant real time information from DARPA field staff in control vehicles, at monitoring positions and at road closures to ensure that vehicles and their immediate paths are monitored at all times, and that no vehicles, pedestrians or large mammals are in the path of the vehicle. In the event that any vehicles, pedestrians, large mammals or other obstacles of concern are observed, the Challenge Vehicle would be stopped until the path is clear.

As an added measure of safety, a wireless tracking and display system would be used. This would provide the command center with the exact position of each Challenge Vehicle along the route, and an overall view of the event. This would also allow the command center to provide information to field staff, and assist with the coordination of road closures.

In addition, each Challenge Vehicle would have increased visibility through an audible warning sound and use of flashing yellow or amber warning lights. These features would operate whenever the Challenge Vehicle is operating. The warning sound would comply with Society of Automotive Engineers (SAE) Class 1 standards for audible warning devices and would not produce sounds that can be confused with those of public-safety vehicles such as law-enforcement, fire, or ambulance.

# 4.2.9 Utilities

During the operation of the event the Grand Challenge field test may inhibit the ability of utilities to access their utility lines. Utilities would be able to schedule routine maintenance outside of the days for the Grand Challenge event, but would need immediate access to power lines in the event of a break. DARPA has contacted the impacted utilities and will enter into an agreement with each utility to provide any essential access to their lines. Collision by a Challenge Vehicle with a transmission tower could affect the structural integrity of a tower. Both the design of the route through field surveys, and the safety control measures that will be employed (see Section 4.2.8) should ensure that energy infrastructure would not be jeopardized. Fugitive dust ( $PM_{10}$ ) emissions can impact the efficient operation of insulators. However, because the distribution of  $PM_{10}$  emissions will take place across the network, as opposed to concentrated in one area, dust emissions are not expected to adversely impact insulators.

# 4.2.10 Recreation and Access

The Grand Challenge field test would inhibit access to a portion of the OHV areas included in the recreational closure area, on selected route segments, and intersecting roads near the route segments. Since only a portion of the Stoddard OHV area and the Nevada open area would be used for the event, the balance of the Stoddard OHV open area and Nevada open area, as well as two other popular OHV Open areas in western San Bernardino County, California (Johnson Valley OHV Area, El Mirage Cooperative Management Area) would still be available, though access in portions of Stoddard OHV area would be somewhat hindered during certain time periods In addition, the available area for OHV use would be more crowded during the affected weekend since other areas would be unavailable and therefore less crowded, somewhat diminishing the recreating experience for those seeking a more isolated experience.

During the event, access to the selected route segments would not be allowed, thereby limiting available acreage for four-wheel drive exploring, sight-seeing, and other recreation activities, as well as destinations that would only be accessible by the particular route segments. For instance, use of the

Northern Network may temporarily prevent access to the northern portion of Clark Mountain ACEC during the field test event.

### 4.2.11 Scenic

Since the Grand Challenge is a temporary event, vehicle activities would be limited to existing roads and open areas. Therefore, scenic values would not be affected over the long-term. Short-term impacts to visibility may occur along portions of the route as a result of fugitive dust generation by vehicle passage. This impact would dissipate within two hours to three days of the event and is further discussed in the air quality section of the analysis. Areas of the Northern Network where scenic values may be temporarily impacted include the Ord/Rodman Mountains, portions of the Boulder Corridor, and areas along I-15, near Primm, Nevada.

#### 4.2.12 Wetlands/Riparian Values

The Northern Network traverses the Mojave River (River) just northeast of Daggett, California. Water flow in this segment of the River is usually subterranean, though small pools would form here during or just following large storm events. Direct impacts include compaction of soil by vehicles and increase in turbidity (also see Section 4.2.6, Water Quality) from erosion by vehicles. Given the subterranean nature of the water flows on this segment any increase in turbidity would be limited to puddles of water where the roadway crosses the River. The Northern Network traverses the Amargosa River on paved roads so that no impacts are anticipated.

# 4.2.13 Mitigation Measures

A number of protective measures have been identified to minimize effects of the event on resource values and uses, which the BLM would impose as mitigation measures, or conditions, to the authorization of this alternative. The event involves a temporary activity, primarily using BLM open routes, and does not involve any construction or installation of long-term facilities. Therefore, these protective measures focus on event operations, and would be temporary in nature.

In the protective measures that follow, a 'desert tortoise monitor' is defined as a trained wildlife biologist who is knowledgeable concerning desert tortoise biology, protective measures, habitat requirements, identification of desert tortoise sign, and procedures used to survey for desert tortoises, and has been approved by the BLM to conduct pre-sweep and event monitoring activities. An 'authorized desert tortoise biologist' is a desert tortoise monitor who has been authorized by the Service to handle desert tortoises.

- 1. The Grand Challenge operational staff would include a BLM-approved "Field Contact Representative" who may be an authorized desert tortoise biologist and who would be responsible for overseeing compliance with these desert tortoise protective measures, and coordination with all biologists.
- 2. All Grand Challenge operational staff would receive desert tortoise training on the distribution, general behavior and ecology, protection afforded by the State and Federal Endangered Species Acts, and procedures for reporting encounters, and the importance of following the protective measures. Operational staff would be instructed that they are not authorized to handle tortoises encountered on the Challenge course. Rather, they would be directed to report all tortoise sightings to the lead desert tortoise biologist identified below in protective measure #5.
- 3. DARPA would provide a sufficient number of authorized desert tortoise biologists or desert tortoise monitors to ensure the proper removal of species from the Challenge course if encountered during the pre-Challenge activities or during the Event.
- 4. Authorized desert tortoise biologists and desert tortoise monitors would provide rolling sweeps of the entire Challenge course before and during the Event, and monitor all Challenge operations (i.e., route marking, administrative sweeps, recreational and road closures, communication trucks, route monitor locations, media observation points, and spectator viewing areas) in conjunction with Grand Challenge operational staff to minimize impacts to desert tortoises. Beginning not more than one hour prior to the start of the Event, authorized desert tortoises biologists would sweep the entire Challenge course, and clear the route of all desert tortoises found on, or immediately adjacent to the route. Desert tortoises would be moved, as needed, approximately 100 feet off the course in the same direction it was heading by an authorized desert tortoise biologist.
- 5. Only desert tortoise biologists who have been authorized by the Service would be allowed to handle desert tortoises.
- 6. Desert tortoises would be moved only by an authorized desert tortoise biologist and solely for the purpose of moving the animals out of harm's way. Desert tortoises would be moved the minimum distance to ensure their safety.
- 7. All handling of desert tortoises would be conducted by an authorized desert tortoise biologist in accordance with Desert Tortoise Council-recommended (1999) protocol.
- 8. Any vehicle on the course that stops would be checked for the presence of desert tortoise under the vehicle prior to moving the vehicle. Any desert tortoises found would be moved by an authorized desert tortoise biologist.
- 9. Vehicles shall not exceed the legal speed limit (posted or unposted) of the road(s) used during the event.
- 10. To ensure that desert tortoises do not re-enter the route, a desert tortoise monitor would track desert tortoises found until all participants have passed.
- 11. Not later than 48 hours after completion of each Event, DARPA, in cooperation with the BLM, would conduct a post-sweep review to determine if the DARPA Grand Challenge Event complied with the conservation and protective measures detailed in this EA and the terms and conditions of the biological opinion.

- 12. To reduce the attractiveness of the event route to the common raven (*Corvus corax*) and other desert tortoise predators, DARPA would implement a "pack-it-in, pack-it-out" strategy for trash and food items. No food or trash would be left by event participants on the route. All trash and food items must be removed.
- 13. A mitigation fee based on the amount of acreage disturbed during the Event would be paid by DARPA as determined by the BLM during its post event sweep. The BLM would determine the required steps and associated costs, including the use of ground crews such as the California Conservation Corps, to mitigate all identified disturbances. DARPA would provide the necessary funding for the BLM to implement these measures.
- 14. Six to twelve weeks prior to the Event, areas of the Stoddard Valley OHV area which would be used by the Event would be surveyed for suitable habitat for the Mojave monkey flower. GPS locations would be recorded for areas that provide suitable habitat. Within one week of the Event these areas would be surveyed for the presence of Mojave monkey flower. Areas which have this species present would be staked and flagged so that they can be avoided by all vehicles associated with the event.
- 15. Site-specific field investigations (Class II or III inventories) would be conducted for any segments warranted by the results of cultural records review, prior to the use of any such segments for the event. These investigations are warranted under two circumstances:
  - When the records search indicates that previous investigations are altogether lacking or are insufficient to determine the potential impacts to cultural resources, or achieving substantial avoidance to resources.
  - When the records search indicates the presence of highly sensitive resources the location of which should be field verified to determine the best means of achieving substantial avoidance to cultural resources.
- 16. Archeological monitors shall be used in locations of substantial archeological sensitivity, as determined by the BLM archeologist in light of the Cultural Resources Assessment and site specific field investigations.
- 17. Biological and event monitors (pedestrian monitors) would be provided information on historic and prehistoric artifacts indicating the potential for contact with such resources, and emphasizing that they should be left undisturbed.
- 18. For routes that would result in  $PM_{10}$  emissions in excess of 15 tons/year, the following measures would be imposed:
  - A soil amendment would be applied at the start area and two spectator areas to minimize fugitive dust from vehicles and pedestrians.
  - At spectator areas, vehicle traffic, including parking would be strictly controlled by DARPA staff to minimize the distance over which vehicles travel on unpaved surfaces, thereby minimizing fugitive dust emissions.

### 4.2.14 Residual Impacts

Mitigation measures have been imposed to protect the BLM-sensitive Mojave monkey flower. Other vegetation, particularly small plants and shrubs in the Stoddard Valley OHV area and within the Nevada open area may be crushed by Challenge Vehicles. These types of impacts were anticipated in the Stoddard Valley OHV management plan, California Desert Conservation Area Plan and Las Vegas Resource Management Plan consistent with typical OHV use of these areas.

Small mammals and reptiles could be crushed by Challenge Vehicles. Given that most of the routes would remain on paved roads and dirt roads designated by the BLM for recreational use, and given the protective measures that DARPA would follow, it is anticipated that few, if any desert tortoises would be killed or injured by event participants or support vehicles. Despite all mitigation measures identified, take in the form of desert tortoise injury or mortality could still occur because of collisions with event robotic or manned support vehicles. The likelihood of this occurring on a given length of route outside of the OHV open area would be considerably less because impacts with event vehicles would be confined to the narrow width of route boundaries as defined by the lateral boundaries available to robotic vehicles on these routes. A pre-sweep and rolling sweeps of the Challenge route during the event would substantially reduce the possibility of desert tortoise being on the route during the event. However, in OHV areas, the robotic vehicles would be allowed much greater flexibility to traverse, including off-road, within a much wider lateral boundary. Given the same length of travel in an OHV open area compared to designated open routes, collisions between vehicles and desert tortoise would be more likely to occur in the OHV open areas. Additionally, the odds of a desert tortoise being crushed within its burrow would also be much greater in an OHV area. On designated open routes, vehicles would very likely not encounter desert tortoise burrows. Depending on the weather, if desert tortoises are active, there could be considerable take in the form of harassment from desert tortoises being removed from the route by authorized desert tortoise biologists.

MFTL mortality may result from crushing of lizards by event vehicles on paved and unpaved roads and in OHV areas. Primary threats to this species are degradation of habitat by OHV vehicles, urbanization, and loss of sand sources for sand habitat (also from urbanization). OHV impacts were anticipated in the OHV management plan and LVRMP consistent with typical OHV use of these areas. Because of the temporary nature of the event, it would not contribute to urbanization.

Staging of a media area within the Shadow Hills ACEC is inconsistent with the resource values for which this ACEC was designated (tortoise protection and recovery as a Desert Wildlife Management Area). Desert tortoise mitigation measures have been identified (see Section 4.2.13 above) to minimize potential impacts to desert tortoise located in this ACEC.

Impacts to air quality would be higher under this alternative than the Central and Southern Network since it has more miles of unpaved route segments. The fugitive dust emissions  $(PM_{10})$  would largely settle within 2 hours to 3 days of the traverse of vehicles, unless there are adverse weather conditions.

Some fugitive dust may be transported and persist for up to 3 days, temporarily diminishing scenic values.

Closure of the event route and immediate surrounding areas would limit access to, and travel across these areas for recreation and commerce. Portions of open areas would be closed to access up to a day prior to the event and during event operations, for a total of up to 3 days. Other areas would be closed intermittently, during the event.

# 4.3 CENTRAL NETWORK ALTERNATIVE 2

# 4.3.1 Vegetation

Impacts to vegetation under the Central Network Alternative would be the same in scope, and potentially greater in magnitude than those described for the Northern Network Alternative, but would be specific to route segments within the Central Network. The Central Network includes 455 miles of open routes comprised of existing paved and unpaved roadways. For practical purposes actual route lengths would be approximately 200 miles, which is the same as the Northern Network. Under this alternative, however, in addition to Stoddard and Nevada open areas, Rasor OHV may be affected. Therefore, potential impacts to vegetation can be expected in the Rasor OHV area also.

# Threatened & Endangered, and BLM-Sensitive Plant Species

Impacts to threatened and endangered or BLM-sensitive plant species under the Central Network Alternative would be the same as those described for the Northern Network Alternative. Some crushing of Mojave monkey flower plants may occur in the Stoddard OHV Open area. See Section 4.2.13 for proposed survey and avoidance measures to minimize impacts to this species.

# 4.3.2 Wildlife

Impacts to wildlife under the Central Network Alternative would be the same in scope, and potentially greater in magnitude to those described for the Northern Network Alternative. Use of the Central Network includes the Rasor OHV area, in addition to the Stoddard Valley OHV area, and the OHV area in Nevada, so that impacts to wildlife, including the crushing of burrows, would also occur there. Therefore, impacts to wildlife would be greater under the Central Network Alternative.

### Threatened & Endangered, and Sensitive Wildlife Species

### Desert Tortoise

Potential impacts to the desert tortoise under the Central Network Alternative would be the same in scope, and potentially greater in magnitude than those described for the Northern Network Alternative, and would be specific to route segments within the Central Network. The Central Network traverses more miles of BLM Category 1 Habitat and USFWS Critical Habitat compared to the Northern Network, and therefore more quality habitat would be traversed, and a higher average density of desert tortoise may be present, if they are active. The Central Network traverses 54 miles of unpaved roadway in BLM Category 1 Habitat compared with 11 in the Northern Network, and 59.3 miles of unpaved roadway in USFWS Critical Habitat compared with 46.7 in the Northern Network. This is during the non-competitive portion of the route, and, as with dual-sport events, strict speed limits and other measures for conservation and protection of desert tortoise have been developed (See Section 4.2.13).

### Mohave Ground Squirrel

As with the Northern Network, the Central Network does not traverse the known range of the MGS and operation of the Grand Challenge in the Central Network is therefore not expected to impact MGS.

# Mojave Fringe-toed Lizard

Impacts to the MFTL would be greater under the Central Network because of the higher propensity for aeolian (sand) habitat which the species prefers, including the Rasor OHV area which has extensive sand areas, as well as adjacent to routes in the vicinity such as the Mojave Road.

#### 4.3.3 Areas of Critical Environmental Concern

Specific segments of the Central Network traverse the ACECs identified below on designated open roadways. In all ACECs Grand Challenge activities would include Challenge and support vehicles on roadways, and pedestrian tortoise monitors adjacent to roadways as needed. No staging areas, public or media viewing areas are located within any of the ACECs along this route.

#### Piute/Eldorado ACEC

The Central Network would traverse this ACEC over approximately 27 miles of unpaved open road. No event monitoring areas are located in this ACEC. Use of open roads is consistent with the ACEC Plan. Tortoise monitors and other mitigation measures are identified in Section 4.2.13 and serve to minimize

impacts to the desert tortoise conservation and recovery, which is the primary focus of this ACEC. Therefore, the event would not impact the resource values for which this ACEC was designated.

#### Afton Canyon ACEC

The Central Network would traverse this ACEC over approximately 6 miles of unpaved open road. One event monitoring point is located in this ACEC. Use of open roads is consistent with the ACEC Plan. Activities would be concentrated along the roadway, which is largely set back from the riparian vegetation in this ACEC. Because of the temporary nature of the event, it would not impact the resource values for which this ACEC was designated.

#### Cronese Basin ACEC

The Central Network would traverse this ACEC over approximately 3 miles of unpaved open road. No event monitoring areas are located in this ACEC. Use of open roads is consistent with the ACEC Plan. The roadway segment used is not proximate to the wetlands, mesquite hummocks and desert willow washes, so that the wildlife which frequent these habitat rich areas would not be disturbed. Because of the temporary nature of the event, it would not impact the resource values for which this ACEC was designated.

#### **Clark Mountain ACEC**

Impacts to this ACEC under the Central Network Alternative would be less than those described for the Northern Network Alternative, as follows. The Central Network would traverse the southern portion of this ACEC over approximately 1 mile of unpaved open road as compared with 4 miles for the Northern Network. No event monitors would be required for this segment so that pedestrian impacts would be reduced, compared to the Northern Network which would have four monitors at two monitoring points. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it would not impact the resource values for which this ACEC was designated.

#### Manix ACEC

The Central Network would traverse this ACEC over approximately 0.4 mile of unpaved open road. No event monitoring points would be located in this ACEC. Use of open roads is consistent with the ACEC Plan. The event would not impact the value of this site as a source of blow sand for fringe-toed sand lizard habitat. Because of the temporary nature of the event, it would not impact the resource values for which this ACEC was designated.

### Halloran Wash ACEC

The Central Network would traverse this ACEC over approximately 4 miles of unpaved open road. No event monitoring points would be located in this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it would not impact the resource values for which this ACEC was designated.

### Superior-Cronese Proposed ACEC

The Central Network would traverse this ACEC proposed in the Draft West Mojave Coordinated Management Plan (2003) over approximately 6 miles of unpaved road. There is one event monitoring area located within the northeastern portion of this proposed ACEC. Use of open roads is consistent with the proposed ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC is proposed. Tortoise protection measures are identified in Section 4.2.13.

#### Ord-Rodman Proposed ACEC

The Central Network would traverse this ACEC proposed in the Draft West Mojave Coordinated Management Plan (2003) over approximately 10 miles of unpaved road. There are no event monitoring points located within this proposed ACEC. Use of open roads is consistent with the proposed ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC is proposed. Tortoise protection measures are identified in Section 4.2.13.

#### Chemehuevi ACEC

The Central Network would traverse this ACEC designated for desert tortoise conservation and recovery over approximately 23 miles of paved road. There are four event monitoring points located within this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC was designated. Tortoise protection measures are identified in Section 4.2.13.

#### Ivanpah Valley ACEC

The Central Network would traverse this ACEC over approximately 10 miles of unpaved road. There are no event monitoring points located within this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC was designated. Tortoise protection measures are identified in Section 4.2.13.

# Puite-Fenner Valley ACEC

The Central Network would traverse this ACEC designated for desert tortoise conservation and recovery over approximately 9 miles of unpaved road. There are no event monitoring points located within this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC was designated. Tortoise protection measures are identified in Section 4.2.13.

### 4.3.4 Air Quality

Impacts to air quality under the Central Network Alternative would be similar in scope and less in magnitude to those described for the Northern Network Alternative, as follows.

The Central Network is close in proximity to I-15 and would generate a total of approximately 12.77 tons of  $PM_{10}$  as a result of Grand Challenge activities on unpaved roads, compared to up to 16.55 tons for the Northern Network. Activities associated with the Central Network would include approximately 50 challenge vehicles, 5 route marking vehicles, and 13 administrative and desert tortoise sweeps traveling 110.2 miles each; 20 route monitor vehicles traveling 33.21 miles each; and 50 vehicles associated with temporary road closures traveling 10 miles each. Since less than 15 tons per day and 100 tons per year of  $PM_{10}$  is generated, Reasonably Available Control Measures are not required for this one-time event.

#### 4.3.5 Cultural Resources

A Cultural Resources Assessment has been prepared for the DARPA Grand Challenge, including a records search and review, and selected field investigation.

Potential direct impacts to prehistoric or historical resources associated with the event include crushing, or disturbance by vehicles or pedestrians. Impacts would be limited to OHV areas, unpaved roadways, areas immediately adjacent to unpaved roadways where pedestrian monitoring may occur, and staging areas (start, finish, media locations).

The area traversed by the Central Network has a high potential for concentrations of cultural resources due to the presence of past water sources, and along the Mojave River and other concentrated resources in this network. However, easy access to the areas traversed by the Central Network via I-15 has vastly jeopardized the integrity of cultural resources in this area, especially in areas where roads (paved and unpaved) have been forged. Substantial cultural resources may still be present outside roadway footprints and could be impacted by pedestrian activities. See Section 4.2.13 for measures to minimize impacts on cultural resources.

### Native American Religious Concerns

The area traversed by the Central Network has a high potential for Native American sacred sites to be located nearby, due to the occurrence of natural resources in this area (water sources, areas of higher elevation). Sacred sites can vary in scale from specific locations to a particular mountain or area. Disturbance from event operations near sacred sites would be limited to traverse by vehicles on open routes and pedestrian monitoring activities. Access to sacred sites during operation of the event may be limited if the site would normally be accessed via a route segment. Native American and public access to a sacred site may be temporarily precluded if the site would normally be accessed via a vehicle and route segment that is being closed for the Grand Challenge event.

### 4.3.6 Water Quality

Impacts to water quality under the Central Network Alternative would be similar to those described for the Northern Network Alternative.

As with the Northern Network, the upper branch of the Central Network traverses the Mojave River (river) just northeast of Daggett, California. In addition, this branch follows an open road (Mojave Road) which runs for more than 10 miles along the Mojave River to Afton Canyon. This segment of the river is wide, flat, and predominantly subterranean until Afton Canyon, except during and following storm events. The route is generally located within the floodplain of the river, with frequent subterranean flows, and stream crossings where perennial or ephemeral surface flows occasionally occur. Challenge vehicles would be likely to increase sediment in this area, though no more so than regular road use, and this effect is moderated by the generally sandy conditions along the Mojave Road. Similarly, after Afton Canyon, the route continues to traverses the river basin to the Cronese basin.

In certain portions of Afton Canyon, water is forced to the surface by bedrock and supports year-round surface water flow and riparian habitat. The route largely parallels and is set back from the surface flows, except in two places where the roadway crosses the river. Afton Canyon is a very popular recreation spot for camping, wildlife viewing, and vehicle driving on the open roads, with easy access from a well-graded road from the freeway. As a result, the river crossings are used frequently, and the soil in the river here is well compacted, somewhat limiting turbidity. The water is fairly still with vegetation on each side of the crossing, further dissipating turbidity created by vehicles crossing. Under these conditions, Challenge Vehicles and support vehicles would be expected to have a modest impact on the turbidity of the water here. Therefore, water quality impacts are modest overall, but higher under this alternative than the Northern Network Alternative and they are short-term.

### 4.3.7 Wastes, Hazardous or Solid

Impacts related to wastes under the Central Network Alternative would be the same as those described for the Northern Network Alternative, as would be the spill prevention and clean-up strategies.

### 4.3.8 Safety and Law Enforcement

Impacts related to safety and law enforcement under the Central Network Alternative would be greater in magnitude than those described for the Northern Network Alternative. The Central Network uses a greater portion of paved roadways, including public highways, compared to the Northern Network. Closure of these roadways would have a bigger impact on the traveling public and require a greater law enforcement effort than that required for the Northern Network.

### 4.3.9 Utilities

The impacts to routine maintenance would be the same for all action alternatives; utility companies would avoid the delays of closure areas as feasible for discretionary activities. Impacts to utilities under the Central Network Alternative would be the same as those described for the Northern Network Alternative. In no case would the event preclude access by utilities for needed repairs for any alternative.

#### 4.3.10 Recreation and Access

Impacts to recreation under the Central Network Alternative would be greater than those described for the Northern Network Alternative. In addition to the portions of the Stoddard Valley OHV Area and an OHV Open Area in Nevada that would be closed under the Northern Network Alternative, use of the Central Network would also limit access to Afton Canyon ACEC and Rasor OHV area. The Afton Canyon/Rasor OHV area is a popular family recreation area which provides established camping and picnicking areas, highly scenic views and significant wildlife viewing areas. During the Grand Challenge, the access roads off of I-15 would be blocked, limiting access to these areas during the event.

#### 4.3.11 Scenic Values

Short-term impacts to visibility may occur along portions of the route as a result of fugitive dust generation by vehicle passage. This impact would dissipate within 2 hours to 3 days of the event and is further discussed in the air quality section of the analysis. Scenic views for travelers on I-15 may be slightly diminished during event operation because the Central Network largely parallels this freeway. In addition, segments of the Central Network include a north-south transmission road adjacent to the eastern edge of the Mojave Preserve. Therefore, scenic values along this margin of the Preserve may be temporarily impaired, although prevailing winds are usually easterly.

# 4.3.12 Wetlands/Riparian Values

Impacts to riparian values under the Central Network Alternative would be greater than those described for the Northern Network Alternative, because the Central Network traverses a greater portion of riparian areas in the Mojave Desert. In addition to traversing the Mojave River northeast of Daggett, the Central Network also traverse the Mojave River west, east and through Afton Canyon, and through Manix Wash and Halloran Wash. Specific route segments of this network include portions of the historic Mojave Road, a popular open route which is sometimes coincident with the floodplain of the Mojave River, an active riparian area. Sandy soils in this area minimize impacts to riparian soils, but active road use inhibits riparian vegetation growth. In this vicinity the route passes adjacent to active riparian vegetation. However, this event/activity alone is not substantial due to regular and frequent use of the Mojave Road. The route would also traverse Manix and Halloran Washes. However, in the location the route would traverse, riparian vegetation is lacking, so that no impacts to riparian values would occur from operation of the event under this Alternative.

### 4.3.13 Mitigation Measures

The mitigation measures proposed for the Central Network Alternative would be the same as those described for the Northern Network Alternative (see Section 4.2.13).

#### 4.3.14 Residual Impacts

Residual impacts from the Central Network Alternative would be similar to those for the Northern Network Alternative, except for the following.

There may be a higher potential for mortality to MFTL under the Central Network compared to the Northern and Southern Network Alternatives due to a greater amount of suitable habitat in this Alternative.

No inconsistencies between the Central Network and the resource values for the ACECs this route would traverse have been identified. The Central Network would impact more ACECs compared to the Northern Network. Therefore, residual impacts to ACECs would be greater under the Central Network than the Northern Network.

Impacts to air quality would be less under this alternative than the Northern Network, and marginally higher than the Southern Network based on the amount of unpaved route segments in this Network. The fugitive dust emissions ( $PM_{10}$ ) would settle within 2 hours to 3 days of the traverse of vehicles, unless there are adverse weather conditions.

The Central Network users a greater portion of paved roadways, including public highways, compared to the Northern Network. Closure of these roadways would have a bigger impact on the traveling public and require a greater law enforcement effort than the Northern Network.

### 4.4 SOUTHERN NETWORK ALTERNATIVE 3

### 4.4.1 Vegetation

Impacts to vegetation under the Southern Network Alternative would be similar in type to those described for the Northern and Central Networks. The Southern Network includes 514 miles of open routes comprised of existing paved and unpaved roadways. For practical purposes actual route lengths would be approximately 200 miles. Since the Southern Network is comprised of a large proportion of paved roads, a greater portion of support vehicles would be parked on the shoulders of paved roadways which have less vegetation than some unpaved roads. Road closure would have more emphasis on paved roads, and more route monitors would be stationed adjacent to paved roads, compared to the Northern Network. Impacts to vegetation in the OHV areas would include the same areas as those for the Northern Network, plus the Johnson Valley OHV area. Impacts to vegetation under the Southern Network would be less than those for the Central Network.

### Threatened & Endangered, and Sensitive Plant Species

Impacts to the BLM-sensitive Mojave monkey flower under the Southern Network Alternative would be the same as those described for the Northern and Central Network Alternatives. Some crushing of Mojave monkey flower plants may occur in the Stoddard OHV Open area. See Section 4.2.13 for proposed survey and avoidance measures to minimize impacts to this species.

The white-margined beardtongue is found in the vicinity of the southern network, north and south of Interstate 40. However, the network in this vicinity is comprised of paved roads, and would not impact this BLM-sensitive plant.

# 4.4.2 Wildlife

Impacts to wildlife under the Southern Network Alternative would be similar to those described for the Northern Network Alternative, but would be specific to route segments within the Southern Network. In addition to road segments, the Southern Network would potentially use an additional OHV area (Johnson Valley).

Potential direct impacts to small mammal and reptile species include crushing by vehicles or pedestrians, and indirect impacts include the crushing of burrows. Wildlife injury and mortality would be largely

limited to animals found within or traversing roadways and staging areas (start, finish, media, observation areas) outside of OHV areas.

Competitive segments would be conducted in established OHV areas or equivalent. Crushing of wildlife species by challenge vehicles and the following control vehicles would be expected to be of a similar magnitude consistent with consistent with early spring recreation use anticipated in an OHV area.

### Threatened & Endangered, and Sensitive Wildlife Species

### Desert Tortoise

Impacts to the desert tortoise under the Southern Network Alternative would be similar in scope and potentially greater in area affected to those described for the Northern Network Alternative, but would be specific to route segments within the Southern Network. The Southern Network traverses 44 miles of unpaved roadway in BLM Category 1 Habitat, as compared with 11 miles in the Northern Network and 54 miles in the Central Network, and 68.9 miles of unpaved roadway in USFWS Critical Habitat, compared with 46.7 in the Northern Network and 59.3 miles in the Central Network. This is during the non-competitive portion of the route, and, as with dual-sport events, strict speed limits and other measures for conservation and protection of desert tortoise have been developed (see Section 4.2.13).

#### Mohave Ground Squirrel

Segments of the Southern Network traverse the known range of the MGS. Direct impacts may include the loss of individual MGS through crushing of animals by event and support vehicles. MGS are active during the time period when the Grand Challenge event would be held, but spend most of their time below ground. They are also fast and would be expected to flee an area when a vehicle approaches, or seek cover under ground when a person approaches. As a result of this behavior, the potential for mortality or injury to MGS from operation of the Challenge event is considered very low.

# Mojave Fringe-toed Lizard

Impacts to the MFTL under the Southern Network would be similar in scope, but lesser in magnitude to those for the Central Network. Less of the preferred habitat (sandy environments) for the MFTL is present compared to the Central Network. Direct impacts may include the loss of individual lizards through crushing of animals by event and support vehicles, or through direct contact with event personnel and spectators.

### 4.4.3 Areas of Critical Environmental Concern

Specific segments of the Southern Network traverse the ACECs identified below on designated open roadways. In all ACECs Grand Challenge activities would include traverse by Challenge and support vehicles on roadways and pedestrian tortoise monitors adjacent to roadways as needed. No staging areas, public or media viewing areas are located within any of the ACECs on the Southern Network.

### Piute/Eldorado ACEC

The Southern Network would traverse this ACEC which was designated for conservation and protection of desert tortoise over approximately 26 miles of paved open road. Two event monitoring points are located in this ACEC, along paved roadways. Use of open roads is consistent with the ACEC Plan. Tortoise monitors and other mitigation measures identified in Section 4.2.13 serve to minimize impacts to the desert tortoise. Therefore, the event would not impact the resource values for which this ACEC was designated.

### Ord-Rodman Proposed ACEC

The Southern Network would traverse this ACEC proposed in the Draft West Mojave Coordinated Management Plan (2003) over approximately 24 miles of unpaved road. There are seven event monitoring points located within this ACEC. Use of open roads is consistent with the proposed ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC is proposed. Tortoise protection measures identified in Section 4.2.13 would provide additional protection for tortoise within this proposed ACEC.

#### Chemehuevi ACEC

The Southern Network would traverse this ACEC which was designated for conservation and protection of desert tortoise, over approximately 40 miles of unpaved road. There are four event monitoring points located within this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC was designated. Tortoise protection measures identified in Section 4.2.13 would provide additional protection for tortoise within this ACEC.

#### **Puite-Fenner ACEC**

The Southern Network would traverse this ACEC which was designated for conservation and protection of desert tortoise as, over approximately 5 miles of unpaved road. There are no event monitoring points located within this ACEC. Use of open roads is consistent with the ACEC Plan. Because of the

temporary nature of the event, it is not anticipated to impact the resource values for which this ACEC was designated. Tortoise protection measures identified in Section 4.2.13 would provide additional protection for tortoise within this ACEC.

# 4.4.4 Air Quality

Impacts to air quality under the Southern Network Alternative would be similar in type to those described for the Northern and Central Networks. The overall volume of  $PM_{10}$  generated would be less under the Southern Network Alternative than the other action alternatives. The Southern Network would generate a total of approximately 11.58 tons of  $PM_{10}$ . Activities associated with the Southern Network would include approximately 50 challenge vehicles, 5 route marking vehicles, and 13 administrative and desert tortoise sweeps traveling 85.5 miles each; 20 route monitor vehicles traveling 89.42 miles each; and 50 vehicles associated with temporary road closures traveling 5 miles each. Since less than 15 tons per day and 100 tons per year of  $PM_{10}$  is generated, Reasonably Available Control Measures are not required for this one-time event under this alternative.

# 4.4.5 Cultural Resources

A Cultural Resources Assessment has been prepared for the DARPA Grand Challenge, including a records search and review, and selected field investigation.

Potential direct impacts to prehistoric or historical resources associated with the event include crushing or disturbance by vehicles or pedestrians. Impacts would be limited to OHV areas, unpaved roadways, areas immediately adjacent to unpaved roadways where pedestrian monitoring may occur, and staging areas (start, finish, media locations).

The area traversed by the Southern Network has high potential for concentrations of cultural resources due to the presence of lithic resources, nearby water sources (most notably the Colorado River), as well as other concentrated resources in this network. However, the Southern Network is comprised primarily of paved roadways, so that impacts to cultural resources are limited to an area south of Barstow and a north-south transmission line largely south of Interstate 40. These roadways are not likely to have any cultural integrity. However, substantial cultural resources may still be present outside roadway footprints, and could be impacted by pedestrian activities. See Section 4.2.13 for measures to minimize impacts on cultural resources.

# Native American Religious Concerns

The area traversed by the Southern Network has a moderate potential for Native American sacred sites to be located nearby, due to the occurrence of natural resources in this area (lithic resources, areas of higher

elevation). Sacred sites can vary in scale from specific locations to a particular mountain or area. Disturbance from event operations near sacred sites would be limited to traverse by vehicles on open routes and pedestrian monitoring activities. Access to sacred sites during operation of the event may be limited if the site would normally be accessed via a route segment. Native American and public access to a sacred site may be temporarily precluded if the site would normally be accessed via a vehicle and route segment that is being closed for the Grand Challenge event.

# 4.4.6 Water Quality

Impacts to water quality under the Southern Network Alternative would be similar to those described for the Northern Network Alternative. The Southern Network does not traverse the Mojave River or other water body and would not contribute to the turbidity of any water body.

# 4.4.7 Wastes, Hazardous or Solid

Impacts related to wastes under the Southern Network Alternative would be the same as those described for the Northern Network Alternative, as would be the spill prevention and clean-up strategies.

### 4.4.8 Safety and Law Enforcement

Impacts related to safety and law enforcement under the Southern Network Alternative would be greater than those described for the Northern Network Alternative and similar to those for the Central Network. The Southern Network uses the greatest portion of paved roadways, including public highways, compared to the Northern or Central Network. Closure of these roadways would have a bigger impact on the traveling public and require a greater law enforcement effort than the Northern Network, and potentially the Central Network, depending on the specific route selected for the event.

# 4.4.9 Utilities

Impacts to utilities under the Southern Network Alternative would be the same as those described for the Northern and Central Network Alternative. In no case would the event preclude access by utilities for needed repairs, for any alternative.

#### 4.4.10 Recreation

Impacts to recreation under the Southern Network would be similar in magnitude, but would affect different user groups and geographic areas than those described for the Northern Network and Central Network. Use of the Southern Network Alternative would not inhibit access to any ACECs with high recreational values along the I-15 corridor, such as Clark Mountain and Afton Canyon. While it would
not limit access to the more family-oriented Rasor OHV area, it would potentially limit access to Johnson Valley OHV area, which is accessible from Victor Valley and Highway 247. Travel to Joshua Tree National Park via Highway 247 would also be intermittently disrupted during operation of the event along this highway.

### 4.4.11 Scenic Values

Short-term impacts to visibility may occur along portions of the route as a result of fugitive dust generation by vehicle passage. This impact would dissipate within 2 hours to 3 days of the event and is further discussed in the air quality section of the analysis. Segments of the Southern Network include a north-south transmission road adjacent to the eastern edge of the Mojave National Preserve. Therefore, scenic values along this margin of the Preserve may be temporarily impaired, although prevailing winds are usually easterly, away from the Preserve boundary.

#### 4.4.12 Wetlands/Riparian Values

Impacts to riparian values would be negligible under the Southern Network Alternative. The Southern Network does not traverse the Mojave River, or run adjacent to other important hydrologic features. Other larges washes are traversed by the network over paved roadways.

#### 4.4.13 Mitigation

The mitigation measures proposed for the Southern Network Alternative would be the same as those described for the Northern Network Alternative (see Section 4.2.13).

#### 4.4.14 Residual Impacts

Residual impacts from the Southern Network Alternative would be similar to those for the Northern Network Alternative, except for the following.

The Southern Network has a lower potential for mortality to MFTL than the Northern or Central Network. The Southern Network has less suitable MFTL habitat than the Central Network.

No inconsistencies between the Southern Network and the resource values for the ACECs this route would traverse have been identified. The Southern Network would impact fewer ACECs compared to the Northern and Central Network. Therefore, residual impacts to ACECs would be lower under the Southern Network.

Impacts to air quality would be less under this alternative than the Northern and Central Networks, due to the predominance of paved roadways in the Southern Network. The limited fugitive dust emissions  $(PM_{10})$  on unpaved surfaces would settle within 2 hours to 3 days of the traverse of vehicles, unless there are adverse weather conditions.

The Southern Network uses the greatest proportion of paved roadways, including public highways, compared to the Northern and Central Networks. Closure of these roadways would have a bigger impact on the traveling public and require a greater law enforcement effort than the Northern Network. However, it would not limit access to popular recreation areas along I-15.

## 4.5 COMBINED NETWORK ALTERNATIVE 4

The Combined Network is comprised of all network segments from the Northern, Central, and Southern Networks. Actual use would be similar to that of any one of the previous alternatives, that is, a combination of use of OHV Open Areas and designated routes that would be approximately 200 miles. If this alternative is selected, impacts would be commensurate with one of the previous alternatives, or a combination thereof where Network route connectors exist, rather than cumulative. Therefore, for each issue, the previous route network alternative that would produce the greatest impact is analyzed. This creates an artificially high cumulative impact analysis, since not all combinations of all route networks are simultaneously feasible, but the route combinations possible with this alternative are so varied that this analysis provides the greatest impact that could result to any resource value or use from selection of this alternative as a basis for alternative comparison and does not require the reader to evaluate dozens of analyses.

## 4.5.1 Vegetation

Impacts to vegetation under the Combined Network Alternative would be the same as those described under the Central Network Alternative, which includes extensive use of unpaved roads coupled with the use of up to three open areas. Damage to vegetation would be limited to open unpaved roadways, consistent with regular roadway use, and to open areas of a similar magnitude, consistent with early spring recreation use anticipated in Stoddard Valley and Rasor OHV areas and the OHV area in Nevada.

## Threatened & Endangered, and Sensitive Plant Species

Impacts to the BLM-sensitive Mojave monkey flower would be the same for all Networks. The Mojave monkey flower potentially occurs in the Stoddard Valley OHV area that would be used for the Event under all action alternatives. Plants may be crushed by Challenge and support vehicles during operation of the event, which would be held in March when plants may be developing. Outside of the open area, vehicle operation would be restricted to the roadway so that plants would not be impacted. See

Section 4.2.13 for survey and avoidance measures that would minimize impacts to Mojave monkey flower.

Route segments of the Combined Network traverse white-margined beardtongue habitat only on paved roadways, so that no impacts to this species would result from use of the Combined Network. Impacts to the white-margined beardtongue would be the same for all Networks.

## 4.5.2 Wildlife

Potential impacts to terrestrial wildlife species are the same as those described for the Central Network, which would allow use of three open areas including Stoddard and Rasor OHV areas and the OHV area in Nevada, so that impacts to wildlife, including the crushing of burrows, would occur there, in addition to direct crushing of wildlife, including small mammal and reptile species, on roadway segments.

## Threatened & Endangered, and Sensitive Wildlife Species

## Desert Tortoise

Impacts to the desert tortoise under the Combined Network Alternative would be similar to those described for the Central Network Alternative, which traverses the most mileage of BLM Category I habitat, and 54 miles and 59 miles of USFWS Critical Habitat. This is during the non-competitive portion of the route, and, as with dual-sport events, strict speed limits and other measures for conservation and protection of desert tortoise have been developed (see Section 4.2.13).

# Mohave Ground Squirrel

Potential impacts to the MGS would be the same as those for the Southern Network, which traverses the known range of the MGS. Direct impacts may include the loss of individual MGS through crushing of animals by event and support vehicles. MGS are active during the time period when the Grand Challenge event would be held, but spend most of their time below ground. They are also fast and would be expected to flee an area when a vehicle approaches, or seek cover under ground when a person approaches. As a result of this behavior the potential for mortality or injury to MGS from operation of the Challenge event is considered very low. Impacts would be lesser under the Northern Network and Central Network which do not traverse MGS habitat.

## Mojave Fringe-toed Lizard

Impacts to the MFTL under the Combined Network would be similar in scope and magnitude as those for the Central Network, which has more of the preferred habitat (sandy environments) for the MFTL, than

the Northern or Southern Networks. Direct impacts may include the loss of individual lizards through crushing of animals by event and support vehicles, or through direct contact with event personnel and spectators. Impacts would be expected to be of a similar magnitude consistent with early spring recreation use anticipated in an OHV area.

## 4.5.3 Areas of Critical Environmental Concern

Specific segments of the Combined Network traverse the ACECs identified below on designated open roadways. In all ACECs Grand Challenge activities would include traverse by Challenge and support vehicles on roadways and pedestrian tortoise monitors adjacent to roadways as needed. No staging areas, public or media viewing areas are located within any of the ACECs.

A particular group of ACECs would be impacted depending on the specific route selected. These may be consistent with the previous alternatives or some new combination, and impacts would be specific to each ACEC. Impact analyses for various ACECs can be reviewed in the previous alternatives, in one of the following groupings.

- Clark Mountain ACEC, Salt Creek Hills ACEC, Amargosa River ACEC, Kingston Range ACEC, Shadow Valley ACEC, Superior-Cronese ACEC, Ord-Rodman ACEC (consistent with Northern Network Alternative)
- Piute/Eldorado ACEC, Afton Canyon ACEC, Cronese Basin ACEC, Clark Mountain ACEC, Manix ACEC, Halloran Wash ACEC, Superior-Cronese ACEC, Ord-Rodman ACEC, Chemehuevi ACEC, Ivanpah Valley, Puite Valley (consistent with Central Network Alternative)
- Piute/Eldorado ACEC, Ord-Rodman ACEC, Chemehuevi ACEC, Puite Valley (consistent with Southern Network Alternative)

See the ACEC section for each Alternative referenced for an analysis of the event's consistency with the established resource values for which each ACEC was designated. No inconsistencies were identified between the event and the established resource values for which each ACEC was designated. Tortoise protection measures are identified in Section 4.2.13.

## 4.5.4 Air Quality

Impacts to air quality under the Combined Network Alternative would be similar to those described for the Northern Network Alternative. It is assumed that this alternative would include activities and distances traveled on unpaved roads similar to the Northern Network and generate a total of approximately 16.55 tons of  $PM_{10}$ . See Section 4.2.13 for reasonably available control measures that would minimize impacts to air quality.

### 4.5.5 Cultural Resources

Potential direct impacts to prehistoric or historical resources associated with the event include crushing, disturbance by vehicles or pedestrians, or removal of items by pedestrians. Impacts would be limited to OHV areas, unpaved roadways, areas immediately adjacent to unpaved roadways where pedestrian monitoring may occur, and staging areas (start, finish, media locations).

The area traversed by the Combined Network has high potential for concentrations of cultural resources due to the presence of lithic resources, past and current nearby water sources (Mojave River, dry lake beds, Colorado River), as well as other concentrated resources in this network. Utility development has led to excavation of resources in some areas and subsequent conservation of resources in repositories. Roadway and utility footprints generally lack resources and cultural integrity. However, substantial resources may still be present outside of these footprints and could be impacted by pedestrian activities. See Section 4.2.13 for measures to minimize impacts on cultural resources.

#### Native American Religious Concerns

The area traversed by the Combined Network has a high potential for Native American sacred sites to be located nearby, due to the occurrence of natural resources in this area (water sources, areas of higher elevation, lithic resources). Sacred sites can vary in scale from specific locations to a particular mountain or area. Disturbance from event operations near sacred sites would be limited to traverse by vehicles on open routes and pedestrian monitoring activities. Access to sacred sites during operation of the event may be limited if the site would normally be accessed via a route segment. Native American and public access to a sacred site may be temporarily precluded if the site would normally be accessed via a vehicle and route segment that is being closed for the Grand Challenge event.

## 4.5.6 Water Quality

Impacts to water quality under the Combined Network Alternative would be similar to those described for the Central Network Alternative, which includes a route segment on the Mojave Road which is coincident with the floodplain of the Mojave River. It is assumed that this alternative would traverse and parallel the Mojave River over a greater distance than the Northern and Southern Network Alternatives, potentially contributing to localized, short-term turbidity in the water.

## 4.5.7 Wastes, Hazardous or Solid

Impacts related to wastes under the Combined Network Alternative would be the same as those described for the Northern, Central, and Southern Network Alternatives. The event may contribute to trash which diminishes the appeal of the desert environment and attracts ravens that prey on young desert tortoise. DARPA would provide covered trash bins and ensure that all trash is recovered following the event. A Spill Prevention and Cleanup Plan would be prepared and implemented to address the potential release and cleanup of any automotive fluids.

### 4.5.8 Safety and Law Enforcement

Impacts related to safety and law enforcement under the Combined Network Alternative would be similar in scope to those described for the Northern Network Alternative. Safety and law enforcement issues associated with the Grand Challenge include: 1) law enforcement support and potential hazards associated with implementing a recreation and access closure on the Challenge route, and 2) the risk of a collision with a Challenge Vehicle.

Depending on the specific route used, this Alternative may require closure of paved roads including highways, unpaved roadways, and up to three open areas. Depending on how spread out the Challenge Vehicles are, some segments may be open intermittently for traffic to cross to assure private land access and other needed access by non-participants. In other areas, where traverse is not essential, segments would remain closed until all Challenge Vehicles have crossed that segment, or have been disqualified. Closure of highways has a bigger impact on the traveling public and requires a greater law enforcement effort then closure of unpaved roadways and open areas. With the expertise of professional law enforcement officials, road closures are expected to be highly effective so that the public remains outside of the closure, or in designated areas, and hazards would be minimized.

Because Challenge Vehicles would operate unmanned and fully autonomous, they are a potential hazard to people and private property. This was understood early in the planning stages for the Grand Challenge, so that measures to ensure public safety have been planned into the event. DARPA has a comprehensive safety system planned to ensure public safety during operation of the Grand Challenge (see Section 4.2.8).

## 4.5.9 Utilities

Impacts to utilities under the Combined Network Alternative would be the same as those described for the Northern, Central, and Southern Network Alternatives. Event operation may inhibit the ability of utilities to access their utility lines. Utilities would be able to schedule routine maintenance outside of the days for the Grand Challenge event, but would need immediate access to power lines in the event of a break. DARPA has contacted the impacted utilities and will enter into an agreement with each utility to provide any essential access to their lines.

#### 4.5.10 Recreation

Impacts to recreation under the Combined Network Alternative would be similar in scope to those described for the Northern Network but may involve other specific geographical areas. Depending on the specific route used, this Alternative may require closed access to portions of up to 3 OHV areas, and inhibit travel to areas with high recreation values such as Clark Mountain and Afton Canyon, or Joshua Tree National Park via Highway 247. Since only a portion of the OHV areas would be used, the balance of the areas would be open to use for the public, as would other OHV Open areas, such as El Mirage Cooperative Management Area. The available area for OHV use would be more crowded during the affected weekend, somewhat diminishing the recreating experience.

During the event, access to travel on the selected route segments would not be allowed, thereby limiting available acreage for four-wheel drive exploring, sight-seeing, and other recreation activities. In addition, destinations that would only be accessible by the particular route segments being used would also be temporarily limited. For instance, use of the segments from the Northern Network may eliminate access to the northern portion of Clark Mountain ACEC during the field test event, while use of Central Network segments may limit access to the popular Afton Canyon/Rasor area.

#### 4.5.11 Scenic Values

Short-term impacts to visibility may occur along portions of the route as a result of fugitive dust generation by vehicle passage. This impact would dissipate within 2 hours to 3 days of the event and is further discussed in the air quality section of the analysis. Depending on the specific route used, view sheds along I-15, along the routes within the Boulder Corridor, or on the eastern margin of the Mojave Preserve may be temporarily impaired.

## 4.5.12 Wetlands/Riparian Values

Impacts to riparian values under the Combined Network Alternative would be the same as those for the Central Network Alternative, which traverses a greater portion of riparian areas compared to the Northern or Southern Network Alternatives. In addition to traversing the Mojave River northeast of Daggett, the Central Network also traverses the Mojave River west, east and through Afton Canyon, and through Manix Wash and Halloran Wash. Specific route segments of this network include portions of the historic Mojave Road, a popular open route which is sometimes coincident with the floodplain of the Mojave River, an active riparian zone. Sandy soils in this area minimize impacts to riparian soils, but active road use inhibits riparian vegetation growth. In this vicinity the route passes adjacent to active riparian vegetation. However, this event/activity alone is not substantial due to regular and frequent use of the Mojave Road. The route will also traverse Manix and Halloran Washes. In these areas, where the route

would traverse, riparian vegetation is lacking, so that no impacts to riparian values are anticipated from operation of the event under this Alternative.

#### 4.5.13 Mitigation

The mitigation measures proposed for the Combined Network Alternative would be the same as those described for the Northern Network Alternative (see Section 4.2.13).

#### 4.5.14 Residual Impacts

Residual impacts from the Combined Network Alternative would be similar to those for the Northern Network Alternative, except for the following.

There may be a higher potential for mortality to MFTL under the Combined Network compared to the Northern and Southern Network Alternatives, due to a greater amount of suitable habitat in this Alternative.

The Combined Network users a greater portion of paved roadways, including public highways, compared to the Northern Network. Closure of these roadways would have a bigger impact on the traveling public and require a greater law enforcement effort than the Northern Network.

#### 4.6 NO ACTION ALTERNATIVE

#### 4.6.1 Vegetation

Under the No Action Alternative impacts to vegetation from operation of the Grand Challenge event would be avoided. Impacts from regular weekend use of the OHV Open areas, including the area temporarily closed, would occur in its stead. These impacts include typical early spring OHV activity within the OHV areas, both on and off of designated open routes.

#### Threatened & Endangered, and BLM-Sensitive Plant Species

Under the No Action Alternative impacts to the Mojave monkey flower from operation of the Grand Challenge event in the Stoddard Valley OHV area would be avoided. Impacts from regular weekend use of the Stoddard Valley OHV Open area would occur in its stead. These impacts include typical early spring OHV activity both on and off of designated open routes.

The No Action Alternative would not result in any changes in the population or status of the whitemargined beardtongue.

## 4.6.2 Wildlife

Under the No Action Alternative impacts to terrestrial wildlife from operation of the Grand Challenge event would be avoided. Impacts from regular weekend use of the OHV Open areas, including the area temporarily closed, would occur in its stead. These impacts include typical early spring OHV activity within the OHV areas, both on and off of designated open routes.

## Threatened & Endangered, and Sensitive Wildlife Species

## Desert Tortoise

Under the No Action Alternative impacts to the desert tortoise from operation of the Grand Challenge event would be avoided. No desert tortoise BLM Category I or critical habitat would be potentially affected by the Grand Challenge Event.

## Mohave Ground Squirrel

Under the No Action Alternative impacts to the MGS from operation of the Grand Challenge event would be avoided.

## Mojave Fringe-toed Lizard

Under the No Action Alternative impacts to the MFTL from operation of the Grand Challenge event would be avoided. Impacts from regular weekend use of the Rasor OHV Open area would occur in its stead. These impacts include typical early spring OHV activity both on and off of designated open routes, including aeolian (sand) habitat of MFTL.

#### 4.6.3 Areas of Critical Environmental Concern

Under the No Action Alternative no inconsistencies between ACEC management plans and the Grand Challenge event would occur. Use of ACECs consistent with specific management plans would continue. Therefore, the No Action Alternative would not contribute to any inconsistency with ACEC management plans.

#### 4.6.4 Air Quality

Under the No Action Alternative no fugitive dust emissions  $(PM_{10})$  from use of OHV areas and unpaved roads would be created by operation of the Grand Challenge event. Fugitive dust emissions from regular weekend use of the OHV Open areas, including the area temporarily closed, would occur in its stead.

These impacts include typical early spring OHV activity within the OHV areas, both on and off of designated open routes.

#### 4.6.5 Cultural Resources

Under the No Action Alternative impacts to cultural resources from the Grand Challenge event would be avoided. Therefore, the No Action Alternative would not contribute to any changes related to impacts to cultural resources.

#### Native American Religious Concerns

Under the No Action Alternative, any impacts to known or unknown Native American Religious Concerns or Sacred Sites from the Grand Challenge event would be avoided, including short-term restriction of access.

#### 4.6.6 Water Quality

Under the No Action Alternative the Grand Challenge event would not contribute to any water quality impacts, including turbidity. Impacts from regular weekend use of the Afton Canyon ACEC, Mojave Road, and Rasor OHV Open Area would occur in its stead. This use would result in minimal turbidity impacts to the Mojave River crossings similar in scope to those described under the Central Network Alternative, based on the relatively lower levels of casual public use anticipated on that day.

#### 4.6.7 Wastes, Hazardous or Solid

Under the No Action Alternative the Grand Challenge event would not contribute to any trash or hazardous waste.

#### 4.6.8 Safety and Law Enforcement

Under the No Action Alternative impacts to safety and law enforcement related to the Grand Challenge event would be avoided, and no law enforcement efforts or road closures would be required.

#### 4.6.9 Utilities

Under the No Action Alternative impacts to utilities related to the Grand Challenge event would be avoided, and no access limitations to utility corridors would result.

#### 4.6.10 Recreation and Access

Under the No Action Alternative impacts to recreation and access would be avoided, and no access limitation to recreation areas would result.

Under the No Action Alternative, the opportunity for the public to view the Grand Challenge Robotic Demonstration and Competition, either directly or later through the eye of a camera, would be foregone.

#### 4.6.11 Scenic Values

Under the No Action Alternative, short-term impacts to visibility resulting from fugitive dust emission from operation of the Grand Challenge event would be avoided

#### 4.6.12 Wetlands/Riparian Values

Under the No Action Alternative the Grand Challenge event would not result in any impacts to wetlands or riparian values. Therefore, the No Action Alternative would not contribute to changes in impacts to wetlands or riparian values.

#### 4.6.13 Mitigation Measures

No mitigation measures are proposed for the No Action Alternative.

#### 4.6.14 Residual Impacts

Selection of the No Action Alternative would mean that the Grand Challenge event would not be held, and impacts associated with this specific activity would not occur. Therefore, residual impacts from the No Action Alternative represent the continuation of existing environmental conditions and ongoing impacts in the APE, consistent with area-wide and site-specific BLM management plans for this region.

Impacts would be limited to those resulting from typical weekend use of the Stoddard Valley, Johnson Valley, Rasor, and Nevada OHV areas. In OHV areas, vehicles are allowed to travel cross-country, which may result in the crushing of vegetation, lizards and other small wildlife, and burrows that provide habitat for wildlife.

In the Stoddard OHV area, cross-country travel may result in the crushing of the annual plant, the Mojave monkey flower, if present. If crushed prior to release of seed, this could adversely affect future populations of this and other plants, as identified in the CDCA Plan, Appendix V.

Impacts to desert tortoise, MGS, and MFTL would be limited to those resulting from typical early spring weekend use of open areas and open routes by the recreating public. Therefore, the No Action Alternative would not result in any changes to management areas or critical habitat, nor contribute to changes in impacts to Threatened and Endangered Species.

Impacts to visibility would be limited to those resulting from typical early spring weekend use of open areas and open routes by the recreating public, and would in most cases be similar to the Action Alternatives.

## 4.7 CUMULATIVE IMPACTS

BLM and Department of Defense regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed. CEQ regulations implementing the procedural provisions of NEPA define cumulative effects as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1507).

The cumulative effects region (CER) for which effects of the proposed action and other past, proposed, and reasonably foreseeable actions would be cumulatively recorded or experienced includes San Bernardino, southeastern Inyo, and western Clark Counties. Therefore, this analysis considers additional effects arising from the proposed action with effects of other known past, present, and reasonably foreseeable actions in the CER. In Fiscal Year 2003, approximately 100 OHV event permits were cumulatively authorized by the Barstow, Needles, and Las Vegas Field Offices within the CER. This is typical of permitted OHV activity in the high desert in recent years. It is anticipated that permit activity will moderately increase in the reasonably foreseeable future, consistent with continued population growth anticipated in the region. Other permitted activities which generate cumulative effects include mining plans of operation. The BLM permitted or renewed approximately 10 plans in 2003 in the CER. Some years this number is lower, depending on mining interest and economic conditions. The other factors in cumulative effects in the high desert are casual use activities which the BLM does not permit, on paved and unpaved roads. The BLM does not have records on the level of casual use activities, except at El Mirage Cooperative Management Area. Casual use at this OHV Open area near the Victor Valley metropolitan area, after briefly leveling off in the mid 1980's, is increasing at a modest pace along with the population increase in the Valley.

Due to the fact that both San Bernardino and portions of Clark Counties are in non-attainment for  $PM_{10}$  with Clean Air Act National Ambient Air Quality Standards and because this event occurs on a popular weekend for motorized recreational activity in the desert, all action alternatives would contribute to short-term cumulative impacts on air quality. These impacts would dissipate within approximately 48 to 72 hours following the completion of the event, depending upon weather conditions.

Cumulative impacts to cultural resources are anticipated and will be similar to direct and indirect impacts described under all of the action alternatives. Loss or destruction of cultural resources within and adjacent to the Stoddard Valley and Johnson Valley OHV Areas has occurred as a result of increased use of these areas over time and is unavoidable. Additional damage to and destruction of cultural resources during and after the event could contribute to the cumulative loss of irreplaceable, scientifically important information contained in known and unknown cultural resources in the OHV open areas. In addition, some of the designated open routes in the East Mojave have had historical significance in the settling of the west and/or its growth. While the integrity of these resources has been depleted through many years of continued use and sometimes has been substantially altered or lost in areas through paving over of original sections of historic routes, evidence remains in areas of earlier times, and continues to be at risk until survey and recovery is complete for these eligible properties. All other sites determined eligible for the National Register of Historic Places that could be impacted by the event would be avoided.

Cumulative impacts in relation to threatened and endangered species (desert tortoise) would occur if additional desert tortoise habitat take in the form of desert tortoise injury or mortality occurs because of collisions with Grand Challenge Event robotic or support vehicles. The likelihood of this occurring on a given length of route in the CER would be considerably less because impacts with Event vehicles would be confined to the narrow width of route boundaries as defined by the lateral boundaries available to robotic vehicles within the roadways. Desert tortoise pre-sweeps and rolling sweeps will further reduce the potential for take. Therefore, outside of the OHV Open Areas, the Event is not anticipated to have a substantial contribution to cumulative impacts to desert tortoise in the CER.

However, in the OHV Open Areas, the robotic vehicles have much greater flexibility to traverse, including off-road within desert tortoise habitat in a much wider lateral boundary. Given the same length of travel in an OHV open area compared to outside of an open area, collisions between vehicles and desert tortoise would be more likely to occur in the open area. Additionally, the odds of a desert tortoise being crushed in a burrow would also be much greater in an OHV Open area. In non-Open Areas, vehicles would very likely not encounter desert tortoise burrows. The percentage of miles of any particular route within an open area would be small (less than 10%) compared to routes outside of OHV Open Areas. Further, OHV Open Areas do not include critical habitat. It is anticipated that few, if any desert tortoises would be killed or injured by Event participants, with the mitigation identified in Section 4.2.13, but if weather conditions are adverse (desert tortoise are active), take in the form of harassment could be substantial. Therefore, some contribution to cumulative effects within the OHV Open areas is possible, in the form of additional harassment of desert tortoise, in conjunction with the harassment and take caused by other casual users in the CER.

Other Phases of the DARPA Grand Challenge would not contribute substantively to cumulative impacts, with the exception of Phase 3, the Qualification, Inspection, and Demonstration (QID) Phase. This would take place at the California Motor Speedway and environmental impacts associated with QID activities are primarily associated with noise, and air pollution of the surrounding areas, oil pollution from leaking

vehicles, potential safety risk to participants and attendees during testing, and transportation safety to the start point. These types of impacts are consistent with those of other events conducted at the Speedway, and compared with other activities at the Speedway, impacts from the Grand Challenge would result in minimal impacts. In addition, the contribution of Phase 3 activities to the overall impacts of the Grand Challenge is anticipated to be minimal as well.

# THIS PAGE INTENTIONALLY LEFT BLANK

## CHAPTER 5 DOCUMENT SUPPORT

## 5.1 PREPARERS OF THE ENVIRONMENTAL ASSESSMENT

#### TABLE 5-1

#### CONTRIBUTORS TO THE DOCUMENT

Name	Occupation	Affiliation		
BUREAU OF LAND MANAGEMENT (BLM)				
Larry Foreman	Biologist	Desert District Office		
Linda Hansen	District Manager	Desert District Office		
Alan Stein	Administrator, Lands Mineral and Renewable Resources	Desert District Office		
Mike Ahrens	Off-Highway Vehicle Program Coordinator	Barstow Field Office		
Larry Blaine	Operations Section Supervisor	Barstow Field Office		
Becki Gonzales	Land Supervisor	Barstow Field Office		
Shelly Jackson	GIS Specialist	Barstow Field Office		
Harold Johnson	Supervisor, Recreation Chief	Barstow Field Office		
Amy Lawrence	Archeologist	Barstow Field Office		
Barry Nelson	Law Enforcement Branch Chief	Barstow Field Office		
Tim Read	Field Office Manager	Barstow Field Office		
Richard Rotte	Realty Specialist	Barstow Field Office		
Edythe Seehafer	NEPA Coordinator/ Environmental Specialist	Barstow Field Office		
Nathan Skallman	Recreation Permit Coordinator	Barstow Field Office		
Charles L. Sullivan III	Natural Resources Specialist	Barstow Field Office		
Roxie Trost	Supervisor, Resource Chief	Barstow Field Office		
Kristin Murphy	Biologist	Las Vegas Field Office		
Carrie Ronning	Biologist	Las Vegas Field Office		
Susanne Rowe	Archeologist	Las Vegas Field Office		
Robert Wandel	Recreational Specialist	Las Vegas Field Office		
Christi Oliver	Wilderness Specialist	Needles Field Office		
Lesly Smith	Outdoor Recreation Planner	Needles Field Office		
Richard Waggoner	Realty Specialist	Needles Field Office		
DEFENSE ADVANCED RES	EARCH PROJECTS AGENCY (DARPA	)		
Colonel Jose Negron	Grand Challenge Program Manager	DARPA		
Tom Strat	Deputy Grand Challenge Program Manager	DARPA		
BOOZ ALLEN HAMILTON	(BAH)			
Peter Brandom	Environmental Coordinator	ВАН		
Dean Bibles	Senior Consultant, Environmental Manager	ВАН		
Karen DeSimone	EA Public Outreach Coordinator	BAH		

# TABLE 5-1 (Cont'd)CONTRIBUTORS TO THE DOCUMENT

Name	Occupation	Affiliation		
MICHAEL BRANDMAN ASSOCIATES (MBA)				
Michael Dice	Archeologist	MBA		
Michael Hendrix	Air Quality Specialist	MBA		
Tom Holm	Manager of Environmental Services	MBA		
Christine Jacobs-Donoghue	Project Manager, EA Consultant	MBA		
Nina Jimerson	Biologist, Project Manager	MBA		
Tom McGill, Ph.D.	Biologist, Regional Manager, BA Consultant	MBA		
DONOGHUE AND ASSOCIATES (D&A)				
John Donoghue	GIS Project Manager	(D&A)		
ASM AFFILIATES (ASM)				
John Cook	Archeologist, Principal, CRA Consultant	ASM		
Sherri Andrews	Associate Archeologist, CRA	ASM		
Micah Hale	Associate Archeologist, CRA	ASM		
Ken Moslak	Associate Archeologist, CRA	ASM		
Michelle Savala	Assistant Archeologist, CRA	ASM		
Catherine Wright	Archeologist/Crew Chief, CRA	ASM		
SCORE INTERNATIONAL (SI)				
Sal Fish	Logistics	SI		

# TABLE 5-2PERSONS CONTACTED

Name	Occupation	Affiliation		
U.S. FISH & WILDLIFE SERVICE (USFWS)				
Ray Bransfield	Field Supervisor	Ventura Field Office		
Michael Burroughs	Biologist	Las Vegas Field Office		
Doug Threloff	Biologist	Ventura Field Office		
NATIONAL PARK SERVICE (NPS)				
Mary G. Martin	Superintendent	Mojave National Preserve		
Danette Woo	Environmental Compliance Specialist	Mojave National Preserve		
CALIFORNIA DEPARTMENT OF FISH AND GAME (CDFG)				
Becky Jones	Biologist			

# TABLE 5-2 (Cont'd)

## PERSONS CONTACTED

Name	Occupation	Affiliation
NEVADA DEPARTMENT OF W	ILDLIFE (NVDW)	
Brad Hardenbrook	Biologist	Southern Region
CALIFORNIA HIGHWAY PATH	ROL (CHP)	
Lt. Mark Roe	Patrol Officer	СНР
NEVADA HIGHWAY PATROL	(NHP)	
Sgt. Gina Johnson	Patrol Officer	NHP
MOJAVE DESERT AIR QUALIT	TY MANAGEMENT DISTRICT (M	IDAQMD)
Alan DeSalvio	Acting Supervising Air Quality Engineer	MDAQMD
CLARK COUNTY AIR QUALIT	Y MANAGEMENT (CCAQM)	
Jack Bingham	Compliance Supervisor	CCAQM
Rodney Langston	Air Quality Senior Planner	CCAQM
LOS ANGELES DEPARTMENT	OF WATER AND POWER (LADW	VP)
Val Amezquita	Environmental Specialist	LADWP
SAN BERNARDINO COUNTY S	HERIFF'S DEPARTMENT	
Lt. Howard Leslie	Officer	Barstow Station
LAS VEGAS METROPOLITAN	POLICE DEPARTMENT (LVMPD	)
Sgt. Tom Page	Police Officer	LMVPD
REPRESENTATIVES FROM TH	E FOLLOWING TRIBES	
Edward Tito Smith	Tribal Representative	Chemehuevi
Daniel Eddie, Jr.	Tribal Representative	Colorado River Indian Tribe
Curtis Anderson	Tribal Representative	Las Vegas Piute
Elda Butler	Tribal Representative	Fort Mojave
Chad Smith	Tribal Representative	Fort Mojave
Nora Helton	Tribal Representative	Fort Mojave
Georgia Kennedy	Tribal Representative	Timbisha Shoshone
Shirley Summers	Tribal Representative	Timbisha Shoshone

# THIS PAGE INTENTIONALLY LEFT BLANK