

Chapter 4

Cumulative Effects

4.1 Introduction

As required under NEPA and the regulations implementing NEPA, this section analyzes potential cumulative impacts from past, present, and reasonably foreseeable future actions combined with the Proposed Action within the cumulative effects study area specific to the resources for which cumulative impacts may be anticipated. A cumulative impact is defined as “the impact which results from the incremental impact of the action, decision, or project 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 Code of Federal Regulations 1508.7).

This analysis focuses on cumulative impacts of the Proposed Action and other actions both within and outside of the Proposed Action area. A qualitative description of the differences in cumulative impacts between those associated with the Proposed Action and those with other alternatives is included.

Nevada BLM Instruction Memo NV-90-435 specifies that impacts must first be identified for the Proposed Action (i.e., the proposed BMM North Operations Area Project) before cumulative impacts with other actions can occur.

As related to the Proposed Action, cumulative impacts are addressed for the following resources:

- Water Resources;
- Geology and Minerals;
- Paleontology;
- Soils;
- Vegetation;
- Non-native Invasive Species;
- Wildlife (including Migratory Birds and Special Status Species);
- Migratory Birds;
- Wetlands and Riparian Areas;
- Range Resources;
- Wild Horses;
- Land Use and Access;
- Recreation;
- Air Quality;
- Visual Resources;
- Noise and Vibration;
- Socioeconomics;
- Cultural Resources; and
- Hazardous and Solid Waste/Hazardous Materials.

Since no direct or indirect impacts to special status plant species, federally-listed animal species, Environmental Justice, and Native American Religious Concerns associated with the Proposed Action were identified in the discussion in Chapter 3, they are not addressed in the cumulative impacts discussion.

4.1.1 Time Frame for Analysis

The reasonably foreseeable time frame for the cumulative impact analysis is 25 years. Twenty-five years represents 10 years of the anticipated life of the mine and an additional 15 years for reclamation (earthwork, revegetation, and stabilization of process fluids). The actual time frame for reclamation activities, primarily the stabilization of process fluids, can range between five years and more than 20 years. An average of 13 years was used for this cumulative impact analysis.

For the purposes of this analysis and under federal regulations, “impacts” and “effects” are assumed to have the same meaning and are interchangeable. The cumulative effects analysis was accomplished through the following steps:

- Step 1: Establish appropriate geographical areas for analysis by resource;
- Step 2: Identify all past, present, and reasonably foreseeable future actions relevant to the resources in the cumulative effects study areas;
- Step 3: Summarize the effects of the Proposed Action in conjunction with past, present, proposed, and reasonably foreseeable future actions;
- Step 4: Provide a cumulative impacts conclusion; and
- Step 5: Discuss the variation in cumulative impacts between the Proposed Action and other alternatives.

4.1.2 Interrelated Projects

Interrelated projects are defined for this FEIS as activities that could interact with the Proposed Action in a manner that would result in cumulative impacts. Interrelated projects have been grouped as past, present, and reasonably foreseeable future actions. The interrelated projects are listed and described below. Table 4-1 quantifies surface disturbance characteristics of each project that is relevant to cumulative impacts. Surface disturbance characteristics were selected to describe the interrelated projects because it allows the combined surface disturbance impacts of interrelated projects to be totaled. The interrelated projects are shown in Figures 4-1 and 4-2, and Table 4-2 identifies potential interactions among the interrelated projects and resources. The geographic area for the cumulative impacts analysis is determined primarily by the locations of the interrelated projects and the interactions with potentially affected resources.

Past Actions

Sierra Pacific Power Company Falcon to Gonder Power Line

The Sierra Pacific Power Company Falcon to Gonder Transmission Project involved the construction of a new 345 kilovolt power line, generally located between Ely and Dunphy, Nevada (BLM, 2001a). The power line was constructed in 2003, is approximately 180 miles long, has a construction disturbance width of 160 feet, and consists of steel H-frame towers. For the purposes of this analysis, it is assumed approximately 25 miles of the power line is within the air/water resources cumulative effects study area, approximately 27 miles of the power line is within the wildlife cumulative effects study area, and 24.5 miles of the power line is within the wild horse cumulative effects study area. Based on a 160-foot right-of-way width the corridor associated with the power lines within the different cumulative effects study areas is estimated to include 485 acres (air/water), 524 acres (wildlife), and 475 acres (wild horse).

Interrelated Projects	Air Quality, Water Resources, Soils, Non-Native Invasive Species, and Vegetation Cumulative Effects Study Area	Paleontology, Geology and Minerals, and Noise and Vibration Cumulative Effects Study Area	Wildlife Cumulative Effects Study Area	Cultural Resources Cumulative Effects Study Area	Visual, Recreation, and Land Use and Access Cumulative Effects Study Area	Range Cumulative Effects Study Area	Wild Horse Cumulative Effects Study Area	Hazardous and Solid Waste/Hazardous Materials Cumulative Effects Study Area	Socioeconomic Cumulative Effects Study Area
Disturbance Subtotal	2,800	1,568	2,890	575	1,142	1,636	2,566.2	412	
Present Actions									
BMM	3,418	3,418	3,418	3,418	3,418	3,418	3,418	3,418	*
Mooney Basin Operations Area	742	742	742	742	742	742	742	742	*
Oil & Gas Wells ¹	15	3	9	3	**	3	9	**	*
BMM Regional Exploration Plan	210	210	210	210	210	210	210	210	*
Little Bald Mountain Mining Project	1	1	1	1	1	1	1	**	*
Little Bald Exploration Plan	11	11	11	11	11	11	11	**	*
Silver State Fiber Optic Line	70	**	**	**	**	**	**	103	*
Notices Of Intent	50	50	50	50	50	0	50	**	*
Socioeconomics-Specific Projects	**	**	**	**	**	**	**	**	*
USFS Fuel Treatment Project	500	**	500	500	500	**	500	**	*
Disturbance Subtotal	5,017	4,435	4,941	4,935	4,932	4,385	4,941	4,473	
Reasonably Foreseeable Future Actions									
BMM NOAP (Proposed Action)	3,920	3,920	3,920	3,920	3,920	3,920	3,920	3,920	*
Alligator Ridge Mining Project	600	600	600	**	600	600	600	**	*
Midway Gold – Pan Mining Project	50	**	**	**	**	**	**	**	*
Limousine Butte Exploration Plan	**	**	**	**	**	**	88	**	*
Yankee Mining	400	400	400	**	**	400	400	**	*

Interrelated Projects	Air Quality, Water Resources, Soils, Non-Native Invasive Species, and Vegetation Cumulative Effects Study Area	Paleontology, Geology and Minerals, and Noise and Vibration Cumulative Effects Study Area	Wildlife Cumulative Effects Study Area	Cultural Resources Cumulative Effects Study Area	Visual, Recreation, and Land Use and Access Cumulative Effects Study Area	Range Cumulative Effects Study Area	Wild Horse Cumulative Effects Study Area	Hazardous and Solid Waste/Hazardous Materials Cumulative Effects Study Area	Socioeconomic Cumulative Effects Study Area
Wind Energy Projects	1,020	**	**	1,020	**	**	1,020	**	*
Oil & Gas Wells ¹	15	3	9	3	**	3	9	**	*
Socioeconomics-Specific Projects	**	**	**	**	**	**	**	**	*
Disturbance Subtotal	6,005	4,923	4,929	4,943	4,520	4,923	6,037	3,920	
Natural Processes									
Wildland Fire	*	*	*	*	*	*	*	*	*
Spread of Noxious/Invasive Weeds	*	*	*	*	*	*	*	*	*
Expansion of Pinyon and Juniper Trees and other Woody Species	*	*	*	*	*	*	*	*	*
Spread of Forest Insects and Diseases	*	*	*	*	*	*	*	*	*
Disturbance Total	13,822	10,926	12,760	10,453	10,594	10,944	13,544	8,805	

** The project not present within the CESA for this resource.

* The project is present within this CESA.

¹ Assumes 3 acres of disturbance for each past or present well.

² Acreage determined from BLM Shape Files 2008.

TABLE 4-2 INTERACTIONS BETWEEN RESOURCES AND INTERRELATED PROJECTS

Interrelated Projects	Water Resources	Geology and Mineral	Paleontology	Soils	Vegetation Resources	Non-Native Invasive Species	Wildlife	Wetlands, Riparian Zones, and Waters of the U.S.	Range Resources	Wild Horses	Land Use and Access	Recreation	Air Quality	Visual Resources	Noise and Vibration	Socioeconomics	Environmental Justice	Cultural Resources	Native American Religious Concerns	Hazardous and Solid Waste/Hazardous Materials
Past Actions																				
SPPCo Falcon to Gonder Power Line					X	X	X	X								X				
Oil & Gas Wells					X	X							X	X	X	X		X	X	
Illipah Mine	X			X	X	X	X	X		X			X			X				
Highway 50 Corridor					X	X	X	X					X			X				X
Gravel Pits	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Casino/Winrock Mine	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Yankee Mine	X	X	X	X	X	X	X	X	X	X			X		X	X				
Bellview Project	X			X	X	X	X	X			X	X	X	X		X		X	X	
Cherry Springs Canyon Exploration Project	X			X	X	X	X	X			X	X	X	X		X		X	X	
Overland Pass Exploration Project	X			X	X	X	X	X		X	X	X	X	X		X		X	X	
Alligator Ridge Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Little Bald Mountain Mining Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Golden Butte Mine										X						X				
White Pine Mine	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Socioeconomics-Specific Projects																X				
Present Actions																				
BMM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Mooney Basin Operations Area	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X
Oil & Gas Wells					X	X	X			X		X	X		X	X		X	X	
BMM Regional Exploration Plan	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X
Little Bald Mountain Mining Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Little Bald Exploration Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Silver State Fiber Optic Line				X	X	X		X				X	X			X				
Notices Of Intent		X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	
Socioeconomics-Specific Projects																X				
USFS Fuel Treatment Project	X			X	X	X	X	X		X	X	X	X	X		X		X	X	

Interrelated Projects	Water Resources	Geology and Mineral	Paleontology	Soils	Vegetation Resources	Non-Native Invasive Species	Wildlife	Wetlands, Riparian Zones, and Waters of the U.S.	Range Resources	Wild Horses	Land Use and Access	Recreation	Air Quality	Visual Resources	Noise and Vibration	Socioeconomics	Environmental Justice	Cultural Resources	Native American Religious Concerns	Hazardous and Solid Waste/Hazardous Materials
Reasonably Foreseeable Future Actions																				
EnXco / Power Partners Wind Project N82424					X	X							X			X		X	X	
BMM NOAP (Proposed Action)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Alligator Ridge Mining Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Midway Gold - Pan Mining Project	X			X	X	X	X		X				X			X				
Limousine Butte Exploration Plan	X									X						X				
Yankee Mining	X	X	X	X	X	X	X	X	X	X			X		X	X				
Wind Energy Projects	X				X	X				X			X			X		X	X	
Oil & Gas Wells					X	X	X		X	X			X		X	X		X	X	
Socioeconomics-Specific Projects																X				
														X						
Natural Processes																				
Wildland Fire	X			X	X	X	X	X	X	X	X	X	X	X				X		
Spread of Noxious/Invasive Weeds	X			X	X	X	X	X	X	X	X	X		X						
Expansion of Pinyon and Juniper Trees and other Woody Species					X	X	X		X	X	X	X		X					X	
Spread of Forest Insects and Diseases					X	X	X	X	X	X	X	X		X					X	

Oil and Gas Wells

Numerous past (pre-2001) oil and gas notices have been filed in the region. The locations of past oil and gas notices are shown on Figure 4-1. Disturbance associated with each well is based on approximately three acres.

Illipah Mine

The Illipah Mine is currently inactive and is located approximately four miles north of Antelope Summit on U.S. Highway 50 and approximately 30 miles south of the BMM area. Several companies have conducted exploration in the area of the mine over the last 10 years. It is estimated that the mine site encompasses approximately 200 acres of disturbance (Wilson, 2008).

Highway 50 Corridor

U.S. Highway 50 is a paved two-lane highway located south of the project area. The highway follows portions of the Pony Express Trail and Lincoln Highway. It includes a 200-foot right-of-way with an approximate disturbance width of 100 feet. The highway forms the southern boundary of the wildlife cumulative effects study area for a distance of approximately 31 miles and is within the air, water resources, soils, vegetation, and non-native invasive species cumulative effects study area for approximately 24 miles.

Gravel Pits

Seventy-one sand and gravel (material) pits were identified adjacent to highways and in the valleys surrounding the project area. The majority of these pits are abandoned, and several more are inactive. Past gravel pits and their locations in proximity to the cumulative effects study area are shown in Figure 4-1. Approximate disturbance associated with the gravel pits is provided in Table 4-1.

Casino/Winrock Mine

The Casino/Winrock Mine consists of two inactive mine sites, Casino (north of the Proposed Action boundary) and Winrock (northeast of the BMM North Operations Area Project boundary). The mine sites include a combined heap leach facility (the Casino/Winrock leach pad) located north of the Winrock Mine. These inactive mines are located at the extreme south end of Ruby Valley, in northwest White Pine County, Nevada. Activities resulted in approximately 200 acres of disturbance; all disturbance except for approximately 33 acres of pits has been reclaimed.

Yankee Mine

The Yankee Mine is located along the west flank of Long Valley near the southern-most edge of the Bald Mountain Mining District. An extensive drilling program was conducted by Amselco Exploration, Inc. in early 1984. Activities in the late 1980s and mid-late 1990s included open pit mining and the construction of associated waste rock disposal areas, a heap leach facility, roads, and ancillary facilities. There were several operators at the Yankee Mine prior to the Placer Dome U.S. purchase in August 1993. Currently, Barrick controls the Yankee Mine and its associated facilities. The mine consists of a six-million-ton heap leach facility, three associated process ponds, a central processing plant, 17 pits, and several waste rock stockpiles. Mining ceased at the Yankee Mine in 1998 with ongoing processing occurring until the spring of 1999. Secondary heap leaching was concluded in April 2000. Past disturbance is estimated at 450 acres.

Bellview Project

The Western States' Bellview Project was a proposed open pit mine with cyanide heap leaching. The project is located in Walker Canyon, on USFS administered lands on the west flank of the southern Ruby Mountains. The project was proposed in 1991 and is located in

Figure 4-1 Cumulative Effects Study Area

Figure 4-2 Socioeconomic Cumulative Effects Study Area

portions of Sections 2 and 3, Township 25 North, Range 56 East, and in portions of Sections 34 and 35, Township 26 North, Range 56 East. Mining was proposed for 1992 and early 1993 but never proceeded beyond the exploration phase (SRK, 2008). Disturbance in the area is estimated to include approximately five acres of reclaimed exploration roads.

Cherry Springs Canyon Exploration Project

Barrick Gold Exploration's Cherry Springs Exploration Project was proposed on USFS administered lands north of Overland Pass, on the western flank of the southern Ruby Mountains. The project was approved in 1998 with a Categorical Exclusion from the USFS. The project area is located in Sections 15, 22, and 26, Township 25 North, Range 56 East. Barrick Gold Exploration proposed to drill up to six exploration holes over a two-week period in 1998. The project temporarily affected approximately one acre. Reclamation was proposed for the same year as the project (1998).

Overland Pass Exploration Project

The Overland Pass exploration project was proposed by Cordex Exploration Co., on USFS administered lands north of Overland Pass. The project was approved in 1998 with a Categorical Exclusion from the USFS. The project area is located in Sections 19, 20, 29, and 30, Township 25 North, Range 57 East. Cordex proposed to drill up to 11 exploration holes and construct associated sumps. The project would utilize overland travel and affect approximately 3.2 acres. Reclamation was proposed and was assumed to be completed the same year as the project (1998).

Alligator Ridge Project

The Alligator Ridge Project area is located approximately 11 miles south of Barrick's Mooney Basin Operations in portions of Township 22 North, Range 57 East. The Alligator Ridge Mine is located at the southern tip of the Ruby Mountains. Bald Mountain Mining, Inc. acquired the property and facilities from the original owner and operator, USMX, Inc., in 1993. The Alligator Ridge Mine comprised seven open pits, waste rock facilities, a mill and tailings impoundment, and a heap leach facility. Mining activities at the Alligator Ridge Mine ceased in mid-1987. Approximately seven million tons of ore were leached, and about 500,000 tons were milled. Leaching continued from 1987 through 1990 by BMM, and secondary leaching was continued by USMX, Inc. through 1993. From 1993 to 1997 leaching operations were conducted by BMM. Cessation of production occurred in 1997, and ongoing closure and reclamation activities were largely completed by 2000. The project area included a total permitted disturbance area of 593 acres, including eight open pits. All disturbance, except for approximately 100 acres in pits, has been reclaimed.

Little Bald Mountain Mining Project

The Little Bald Mountain Mine is located in Bourne Canyon, south of the existing BMM and Mooney Basin Operations. New Dynasty Mines (U.S.), Inc. commenced exploration activities at the Little Bald Mountain Mine site in 1984. However, mining and ore processing on heap leach pads did not occur until 1985 and continued through 1991 with re-leaching occurring until 1992. The 1995 BMM Expansion EIS states that mining disturbance at the Little Bald Mountain Mine, just south of the BMM, was 28 acres. In December 1992, a Plan of Operations and Reclamation Permit Application were submitted by New Dynasty Mines (U.S.) Inc. The Plan of Operations was subsequently revised in March 1993 as part of the land package that included Dynasty Basin (SRK, 2008). The mine was later acquired by Placer Dome U.S. in 1993. Cessation of mining occurred in 1992, with heap rinsing on-going until 1995. The final permanent closure plan and design for the site was carried out in the summer of 1998 (SRK, 2004).

Golden Butte Mine

The Golden Butte Mine is located in Township 23 North, Range 61 East and consisted of an open pit and heap leach operation. The mine resulted in approximately 175 acres of disturbance; all disturbance except for approximately 20 acres of open pit has been reclaimed.

White Pine Mine

The White Pine Mine is an inactive, reclaimed mine located approximately five miles north of the Proposed Action boundary in portions of Sections 35 and 36, Township 25 North, Range 57 East. The mine includes a total of 274 acres of disturbance, including four open pits and three backfilled pits.

Socioeconomics-Specific Projects

The cumulative effects study area for socioeconomics encompasses Elko, Eureka, and White Pine counties, an area of approximately 30,000 square miles. It is not feasible to list every project that has contributed to social and economic conditions in the study area. However, major past projects in the area that should be mentioned. The Rain Mine, which is located approximately 10 miles southeast of Carlin, Nevada. The Rain Mine is no longer in operation and is currently being reclaimed. The Tonkin Springs Mine, which is located in the Simpson Park Mountains, was operated by U.S. Gold Corporation. The mine is no longer in operation.

Past Natural Processes within the Cumulative Effects Study Area

Wildland Fire

There have been several wildland fires within the cumulative effects study area and vicinity. Approximately 13,208 acres within the vegetation cumulative effects area and 13,097 acres within the wildlife cumulative effects area have burned within the last eight years.

Spread of Non-native Invasive Weeds

Non-native invasive weeds have been progressively spreading in the cumulative effects study area. The entire cumulative effects study area has not been formally surveyed for non-native invasive weeds that are not designated as noxious, so an estimated acreage cannot be determined.

Expansion of Pinyon and Juniper Trees and other Woody Species

Over the past 150 years, pinyon and juniper trees have spread into shrublands and grasslands and are expected to continue expansion.

Spread of Forest Insects and Diseases

Several years of drought in western states have resulted in severe stress on pinyon pines. Trees have become more susceptible to insect infestations.

Present Actions

BMM and Mooney Basin Operations Area

Present actions at BMM and the Mooney Basin Operations Area are described in Chapter 2 of this document. Current authorized disturbance is 4,165 acres; however, to date only 3,418 have been disturbed.

Oil and Gas Wells

Locations of the currently operating oil and gas wells and past notices for oil and gas wells are shown on Figure 4-1. Currently, there are five wells within the vicinity of the proposed project. Oil and gas wells are estimated to disturb approximately three acres each (Wilson, 2008).

BMM Regional Exploration Plan

BMM proposes up to 210 acres of exploration disturbance; however, only 70 acres would be disturbed at any one time based on reclamation bond limitations and requirements. Locations of drill sites and cross-country travel routes would be dependent on geological conditions and the results of ongoing drilling; thus BMM cannot predict where disturbance would occur. This exploration project is anticipated to occur through 2014 (SRK, 2008).

Little Bald Mountain Mining Project

Previous operations associated with the Little Bald Mountain Mining Project are described above. In January 2006, BMM submitted an Environmental Assessment (BLM, 2006c) for the Little Bald Mountain Mine Plan of Operations to the BLM, which was approved on December 13, 2006 (BLM, 2006c). The amendment allows for re-opening the existing portal for underground exploration activities, which involves disturbance of approximately one acre of previously disturbed/reclaimed land.

Little Bald Exploration Plan

The Little Bald Mountain Mine is the site of a small, permitted underground exploration operation. This operation has not yet begun. The project would result in 11 acres of disturbance.

Silver State Fiber Optic Line

The Silver State Fiber Optic Line is a communications line constructed parallel to the highway right-of-way between Salt Lake City, Utah, and Reno, Nevada. Within the cumulative effects study area, the line is located adjacent to U.S. Highway 50. The fiber optic line has a total permitted disturbance width of 25 feet (Sierra Pacific Power Company has a 10-foot right-of-way; AT&T has a 15-foot right-of-way width). Approximately 23 miles of the fiber optic line fall within the air, water, soils, non-native invasive species, and vegetation cumulative effects study areas.

Notices of Intent

Several hundred Notices of Intent have been filed over much of the project area and on lands to the south. Up to five acres of disturbance may occur under a notice, though actual disturbance would in many cases be less. The majority of these notices are closed, cancelled, expired, or withdrawn. Approximately 10 notices are active within the BLM Elko District Office portion of the cumulative effects study area. If it is assumed five acres of disturbance occurred under each notice, then approximately 50 acres of additional disturbance would occur.

Socioeconomics-Specific Projects

As mentioned previously, it is not feasible to list every project that contributes to social and economic conditions in the study area because it encompasses such a large area. Some of the larger projects in the study area include the Ruby Hill Mine, which is located west of the town of Eureka, Nevada, on private lands and lands administered by the BLM (BLM, 2005d). As mentioned above, the Tonkin Springs Mine is closed but additional exploration is taking place in and near the mine site. The Robinson Mine is an open pit copper and gold mine located approximately seven miles west of Ely, Nevada. The property was mined from the late 1800s to 1978 and then again from 1986 to 1999. The Robinson Mine recently reopened and is operated by Quadra Mining. Numerous other mines are in operation within the cumulative effects study area. The Elko County Railport is located six miles east of Elko, south of Interstate 80, and north of the Humboldt River along the Union Pacific rail line. At completion, the railport is estimated to produce up to 1,500 jobs in the Elko area (SPPCo, 2006).

United States Forest Service Fuel Treatment Project

USFS, Ruby Mountain Ranger District conducted a Fuel Treatment Project in the fall of 2008. The project was located on the west slopes of the Ruby Mountains generally located between Cherry Spring Canyon and Walker Canyon. The purpose of the project was to treat approximately 500 acres of pinyon/juniper encroachment into sagebrush communities on the southern end of the Ruby Mountains with prescribed fire and mechanical treatment. The project broke up fuel continuities and improved the quality of habitat in the project area for mule deer and other wildlife species. Burning occurred in the fall of 2008.

Present Natural Processes within the Cumulative Effects Study Area

Wildland Fires

Natural and human caused fires continue to be a threat to vegetation.

Spread of Non-native Invasive Weeds

Several species of non-native invasive weeds are found throughout the cumulative effects study area. These species are expected to continue to spread on both private and public lands throughout the cumulative effects study area.

Expansion of Pinyon and Juniper Trees and other Woody Species

Pinyon and juniper trees continue to expand into shrublands and grasslands.

Spread of Forest Insects and Diseases

Several years of drought in western states have resulted in severe stress on pinyon pines. Trees have become more susceptible to insect infestations.

Reasonably Foreseeable Future Actions

BMM North Operations Area Project (Proposed Action)

The Proposed Action is described in detail in Chapter 2 of this document. There would be a disturbance of approximately 3,920 acres with expansion of existing pits and waste rock dumps and process areas.

Alligator Ridge Mining Project

Mining may occur at the Alligator Ridge Mine in the future. Reasonably foreseeable mining-related disturbance is estimated at approximately 600 acres.

Midway Gold-Pan Mining Project

Midway Gold-Pan Mining Project is an exploration project south of U.S. Highway 50 that could develop into a 50-acre mine.

Limousine Butte Exploration Plan

The Limousine Butte Exploration Plan is located in the vicinity of Alta Gold's Golden Butte Mine, located in northern White Pine County. The exploration project proposed up to 88 acres of disturbance occurring within a 27,000-acre plan area.

Yankee Mine

The Yankee Mine is currently reclaimed and in closure; however, a 143-hole exploration program is proposed for the area. Mining may occur at the Yankee Mine in the future. Reasonably foreseeable mining disturbance is estimated at approximately 400 acres.

Wind Energy Projects

Based on current interest in wind energy development, it is projected by the BLM that three 200-megawatt wind farms would be developed during the next 20 years somewhere within the

cumulative effects study areas. Based on information in the Draft Ely Resource Management Plan/EIS (BLM, 2005c), each wind farm is assumed to have approximately 340 acres of permanent disturbance. Assuming three wind farms would be developed, this action would have approximately 1,020 acres of disturbance. Disturbance would largely occur along mountain ridgelines.

Oil and Gas Wells

Reasonably foreseeable oil and gas well exploration (estimated at five wells) is expected to occur in the future (Wilson, 2007).

Socioeconomics-Specific Projects

As mentioned previously, it is not feasible to list every reasonably foreseeable project that could contribute to social and economic conditions in the study area because it encompasses such a large area. Larger future actions in the study area include the Mount Hope Mine, a proposed molybdenum mine northwest of Eureka, Nevada, with an estimated 53-year mine life. The White Pine Energy Station is a proposed coal-fired electric power generating plant that would be constructed on a 1,300-acre site in Steptoe Valley north of Ely. The White Pine Energy Station would include two 500- to 800-megawatt power generation units with a total combined electrical capacity ranging from 500 megawatts to 1,600 megawatts. The project life is expected to be 40 years or longer. The Ely Energy Center is a NV Energy proposed coal-fired power generation facility to be located north of Ely. When fully built out, the project would have a total generating capacity of 2,500 megawatts. Newmont Mining Corporation has submitted a DEIS for the Emigrant Project, which is located approximately 10 miles south of Carlin, Nevada, on both public and private land and would consist of an open pit mine, waste rock disposal facilities, an oxide leach facility, borrow material areas, haul roads, and exploration activities (BLM, 2005e). Other noteworthy projects include the White Pine County Airport expansion, the Egan Range Wind Generating Project, and the Clark, Lincoln, and White Pine counties groundwater development project proposed by the Southern Nevada Water Authority.

Reasonably Foreseeable Natural Processes within the Cumulative Effects Study Area

Wildland Fire

The area burned by wildland fire would continue to vary greatly from year to year.

Spread of Non-native Invasive Weeds

Several species of non-native invasive species are found throughout the cumulative effects study area. These species are expected to continue to spread on both private and public lands throughout the cumulative effects study area.

Expansion of Pinyon and Juniper Trees and Other Woody Species

Over the past 150 years, pinyon and juniper trees have spread into shrublands and grasslands and are expected to continue expansion.

Spread of Forest Insects and Diseases

Several years of drought in western states have resulted in severe stress on pinyon pines. Trees have become more susceptible to insect infestations.

4.1.3 General Assumptions for Cumulative Impact Analysis

The following are general assumptions made for all resources in the cumulative impacts analysis:

- Analysis is based on the assumption that all interrelated projects are approved and completed as projected;

- Analysis is based on a time frame for Proposed Action reclamation activities to be completed 13 years after mining activities cease.
- Based on information in the Draft Ely Resource Management Plan/EIS (BLM, 2005c), each wind farm is assumed to have approximately 340 acres of permanent disturbance.

If applicable, other resource-specific assumptions are included at the beginning of each resource section. If none are included, only the general assumptions apply.

4.2 Water Resources

The affected environment for water resources within and directly surrounding the project area is discussed in Section 3.2. Since the cumulative effects study area for water resources is much larger than the Proposed Action boundary, additional information on the area is included herein. The cumulative effects study area comprises four hydrographic basins: Huntington, Ruby, Long, and Newark valleys (Figure 4-1). Ruby, Long, and Newark valleys are topographically closed basins, while Huntington Valley drains north into the Humboldt River. Ruby and Huntington valleys are designated groundwater basins, and Long and Newark valleys are undesignated groundwater basins. The surface water within these basins consists primarily of springs and ephemeral drainages. There are minor amounts of perennial surface water (e.g., Ruby Lake and Marshes, Huntington Creek, and Newark Lake); however, most surface water either evaporates or infiltrates at some point along its flow path.

4.2.1 Assumptions for Analysis

Surface Water and Groundwater

Assumptions for analysis for the cumulative effects to surface water and groundwater are the same as indicated in Chapter 3.

4.2.2 Geographic Area for Analysis

Surface Water

The cumulative effects study area for surface water resources encompasses four hydrographic basins: in the Humboldt River Basin Region, Huntington Valley Basin (Basin Number 47), and, in the Central Region, Newark Valley Basin (154), Long Valley Basin (175), and Ruby Valley Basin (176). The cumulative effects study area for water resources incorporates natural watershed boundaries associated with the Proposed Action (Figure 4-1). The four basins cover an area of approximately 2,070,965 acres.

Surface water in Ruby Valley drains to Ruby and Franklin lakes. Surface water in Long Valley drains toward a small playa in the center of the valley. The majority of surface water in Long Valley infiltrates or evaporates prior to reaching the playa. Surface water in Newark Valley drains to Newark Lake. Surface water in Huntington Valley drains to Huntington Creek, which then drains into the South Fork of the Humboldt River. Huntington Creek is considered a perennial drainage. Ruby Lake and Newark Lake have water year-round, largely due to localized springs that are adjacent to the lakes. There are limited perennial surface water features in Long Valley, with the majority of Long Valley dry by the end of the summer. The seeps and springs within the general project vicinity are discussed in Section 3.2.

Groundwater

The cumulative effects study area for groundwater resources encompasses the same four hydrographic basins as described above for surface water: in the Humboldt River Basin Region, Huntington Valley Basin (Basin Number 47), and, in the Central Region, Newark Valley Basin (154), Long Valley Basin (175), and Ruby Valley Basin (176). These four basins cover an area

of approximately 2,070,965 acres. The cumulative effects study area for water resources incorporates natural watershed boundaries associated with the proposed project.

Drinking Water

The cumulative effects study area for drinking water is the same as the study area for both surface water and groundwater.

4.2.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions Surface Water

Potential cumulative effects to surface water resources within the cumulative effects study area could occur from mining operations and exploration activities, oil and gas exploration, fuel treatment projects, livestock grazing, and projects having direct surface disturbance. Projects located within the water resources cumulative effects study area are discussed in Section 4.1.2 and summarized in Table 4-1.

In general, all projects within the cumulative effects study area involving surface disturbance have the potential to impact surface water quality and quantity, primarily through increased sedimentation as a result of the removal of vegetation and disturbance to the soil structure. All authorized past, present, proposed, and reasonably foreseeable future actions in the cumulative effects study area that have associated surface disturbance and are located on public lands would be required to implement Best Management Practices (Appendix D), which are part of the BLM Ely District Resource Management Plan. Use of Best Management Practices would help to stabilize soils and reduce sedimentation to surface waters in the cumulative effects study area. Impacts from all actions identified in the cumulative effects study area are anticipated to be limited to the life of each project and the localized nature of each project.

Due to the limited surface water resources in the Proposed Action area compared with other areas of the cumulative effects study area and to the minimal impact to surface water from the Proposed Action with implementation of Best Management Practices developed by the BLM (Appendix D) and Design Features selected by Barrick (Table 2-13), the Proposed Action would have only a limited impact on surface water quality or quantity within the cumulative effects study area.

Groundwater

The impacts to groundwater resources directly associated with the Proposed Action are discussed in Section 3.2. Potential cumulative effects to groundwater resources within the cumulative effects study area could occur from mining operations and exploration activities, oil and gas exploration, and any other projects where the groundwater is intercepted. Projects located within the water resources cumulative effects study area are discussed in Section 4.1.2 and summarized in Table 4-1.

Past and present mining and mineral exploration activities in the cumulative effects study area have disturbed approximately 6,472 acres. This disturbance includes existing mines and exploration disturbance and Notices of Intent, as well as existing gravel pits. Other past and present actions within the water resources cumulative effects study area include utilities and road disturbances (approximately 1,345 acres). Since the power lines and roads do not intercept the water table, there have been no known impacts to groundwater from these projects. Reasonably foreseeable future mining actions include disturbance of approximately 4,970 acres which includes the 3,920 acres of disturbance from the Proposed Action. Mining operations would require use of groundwater for processing operations and may intercept groundwater during open pit mining. Other reasonably foreseeable future actions within the water resources cumulative effects study area include wind energy projects. These projects

would disturb approximately 1,020 acres. The power lines, roads, and wind energy projects do not intercept the water table and are therefore not anticipated to impact the groundwater resources.

A concern has been raised regarding the impact on the Ruby Lake National Wildlife Refuge of the increased groundwater production from the Mooney Basin wells associated with the Proposed Action. Impacts to the Ruby Lake National Wildlife Refuge are not anticipated (Osterberg, 2007), primarily due to the fact that the Mooney Basin wells are located in Newark Valley and are not within Ruby Valley. Ruby Valley is a designated basin, while Newark Valley is an undesignated basin. The sources of recharge for the Ruby Lake National Wildlife Refuge and for the Mooney Basin wells are different. Between 1999 and 2003, the U.S. Geological Survey conducted a study of the hydrogeology and water resources of Ruby Valley (USGS, 2005a). The report states that the major sources of recharge to the Ruby Lake National Wildlife Refuge are the springs discharging directly west of the lake. These springs are fed by precipitation in the mountains to the west. The carbonate rocks transmit the water down-slope to the east where they discharge as springs along a localized fault system at the base of the mountains. The U.S. Geological Survey report states that there is no measurable component of recharge to the Ruby Valley from the south. According to the report, the area to the south and east are theorized as actual discharge points for the groundwater from Ruby Valley.

Current activities impacting groundwater quality and quantity include irrigation in all four hydrographic basins but primarily in Huntington and Ruby valleys. Irrigation is the primary use of groundwater in both Huntington and Ruby valleys. The Proposed Action is not projected to impact groundwater quality or quantities in Ruby Valley; thus no cumulative impacts to groundwater in that valley would occur. Cumulative impacts associated with Huntington Valley, where under the Proposed Action additional groundwater would be withdrawn, are expected to be minimal because there are no other groundwater users within five miles of the existing groundwater wells and the aquifer utilized for existing BMM wells is a large, unconfined alluvial system. In addition, no significant decreases in the groundwater levels have been observed at the BMM wells since they were drilled, and the calculated zones of depression, based on the assumptions in Section 4.2.1, do not impact any other water users.

The level of impacts from the current BMM and Mooney Basin Operations Area are discussed in Section 3.2. The impacts to groundwater due to mining from other identified projects are not known at this time as many of these projects are still in the exploration and planning phases and may or may not go forward toward development. If other mining projects do proceed to the operation phase, additional groundwater resources would be used. This would result in impacts to the basin from which the groundwater is withdrawn. It is likely that groundwater use from additional mining projects would occur in the two undesignated basins of Long Valley and Newark Valley and that these other operations would be smaller than the Proposed Action, thus requiring less water for operations. The proposed withdrawal rate of 550 acre-feet per year combined with the additional use from these mining operations would result in minimal cumulative impacts to the groundwater quality since the foreseeable mining operations are much smaller than the Proposed Action.

NEPA compliance would be required for all proposed future actions, and NEPA compliance would address direct, indirect, and cumulative impacts to groundwater quality and quantity. All future mining operations would also be required to comply with state and federal regulations; therefore, impacts from contaminants to groundwater quality would not be likely to occur. Increases in groundwater pumping, in addition to what is proposed by BMM, are unknown at this time.

4.2.4 Cumulative Impacts Conclusion

Surface Water

Based on current knowledge of projects within the water resources cumulative effects study area, the cumulative impact to seeps and springs would be minimal with the addition of the Proposed Action. Most of the impacts to seeps or springs by past, present, and future actions would be localized to disturbed areas and limited to the life of each project. Most projects are required to follow Best Management Practices developed by state, federal, and private companies so impacts to surface water from past, present, and reasonably foreseeable actions would be minimized with the use of Best Management Practices.

Groundwater

Cumulative effects to groundwater in the cumulative effects study area would consist of increased groundwater withdrawals from wells. Effects from wind energy projects, power line projects, or fuels treatment projects would be negligible since they would not intercept the water table. Surface disturbance actions within the cumulative effects study area are listed in Table 4-1. Minimal cumulative impacts to the groundwater are anticipated.

4.2.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Surface Water

Alternative A would decrease disturbance associated with the BMM since some of the waste rock would be placed in the open pits. Cumulative impacts to surface water resources would be reduced since there would be less surface disturbance and less potential for surface erosion. Cumulative impacts associated with Alternative B would be the same as with the Proposed Action. The movement of the heap leach pad would have no varying impacts on the surface water resources. Under the No Action Alternative, cumulative impacts to the cumulative effects study area would not exceed those already authorized.

Groundwater

Alternative A would decrease disturbance associated with the BMM since some of the waste rock would be placed in the open pits. Cumulative impacts to groundwater resources would be the same as with the Proposed Action since the level of production would remain the same. Under Alternative B, movement of the heap leach pad would result in a larger amount of ore being processed at the 2/3 Heap Leach Pad. Since the Mooney Basin Heap Leach Pad is located in Long Valley, cumulative impacts to groundwater resources in Long Valley would be less under Alternative B. Cumulative impacts under the No Action Alternative would not exceed those already authorized.

4.3 Geology and Minerals

4.3.1 Geographic Area for Analysis

The cumulative effects study area for the geology and minerals resource is shown in Figure 4-1 and includes the southern end of the Ruby Mountains. The cumulative effects study area was chosen to represent the local geologic environment. The southern Ruby Mountains were chosen because the geology is very similar throughout. The valleys were chosen to be the boundaries because Basin and Range faulting has created a significant change in the geology visible at the surface and in the areas below the surface that would be impacted by the Proposed Action and the other included projects. The geologic setting is discussed in Section 3.3. The geology and minerals resource cumulative effects study area includes approximately 199,258 acres.

4.3.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Past projects within the geology and minerals cumulative effects study area have disturbed approximately 1,568 acres, and present projects within the cumulative effects study area boundary have disturbed approximately 4,435 acres (Table 4-1). Reasonably foreseeable future actions are expected to disturb approximately 4,923 acres. Future actions include the Proposed Action, wind energy projects, Alligator Ridge Mine, Yankee Mine, and oil and gas wells. The only projects anticipated having impacts to the geology and minerals are the mining and oil and gas projects. The other projects are not anticipated to impact geologic and mineral resources.

The contribution of the Proposed Action to cumulative effects on geology and mineral resources would be the removal of approximately 200 million tons of ore and 830 million tons of waste rock. Waste rock would be placed in areas where it would not impede future access to mineral resources. The other foreseeable future mining projects are small in comparison with the Proposed Action. The foreseeable future actions operated by Barrick are currently in exploration, and the amounts of ore and waste to be mined are not known at this time. Future oil and gas wells would impact geology by removing oil and gas resources but would not affect precious metals resources.

4.3.3 Cumulative Impacts Conclusion

The cumulative effects anticipated in the cumulative effects study area for geology and minerals would be the removal of ore resources. The Proposed Action would add cumulatively to the ore being removed throughout the cumulative effects area and would contribute to the location and possible extraction of additional ore resources in the future.

4.3.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Alternative A would involve partial backfilling of up to six open pits. This would lead to less surface disturbance and the potential to limit future access to economic resources. The proposed pit configurations are based on current market conditions. Future market conditions may make it possible to process ore that is currently not profitable. By backfilling the pits, the ore would be unavailable for future mining without significant expense. Alternative B would require processing of some of the ore at another location. The extent of mining would be the same, and the cumulative impacts to the geologic and minerals resources would also be the same. Under the No Action Alternative, mining would end in 2009 and there would be no impacts other than those already authorized.

4.4 Paleontology

4.4.1 Geographic Area for Analysis

The cumulative effects study area for paleontology is the same as the cumulative effects study area for geology since the paleontological resources are linked to certain geologic formations.

4.4.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Fossils associated with the cumulative effects study area are abundant, and none have been classified as rare or important. Contingency measures to be implemented in the event of unexpected discoveries of potentially valuable paleontological resources in the Proposed Action area are contained in Section 3.4. The Proposed Action, past, present, and foreseeable future actions are therefore unlikely to contribute to cumulative impacts to paleontological resources.

4.4.3 Cumulative Impacts Conclusion

Because no rare and important paleontological resources are known to be present in the Proposed Action area, and because contingency plans are in place in the event that any are discovered, the actions are not likely to contribute to cumulative impacts to paleontological resources.

4.4.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be a slight reduction in the potential to impact paleontological resources under the two action alternatives because of less ground disturbance. Under the No Action Alternative there would be no impacts other than those already authorized.

4.5 Soils

4.5.1 Geographic Area for Analysis

The cumulative effects study area boundary for soil resources is 2,070,965 acres and encompasses four hydrographic basins, as described in Section 4.2. Based on Natural Resources Conservation Service Soil Surveys, approximately 400 soil associations occur within western White Pine County, approximately 500 soil associations occur within Elko County, and approximately 370 associations occur within the soil resource cumulative effects study area. The physical and chemical properties of the soils that occur within the cumulative effects study area boundary are discussed in detail in the Soil Surveys of White Pine and Elko counties. The location and extent of each soil association is illustrated on the orthographic base maps included in the soil surveys.

4.5.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the soils cumulative effects study area from past actions total 2,800 acres, the impact from present actions totals 5,017 acres, and the impact from reasonably foreseeable future actions totals 6,005 acres. Many of the past projects are in various stages of reclamation; present and reasonably foreseeable future project disturbance is also likely to be reclaimed in full or in part. Natural processes that could impact soil resources within the cumulative effects study area include wildland fire, the spread of forest insects and diseases, and the spread of non-native invasive weeds. Past wildland fire activities has impacted approximately 13,208 acres or 0.6 percent of the cumulative effects study area.

Ground disturbance can affect soils by removing them from productive use as a result of burying or excavating them and by altering infiltration and erosion as a result of compaction or changes in topography. Disturbed soils can increase both wind and water erosion and are more susceptible to establishment of non-native invasive weeds. These potential impacts can be reduced by reclaiming disturbed areas and restoring them to productive use. The Proposed Action would contribute to cumulative effects on soils by disturbing approximately 3,920 acres. Impacts would be minimized by stockpiling soil and reclaiming disturbed areas as discussed in Chapter 2.

There is the potential for process chemicals, fuel, and waste materials to be accidentally released during transport within the cumulative assessment area, resulting in a cumulative impact to soils. The probability and impacts of such a release is discussed in Section 4.19.

4.5.3 Cumulative Impacts Conclusion

Existing, proposed, and reasonably foreseeable actions within the cumulative impacts area total approximately 13,822 acres of disturbance, or about 0.7 percent of the analysis area. Additional

impacts to soils have occurred as a result of natural processes that are likely to continue into the future. The Proposed Action would add to cumulative impacts by disturbing approximately 3,920 acres; however, disturbed soils would be reclaimed in most cases of permitted projects unless permanent structures and developments occur. Over time, disturbed soils from natural events such as fires will recover and become productive. Cumulative impacts to soils would be minimal.

4.5.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Alternative A would reduce disturbance by approximately 434 acres and Alternative B would reduce disturbance by approximately 105 acres compared with the Proposed Action, resulting in a proportional decrease in impacts to soils. Under the No Action Alternative there would be no contribution to cumulative impacts to soils other than those previously authorized.

4.6 Vegetation Resources

4.6.1 Geographic Area for Analysis

The cumulative effects study area boundary for vegetation resources encompasses the four hydrographic basins as identified under the water resources and soil cumulative effects study areas. Watershed boundaries are appropriate to use because watersheds can influence regional vegetation. In addition, the BLM Ely District currently manages resources by watershed.

Plant and soil interrelationships are such that characteristics of one would intimately affect the characteristics of the other (i.e., composition and structure) over time. This being the case, they should be treated at the same scale. Therefore, the same boundary is used for both vegetation and soils cumulative effects study areas.

The cumulative effects study area for vegetation includes approximately 2,070,965 acres. Impacts to vegetation within the cumulative effects study area result from mining, other industrial activities, increased traffic, maintenance of existing roads, grazing, and wildland fires.

The information used to compile vegetation communities within the cumulative effects study area was taken from data collected for the Southwest Regional Gap Analysis Program (USGS, 2005b). The gap data were broken down into several detailed community types. For this analysis, the gap community types were grouped into the 11 community types listed below and in Table 4-3. Gap data were also used to compile invasive and non-native species and are discussed in Section 4.7.3.

The pinyon-juniper woodland community, big sagebrush community, and low sagebrush community (combined here as the sagebrush community) and the mountain brush community are discussed in Section 3.6, and the wetland/riparian community is discussed in Section 3.9. The largest vegetation community components of the cumulative effects study area are the pinyon-juniper community (16.0 percent) and the sagebrush community (60.5 percent) (Table 4-3).

The conifer woodland vegetation community type typically occurs between 4,000 and 12,000 feet above mean sea level. This vegetation community type can consist of a mixture of limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorta*), ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), fir (*Abies* spp.), spruce (*Picea* spp.), pinyon pine (*Pinus monophylla*), and juniper (*Juniperus osteosperma*) in the overstory. Common understory plants include serviceberry (*Amelanchier alnifolia*), chokecherry

(*Prunus virginiana*), snowberry (*Symphoricarpos albus*), Woods' rose (*Rosa woodsii*), blue wildrye (*Elymus glaucus*), bluegrass (*Poa* sp.), needlegrass (*Achnatherum* spp.), needle and thread grass (*Hesperostipa comata*), yarrow (*Achillea millefolium*), and aster (*Aster* spp.)

TABLE 4-3 VEGETATION COMMUNITY TYPES WITHIN THE CUMULATIVE EFFECTS STUDY AREA

CATEGORY	ACREAGE WITHIN THE CUMULATIVE EFFECTS STUDY AREA	PERCENT OF CUMULATIVE EFFECTS STUDY AREA
Conifer woodland	34,090	1.6
Pinyon/Juniper Woodland	329,994	16.0
Mountain Brush	15,463	0.7
Sagebrush	1,253,349	60.5
Desert scrub	242,652	11.9
Grasslands	52,122	2.5
Riparian/Wetland/Meadow*	36,028	1.7
Agriculture	8,343	0.4
Non-Native Invasive Species	52,145	2.5
Water	2,491	0.1
Barren	44,288	2.1
Total	2,070,965	100

* Discussed further in Section 4.9.

The mountain brush vegetation type typically occurs between 2,000 and 9,000 feet above mean sea level. This vegetation community type includes woodlands and shrublands dominated by mountain mahogany (*Cercocarpus ledifolius*), mountain big sagebrush, and antelope bitterbrush (*Purshia tridentata*). Other species common within this vegetation type include manzanita (*Arctostaphylos*), currant (*Ribes*), snowberry, and scattered pinyon and juniper.

The desert scrub community type is found at elevations between 5,900 and 6,400 feet above mean sea level. Dominant plants found within this community include rabbitbrush (*Chrysothamnus nauseosus*), iodinebush (*Allenrolfea occidentalis*), shadscale (*Atriplex confertifolia*), black greasewood (*Sarcobatus vermiculatus*), alkali sacaton (*Sporobolus airoides*), inland saltgrass (*Distichlis spicata*), winterfat (*Ceratoides lanata*), bud sagebrush (*Artemisia spinescens*), black sagebrush (*Artemisia arbuscula*, var. *nova*), ephedra (*Ephedra nevadensis*), fourwing saltbush (*Atriplex canescens*), snakeweed (*Gutierrezia sarothrae*), Indian ricegrass (*Oryzopsis hymenoides*), bottlebrush squirreltail, Sandberg's bluegrass, needle and thread grass, buckwheat, phlox (*Phlox*), and globemallow (*Sphaeralcea* sp.). Winterfat can be dominant in this community type.

The grassland vegetation type typically occurs at elevations of 4,750 to 7,600 feet. This vegetation type is dominated by perennial bunchgrasses and drought-resistant shrubs. Indian ricegrass and needle and thread grass are the dominant species with scattered shrubs such as sagebrush, shadscale, snakeweed, winterfat, and ephedra species also present (USGS, 2005).

The agriculture community type includes all land being actively tilled, pasture land, areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, and areas used for the production of annual crops (USGS, 2005b).

The non-native invasive species vegetation type includes areas that are dominated by introduced annual and/or biennial grass and forb species such as halogeton (*Halogeton glomeratus*), kochia (*Kochia scoparia*), Russian thistle, cheatgrass, Canada thistle, bull thistle,

pepperweed (*Lepidium* spp.), and Scotch thistle (USGS, 2005b). Non-native invasive species are discussed further in Section 4.7.

Water areas are covered or inundated with standing water with less than 25 percent cover by soil or vegetation (USGS, 2005b).

Barren areas are dominated by bare ground with less than 10 percent vegetative cover. Barren areas within the cumulative effects study area include bedrock, scree, cliffs, washes, playas, sand dunes, and mined and quarried areas (USGS, 2005b).

4.6.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The great majority of interrelated projects in Table 4-1 have associated ground disturbance that would impact vegetation. The combination of the Proposed Action as well as past, present, and reasonably foreseeable future actions would impact a total of 13,822 acres (or 0.7 percent) of vegetation community types within the cumulative effects study area. The majority of the area disturbed would be revegetated once the projects have been completed, and a portion of past disturbance has already been successfully revegetated. However, these areas are not always revegetated with the same species that were previously established, possibly changing the number and diversity of plant species. Some vegetation community types such as pinyon-juniper woodland could take decades to recover, or they may be permanently changed to other community types such as sagebrush or grassland.

Wildland fires have burned approximately 13,208 acres within the vegetation cumulative effects study area in the last eight years. This represents approximately 0.6 percent of the vegetation cumulative effects study area. Exacerbating the problem is that burned areas typically are invaded by non-native invasive species that can alter the fire regime. The trend appears to be toward increasing numbers of fires of greater intensity.

The Proposed Action would contribute to cumulative effects on vegetation, mainly by disturbance of up to 3,920 acres. Most of this disturbance would be temporary because all but the pit expansions would be reclaimed. Projects on public land generally incorporate measures to identify special status species and avoid or mitigate impacts to the extent possible. Because the Proposed Action would not impact any special status species or potential habitat, no contribution to cumulative impacts on special status species is anticipated.

4.6.3 Cumulative Impacts Conclusion

Impacts from past, present, and reasonably foreseeable future activities within the cumulative effects study area including the Proposed Action would be a loss of vegetation during disturbance and a potential increase in non-native invasive species as discussed in Section 4.7. The described past, present, and reasonably foreseeable future activities would impact approximately 0.7 percent of the vegetation within the cumulative effects study area. The majority of this land would be reclaimed, resulting in reduced cumulative impacts to vegetation. Reclaimed areas would differ in species composition for a number of years, and sometimes permanently as compared with initial conditions.

4.6.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only minor differences in cumulative effects to vegetation under either of the two action alternatives because of the small reduction in ground disturbance. There would be no contribution to cumulative effects under the No Action Alternative other than those already authorized.

4.7 Non-Native Invasive Species

4.7.1 Geographic Area for Analysis

The non-native invasive species cumulative effects study area, which shares the same boundary as vegetation resources, includes the four hydrographic basins surrounding the project area. Weeds do not stop at fence lines, at property lines, at county borders, or when the soil type changes. Weeds move along several vectors, the most common ones being roads, human activity, and water flow. The boundaries of the watersheds encompass these vectors around the project area, and the likelihood of non-native invasive species moving outside of those boundaries is more limited.

4.7.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Land-disturbing and transportation activities within the cumulative effects study area that can increase chances of spreading existing non-native invasive species (including noxious weeds) populations include mining and other ground-disturbing activities, increased traffic, maintenance of existing roads, grazing, recreation, and wildland fires (Table 4-1). Previously disturbed areas within the cumulative effects study area create the potential for non-native invasive species to spread. Noxious weed species in the cumulative effects study area are found along roadways, drainages, and disturbed areas. The distribution of non-native invasive species around the Proposed Action area is shown in Figure 3-11. Non-native invasive and noxious weed species mapped within the cumulative effects study area include black henbane, bull thistle, Canada thistle, hoary cress, leafy spurge (*Euphorbia esula*), musk thistle, poison hemlock (*Conium maculatum*), Russian knapweed (*Acroptilon repens*), salt cedar (*Tamarix* spp.), Scotch thistle, spotted knapweed, diffuse knapweed (*Centaurea diffusa*), tall whitetop (*Lepidium latifolium*), and water hemlock (*Cicuta maculata*). Other non-native invasive species that probably occur within the cumulative effects study area that have not been mapped include halogeton, kochia, Russian thistle, and cheatgrass. Approximately 52,145 acres, or 2.5 percent, of the cumulative effects study area contain some level of non-native invasive species infestation to the extent that they were identifiable in the gap information (USGS, 2005b).

Impacts from past activities have facilitated the spread of noxious species, especially along transportation routes, drainages, and disturbed areas. Because many activities that occur within the cumulative effects study area do not implement an invasive and non-native noxious weed management plan, establishment of these species is likely to continue in the watersheds.

Impacts from other non-native invasive species would be realized through the Proposed Action and other interrelated action within the cumulative effects study area. These species, such as cheatgrass, readily establish in disturbed and burned areas. Past disturbed and burned areas throughout the cumulative effects study area have created an opportunity for these invasive species to spread.

4.7.3 Cumulative Impacts Conclusion

Establishment of non-native, invasive species would likely occur under the Proposed Action and other interrelated projects. However, the spread of noxious weeds would be minimized through Best Management Practices required for most permitted activities.

These impacts would be realized through the spread of invasive species due to an increase in transportation from project areas, combined with recreation and other activities within the cumulative effects study area. Natural processes such as wildland fire have the potential to disturb large areas, contributing to the opportunity for new non-native invasive species infestations throughout the burned areas. Any increase in human activity within a region will usually result in the opportunity to spread noxious weeds. However, there is also an increased

awareness to implement Best Management Practices and reclamation criteria to control their spread which can help minimize the cumulative effect.

4.7.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only inconsequential differences in cumulative effects from non-native invasive species under either of the two action alternatives. The No Action Alternative would reduce potential total disturbance by 3,920 acres, thereby reducing the area susceptible to non-native invasive species invasion.

4.8 Wildlife, Migratory Birds, and Special Status Animal Species

4.8.1 Geographic Area for Analysis

The cumulative effects study area for wildlife, migratory birds, and special status animals encompasses NDOW Big Game Hunt Units 102, 103, and 108 of Management Area 10. These units include migration corridors and winter range areas for mule deer and habitat for elk that could be affected by the project. The area also includes portions of the hydrographic basin that encompasses the Ruby Lake National Wildlife Refuge. The wildlife cumulative effects study area encompasses approximately 1,794,903 acres (Figure 4-1).

4.8.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the wildlife cumulative effects study area from past actions is 2,890 acres; the impacts from present actions is 4,941 acres; and the impacts from reasonably foreseeable future actions is 4,929 acres. The total disturbance from these projects (12,760 acres) is less than one percent of the study area. The wildlife habitats affected are those typically found at low to middle elevations, mainly a mix of big sagebrush and pinyon-juniper vegetation types. Many of the past projects are in various stages of reclamation; present and reasonably foreseeable future project disturbance is also likely to be reclaimed in full or in part. Natural processes that could impact wildlife resources within the cumulative effects study area include wildland fire, the spread of forest insects and diseases, pinyon and juniper encroachment into sagebrush habitats, and the spread of non-native invasive weeds.

Wildland fires have affected approximately 13,097 acres (0.7 percent) of the wildlife study area in the past eight years. Fires have occurred in the northwestern and northeastern portions of the project area and lands north of Cherry Spring. Affected habitats include pinyon-juniper woodland and smaller amounts of big sagebrush.

It could take decades for disturbed pinyon-juniper woodland habitat to be restored to pre-disturbance condition, a process that is uncertain because it can be altered by management actions, fire, and other factors. Reclamation would initially establish shrubland and grass habitats that could benefit mule deer, sage-grouse, sage thrashers, and Brewer's sparrows. Other species such as juniper titmice, blue-gray gnatcatchers, plumbeous vireos, and black-throated gray warblers would be affected by the loss of pinyon-juniper woodland. In addition to loss of habitat, past, present, and reasonably foreseeable future actions could affect wildlife species by displacement because of the presence of humans, direct mortality from vehicle collisions, and interference with migration routes.

Potential impacts of the Proposed Action to wildlife, migratory birds, and special status species are discussed in detail in Section 3.8. The primary contribution of the Proposed Action to cumulative effects would result from disturbing approximately 3,920 acres of sagebrush and pinyon-juniper habitat. Not all of this area would be disturbed at one time, and reclamation

would be implemented in stages, reducing the potential impact. The reclamation process would likely result in at least a temporary change in plant species composition, particularly in the case of pinyon-juniper woodland. The proposed disturbance is a small proportion of the study area, and vast amounts of similar wildlife habitat would remain on adjacent public land.

Projects on public land generally incorporate measures to prevent the destruction of active migratory bird nests, eggs, and/or young. Under the Proposed Action these impacts would be avoided by performing land-clearing activities outside of the avian breeding season. In the event that surface disturbance must take place during the avian breeding season, a qualified wildlife biologist would survey the areas of proposed disturbance immediately prior to the disturbance. Consistent with current practice, if active nests or evidence of nesting is found or observed, a buffer zone would be established around the nest area to prevent the destruction or disturbance of nests until young have fledged. The Proposed Action would therefore have a minimal impact on migratory birds.

The increase in traffic to and from the mine by employees and deliveries of materials and equipment could have cumulative impacts on wildlife by increasing the risk of injury and mortality by collisions with vehicles. In addition, the Proposed Action could interfere with wildlife migration, particularly mule deer. Proposed Design Features described Table 2-13 would minimize this potential impact.

The contribution of the Proposed Action to cumulative impacts on special status species would be minimal, as described in Section 3.8.6.

4.8.3 Cumulative Impacts Conclusion

Cumulative impacts to wildlife, including migratory birds, and special status species, occur primarily through the disruption of habitat. Many of the projects would have a temporary impact that would last until the disturbed land has been reclaimed. Cumulative impacts would result from the presence of humans, potential interference with migratory movements, and the increased risk of injury and mortality from vehicle collisions. The change in cumulative impacts to wildlife with the addition of the Proposed Action is small, especially since state and federal permitted activities within the cumulative effects area are required to minimize and mitigate any potential effects.

4.8.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

The Partial Backfill Alternative would reduce impacts resulting from the Proposed Action by approximately 434 acres (less than 1 percent of the wildlife cumulative effects study area). This would be a minor decrease in loss of habitat and the amount of wildlife displacement that could occur. The Mooney Basin Heap Leach Pad Alternative would reduce impacts by approximately 105 acres compared with the Proposed Action. Under the No Action Alternative there would be no contribution to cumulative effects other than those already authorized.

4.9 Wetlands, Riparian Zones, Waters of the U.S.

4.9.1 Assumptions for Analysis

The following assumption is made for analysis for the cumulative effects to wetland, riparian zones, and waters of the U.S.:

- The U.S. Army Corps of Engineers would concur with the findings of the waters of the U.S. delineation, which found that drainages in the project area are isolated and do not share a significant commerce connection with identified waters of the U.S. (JBR, 2008).

4.9.2 Geographic Area for Analysis

The 2,070,965-acre cumulative effects study area for wetlands, riparian zones, and waters of the U.S. is the same as that for water resources and was chosen for the same reasons as those provided in Section 4.2.2.

Wetlands and riparian zones are limited and represent important habitats in the xeric environment of the Great Basin. Few wetlands (none of which are under the jurisdiction of the U.S. Army Corps of Engineers) and no riparian areas are found in the Proposed Action area, but large wetland areas exist at the Ruby Lake Marshes in Ruby Valley, northeast of the Proposed Action area. Relatively large wetland and open water areas also exist in Newark Valley southwest of the Proposed Action area. Huntington Creek is a perennial stream located northwest of the Proposed Action area. Long Valley, to the southeast, supports limited areas of perennial waters or riparian areas (a short reach of Long Valley Slough, east of Long Valley Road, is mapped as a perennial water). Tetra Tech (2007) surveyed springs in and near the survey area and farther south in the Ruby Mountains. These surveys included sites along the west edge of the Ruby Mountains in eastern Newark Valley, two springs on the western side of Newark Valley, and several springs east of the project area in the Maverick Springs Range. While not included in the Tetra Tech surveys, a number of springs, some supporting perennial streams, are located farther north in the Ruby Mountains, north of Overland Pass.

4.9.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Most of the interrelated actions in the cumulative effects study area are either fully or partially on public land. In recognition of the special value of streams and wetlands, land use authorizations for such projects typically include measures to identify, avoid, and mitigate impacts to wetlands, riparian areas, and waters of the U.S. The Proposed Action would not contribute to cumulative effects on wetlands because disturbance to the few wetlands in the Proposed Action area would be avoided.

4.9.4 Cumulative Impacts Conclusion

The Proposed Action would not contribute to cumulative impacts on wetlands, riparian zones, or waters of the U.S. Future actions might have the potential to impact wetlands, riparian zones, or waters of the U.S.; however, these actions cannot be quantified due to the lack of descriptive data for each project. All future projects on public lands would be evaluated on an individual basis.

4.9.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be no impact to wetlands, riparian zones, or waters of the U.S. under either of the action alternatives. Under the No Action Alternative there would be no impacts other than those already authorized.

4.10 Range Resources

4.10.1 Geographic Area for Analysis

The cumulative effects study area for range resources encompasses the Warm Springs grazing allotment. This boundary was selected because all the range resources affected by the Proposed Action fall within this boundary and because range resources are managed on an

allotment basis. The area of the range resource cumulative effects study area is approximately 356,666 acres.

4.10.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the range resources cumulative effects study area from past actions totals 1,636 acres; the impact from present actions totals 4,385 acres; and the impact from reasonably foreseeable future actions totals 4,923 acres. Based on these numbers of disturbed acreages, a maximum reduction of 278 animal unit months would result, based on an average stocking rate of 40 acres per animal unit month. This reduction assumes that none of the past or present disturbances have been reclaimed, but many of the past projects are in various stages of reclamation; present and reasonably foreseeable future disturbance is also likely to be reclaimed in full or in part. In addition to these actions, the study area has been affected by natural processes such as wildland fire, expansion of pinyon and juniper trees into range habitat, spread of non-native/invasive weeds, and spread of forest insects and disease. These natural processes are likely to continue into the future.

The contribution of the Proposed Action to cumulative effects on grazing would be an additional 3,920 acres of disturbance. Based on an average stocking rate of 40 acres per animal unit month, this much disturbance at one time could result in a reduction of 98 animal unit months. However, disturbed areas are proposed to be reclaimed in stages, reducing the impact on grazing. As disturbed land is reclaimed it would be re-evaluated to determine productivity, and the stocking level would be adjusted as necessary. Only the approximately 540 acres of pit expansion that would not be reclaimed would cause a permanent loss of grazing land.

4.10.3 Cumulative Impacts Conclusion

The Proposed Action combined with the other past, present, and future projects, would contribute to cumulative impacts by reducing available Animal Unit Months. However, many projects within the cumulative effects study area are temporary and would require reclamation. Past, present, and future actions would result in a temporary loss of a maximum of 278 animal unit months within the 356,666 acre cumulative effects study area. There would be some permanent loss of Animal Unit Months. Fires reduce the available Animal Unit Months most significantly compared to most project proposals, and this loss is also of a temporary nature. At the conclusion of some projects, such as mining, more Animal Unit Months will be available in sites that had restricted access, but a small permanent loss would occur with open pits that were not reclaimed. However, this could be offset by increased grazing opportunities through reclamation and a change in vegetation type from woodland to more grasses and forbs. Overall, the cumulative impact on grazing is minimal.

4.10.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

The reduction in ground disturbance under either of the two action alternatives would result in a proportional reduction in cumulative impacts to range resources. The reduction would likely be inconsequential considering the size of the cumulative effects study area. With the No Action Alternative there would be no impact on range resources other than those already authorized.

4.11 Wild Horses

4.11.1 Geographic Area for Analysis

The cumulative effects study area for wild horses consists of the Triple B Herd Management Area. The Herd Management Area boundary encompasses approximately 1,233,000 acres, including the majority of the project area.

4.11.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the wild horses cumulative effects study area from past actions totals 2,566 acres; the impact from present actions totals 4,941 acres; and the impact from reasonably foreseeable future actions totals 6,037 acres. Many of the past projects are in various stages of reclamation; present and reasonable foreseeable project disturbance is also likely to be reclaimed in full or in part. Based on the amount of range available to wild horses and continued management by the BLM to control the numbers of wild horses, cumulative impacts to wild horses would be negligible. Although rare, mortalities to wild horses could also occur from collisions with vehicle.

The study area has also been affected by natural processes such as wildland fire, expansion of pinyon and juniper trees into range habitat, spread of non-native/invasive weeds, and spread of forest insects and disease. These natural processes are likely to continue into the future.

4.11.3 Cumulative Impacts Conclusion

Past, present, and reasonably foreseeable future actions would potentially affect 13,544 acres of habitat, or about 1.1 percent of the Herd Management Area. However, most of the disturbance would be reclaimed and range productivity would be restored. For the most part, the impacts would be temporary. There would be some permanent loss of forage due to open pits and permanent structures. The 3,920 acres of disturbance that would result from the Proposed Action is only 0.3 percent of the Herd Management Area. With reclamation of disturbed areas, the contribution of the Proposed Action to cumulative effects on wild horses would be negligible.

4.11.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only minor differences in impacts to wild horses under either of the two action alternatives because of a small reduction in total disturbance. With the No Action Alternative there would be no effects on wild horses other than those already authorized.

4.12 Land Use and Access

4.12.1 Geographic Area for Analysis

The cumulative effects study area for Land Use and Access encompasses 317,038 acres of the south Ruby Mountains and portions of Huntington Valley, Newark Valley, and Long Valley (Figure 4-1). The land use and access study area boundary includes the major access routes to the project area. This boundary follows State Route 892 to the east, Long Valley Road to the west, Harrison Pass to the north, and Buck Pass to the south. These routes would most likely be used for access to the area.

4.12.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Land use in the cumulative effects study area consists mainly of ranching, mining, recreation, and wildlife habitat. The past, present, and reasonably foreseeable future actions in the cumulative effects study area (described in Table 4-1) are most likely to impact Land Use and Access by disturbing rangeland and wildlife habitat, increasing traffic on the major access routes, and restricting public access. Total estimated surface disturbance in the cumulative effects study area is approximately 10,594 acres (3.3 percent). Mining-related projects have the greatest potential impact because they restrict access for incompatible uses such as grazing and recreation. Restricted access to mining areas continues until active mining ceases and reclamation is complete. The amount of land with restricted access as a result of mining varies

with each project, depending on the area currently being used for operations and the area in various stages of reclamation.

The Proposed Action would contribute to cumulative effects on land use and access by disturbing approximately 3,920 acres (1.2 percent of the study area), restricting public access to active mining areas, potentially interfering with other BLM land use authorizations, and increasing traffic on public roads. Road impacts would be partially offset by maintenance performed by Barrick during the life of the mine. It is anticipated that any conflicts with other BLM land use authorizations could be resolved by negotiation. The effects of land disturbance would be mostly temporary, lasting until reclamation is complete. Approximately 540 acres of pit expansion would not be reclaimed, resulting in permanent loss.

4.12.3 Cumulative Impacts Conclusion

The contribution of the Proposed Action to the cumulative effects of land use and access is noticeable, but temporary for the most part. Following reclamation, some features within the cumulative effects study area, such as open pits, could change land use and access long-term. For example, the open pits would be equipped with berms and warning signs to provide for public safety and limit access, while still being within an area open to grazing, wildlife use, and hunting. The type of recreational experience may change with the added attraction (for some) of viewing open pits rather than a pristine environment. Wildlife use may change favoring those that can make use of the cliffs within the pit and slightly displacing other wildlife species. With the exception of these types of changes, cumulative impacts to land use and access would be temporary and minimal in the long-term.

4.12.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only inconsequential differences in cumulative effects to Land Use and Access under either of the two action alternatives. There would be no contribution to cumulative impacts to land use and access under the No Action Alternative other than those already authorized.

4.13 Recreation

4.13.1 Geographic Area for Analysis

The cumulative effects study area for recreation encompasses 317,038 acres of the south Ruby Mountains and portions of Huntington Valley, Newark Valley, and Long Valley (Figure 4-1) and is the same as the land use and access cumulative effects study area. The area within the cumulative effects study area is bounded by the major transportation routes that would be used to access the area surrounding the project area for recreation.

4.13.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Recreational resources in the cumulative effects study area include the Pony Express Trail and the Ruby Mountain Ranger District. Hunting, hiking, and off-road vehicle use are the dominant recreational activities in the cumulative effects study area. Off-road vehicle use in eastern Nevada has been increasing rapidly because of increasing population size and closure of other sensitive areas (BLM, 2007b). The effects of past, present, and reasonably foreseeable future actions on recreation in the cumulative effects study area (described in Table 4-1) result mainly from restricted access as a result of mining-related projects. Public access to mines must be restricted for safety reasons as long as the mines are in operation. Notices of intent and oil and gas projects could also affect recreation although they are probably less important than mining projects because of the smaller area involved. Approximately 9,594 acres of land could be

removed from access for public recreational purposes as a result of present and reasonably foreseeable future actions. For the most part the impacts would be temporary for all but unreclaimed pits that would remain inaccessible for recreation. Hunting could be affected indirectly as a result of cumulative impacts to game animal habitat and movement patterns.

The Proposed Action would contribute to cumulative effects on recreation by restricting access to active mining areas. Even if the entire 3,920 acres were restricted, only 1.2 percent of the cumulative effects study area would be affected by the Proposed Action, and the effect would be temporary. Increased traffic on public roads is not anticipated to affect access to public lands for recreation. Indirect effects on game animals are unlikely to have a measurable effect on hunting.

4.13.3 Cumulative Impacts Conclusion

The cumulative effects on recreation in the study area would be minimal and temporary for most projects, except for permanent loss of pit expansion acreage that is not reclaimed. The pits may in themselves become a recreational viewing area. The principal impact on recreation would result from those projects that restrict access to recreational users of public lands. Hunting is currently among the most prevalent recreational activity within the cumulative effect study area. The impact of increased traffic and indirect effects on game animals should be minimal.

4.13.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only negligible differences in impacts to recreation under either of the two action alternatives. Under the No Action Alternative there would be no impact on recreation other than already authorized.

4.14 Air Quality

4.14.1 Geographic Area for Analysis

The cumulative effects study area for air quality encompasses four hydrographic basins: Huntington Valley Basin (Basin Number 47); and Central Region, Newark Valley Basin (154), Long Valley Basin (175), and Ruby Valley Basin (176). These four basins cover an area of approximately 2,070,965 acres. The cumulative effects study area for air incorporates natural watershed and air quality boundaries associated with the proposed project.

4.14.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions Industrial Activity within the Cumulative Effects Study Area

Historic development, as documented in Table 4-1, includes fairly extensive mining or mineral exploration activity including at least a dozen identified mining or exploration projects. Other historic projects include limited oil and gas well development, several gravel pits, the U.S. Highway 50 corridor, and the Falcon to Gonder Power Line. Those projects accounted for approximately 2,800 acres of disturbed ground. Historic vegetation management efforts included grazing and limited prescribed burning.

Currently, the only operating mine in the cumulative effects study area other than those included in the BMM Proposed Action is the Little Bald project. There is also exploration occurring around the proposed BMM and the Little Bald project. One oil and gas well field is operational, and the Silver State Fiber Optic Line is being developed through the cumulative effects study area. Disturbance within the cumulative effects study area from the present actions is approximately 5,017 acres. Of that total, 4,165 acres are associated with the BMM and Mooney Basin Operations Area activities. Most of the described activity, with the exception of the oil and

gas development and the fiber optic line (85 acres of disturbance), occur in higher elevations above residential areas. Land management agencies maintain grazing programs with the goal of maintaining vegetation integrity, which can help minimize dust generation. The agencies are becoming more aggressive in using prescribed fires as a land management tool.

Foreseeable activity in the cumulative effects study area is presented in Table 4-1 and discussed in the sections that follow. Most activities, with the exception of gravel pits and potential oil and gas development, are or would be at elevations well above the valleys where sensitive receptors (human residences) are located. Disturbance within the cumulative effects study area associated with other mines and potential wind energy projects, in combination with potential ground disturbance from the Proposed Action for the reasonably foreseeable future, would be approximately 6,005 acres. Disturbed ground would allow the wind to lift and transport fugitive dust. The mining activities would also generate fugitive dust from material transport and storage efforts during their operational life spans. Reclamation to minimize wind erosion and disturbed ground would be expected after the operational life span of each project. Because these activities would generally occur at higher elevations than sensitive receptors and dust generation volumes would be small compared with the distance to sensitive receptors, the cumulative impact of the high elevation operations, including the proposed project, would be expected to be mostly minor in areas of public activity or exposure. Ground disturbance in the lower elevations associated with utility corridors and other listed ground disturbances increase soil wind erosion and would continue to do so in the future until reclamation is successful. The impacts are typically localized and minor for all but the largest areas of disturbance, which tend to be away from areas of regular human activity. Past, present, and reasonably foreseeable gravel production generates dust that could lead to moderate impacts in the immediate vicinity. Those activities are generally at lower elevations, preferably sited away from sensitive receptors including residences and areas of regular human activity.

Air quality modeling was performed to estimate mercury deposition in the cumulative effects study area and beyond by Air Sciences (2008) using the Environmental Protection Agency Regional Modeling System for Aerosols and Deposition and regional and national mercury emissions and monitoring data. The AggreGATOR program was used as a tool to interpret the Regional Modeling System for Aerosols and Deposition modeling results. The model results indicated that cumulative impact from all industrial activity in the western United States was generally less than one tenth of global background mercury levels. BMM mercury emissions represented over 1 percent of all mercury depositions in only the hydrologic basins immediately northwest and northeast of the facility, with a maximum impact of 4.4 percent of cumulative mercury deposition. The cumulative impact of all gold mines reached 10 percent of all mercury deposition in only three hydrologic basins 50 to 150 miles northwest of the BMM. Cumulative impacts of all gold mines in the cumulative effects study area remain under 10 percent of all mercury deposition in all hydrologic basins.

Figure 4-3 provides the mercury deposition contributions from BMM's mercury emissions as a percentage of the total deposition (including global background) to each watershed in Nevada. Figure 4-4 provides the mercury deposition contributions from the mercury emissions from all Nevada gold mines to each watershed in Nevada. As shown by Figures 4-3 and 4-4, the deposition contribution from the gold mines is localized. For example, the mercury deposition from BMM drops off to less than one percent at two watersheds distance from the mine (Air Sciences, 2008).

Figure 4-5 provides the mercury deposition contributions from the global background to each watershed in Nevada. The global background accounts for 66 percent to 97 percent of the total deposition in each watershed (Air Sciences, 2008).

The one potential industrial activity in the cumulative effects study area that has the potential to have moderate impacts on sensitive human receptors is the addition of five oil and gas exploration wells and possible subsequent development or expansion of two existing wells. The BLM has issued a number of leases within the valley floor locations in the cumulative effects study area. Current drilling activity is minimal, with only 15 acres of ground disturbed in the cumulative effects study area. Drilling activities typically include a few weeks to one month construction phase during which ground disturbances and construction activity could have a moderate impact on air quality approximately one mile downwind from the well site and within approximately 100 yards of primary access routes. During operational exploratory drilling, large diesel engines typically power the drilling rig, and any gas discovered is either vented into the air or is flared off until processing equipment can be put in place. Exploratory drilling typically occurs over a three-month period. During that period, moderate air quality impacts are possible within a couple of miles of the well site as well as within 100 yards of the primary access routes. Flaring or gas venting at sites that show development potential could result in moderate air quality impacts one half mile from the well. Production of oil and/or gas reserves would take some time to get started but would represent an ongoing activity for the life of the well. The extent of moderate impacts from a production well site depends on the volume of oil or gas found, how it is stored or processed on-site, how it is transported off-site, and whether there are existing power lines or new power lines or all equipment must be run on diesel or gas. Production wells beyond moderate size are not expected in or near the cumulative effects study area. The area of moderate impact for potential oil and gas field development would therefore be expected to be limited to within a two-mile radius around developed well sites and within 100 yards of primary access routes.

The traffic increase generated by increases in industrial activity in the cumulative effects study area has the potential for moderate air quality impacts within approximately 150 yards of dirt or gravel roads.

Cumulatively, current projects inside and outside the cumulative effects study area are understood to have an overall minor impact on air quality, though impacts can be moderate in the near vicinity of individual projects. Foreseeable projects could extend the extent of moderate impacts to cover the areas around a larger number of project sites, or potentially over larger areas, if or when project sizes or areas of activity expand.

Industrial Activity outside the Cumulative Effects Study Area

Coal-fired power plants currently exist north and northwest of the project cumulative effects study area. New coal-fired power plants have been proposed in Steptoe Valley, a few valleys to the east of the cumulative effects study area, and in other locations regionally. Numerous other mining operations are currently active in the areas surrounding the cumulative effects study area or could potentially be active in surrounding hydrographic basins, most at higher elevation locations. Nevada Division of Environmental Protection review of air quality permits indicate that those projects individually do not have significant impacts in this project's cumulative impact area and that their cumulative impacts do not exceed incremental thresholds established by the federal Prevention of Significant Deterioration program. Cumulatively, current projects inside and outside the cumulative effects study area are understood to have a minor impact on air quality. Foreseeable projects could bring cumulative impacts from regional sources intermittently to moderate levels.

Figure 4-3 Bald Mountain Mercury Deposition Contributions to Watershed (Percent of Total)

Figure 4-4 Mercury Deposition Contributions to Watershed from all Nevada Gold Mines

**Figure 4-5 Mercury Deposition Contributions to Watershed from Global Background
(Percent of Total)**

Industrial Activity outside the Cumulative Effects Study Area

Coal-fired power plants currently exist north and northwest of the project cumulative effects study area. New coal-fired power plants have been proposed in Steptoe Valley, a few valleys to the east of the cumulative effects study area, and in other locations regionally. Numerous other mining operations are currently active in the areas surrounding the cumulative effects study area or could potentially be active in surrounding hydrographic basins, most at higher elevation locations. Nevada Division of Environmental Protection review of air quality permits indicate that those projects individually do not have significant impacts in this project's cumulative impact area and that their cumulative impacts do not exceed incremental thresholds established by the federal Prevention of Significant Deterioration program. Cumulatively, current projects inside and outside the cumulative effects study area are understood to have a minor impact on air quality. Foreseeable projects could bring cumulative impacts from regional sources intermittently to moderate levels.

Land Management and Regional Growth

Federal land management decisions, including fire management and energy development, could affect air quality in the cumulative effects study area. Fire management activities would be expected to have little effect region-wide but could affect local areas. The USFS Fuel Treatment Project affected 500 acres in the cumulative effects study area. Controlled burning is used as part of the fuels treatment project. Smoke generated during the prescribed burn had intermittent impacts on local air quality, but the prescribed burns prevent more significant impacts of larger, potentially catastrophic fires that could otherwise occur. Impacts of foreseeable wind energy and oil and gas exploration have been discussed. Expansions or contractions of those programs are possible in the future. Most of those projects would be located above valley floors, distant from sensitive receptors, so would be less likely to impact the human activity area. Developments by individual landowners in the valleys or expanded oil and gas leasing activity in the valleys would have more potential to affect air quality in areas of human exposure.

Cumulative air quality impacts are anticipated to be minor throughout the cumulative effects study area. With foreseeable new projects, impacts to region-wide air quality are expected to remain minor. However, isolated pockets of moderate impacts are possible near potential oil and gas development, vehicle access routes, mining projects, and regional coal-fired power plants (if multiple plants come on line in the future).

Cumulatively, current projects inside and outside the cumulative effects study area are anticipated to have an overall minor impact on air quality, though impacts can be moderate in the near vicinity of individual projects. Reasonably foreseeable future actions could extend moderate impacts to areas around a larger number of project sites or potentially over larger areas if or when project sizes or areas of activity expand.

4.14.3 Cumulative Impacts Conclusion

The cumulative effects would result in moderate impacts to ambient air quality in the vicinity. The anticipated industrial activity within the cumulative effects study area would be expected to have moderate contribution to the isolated areas around their activity area. Cumulative regional industrial source impacts in the cumulative effects study area, including the impacts of all current mines and power plants, represent well under 10 percent of total mercury deposition. Global background airborne mercury supplies more than 90 percent of mercury deposition (Air Sciences, 2008). Land management activities and regional growth would likely result in minor impacts to ambient air quality across the rest of the cumulative effects study area over the long term, though intermittent actions such as prescribed fire could be expected to briefly result in

moderate or possibly major impacts locally. The results of ambient air quality modeling showed compliance with those applicable impacts at all locations (Appendix H).

4.14.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be no meaningful change in cumulative impacts to air quality under the two action alternatives. Under the No Action Alternative there would be no impact on air quality other than that already authorized.

4.15 Visual Resources

4.15.1 Geographic Area for Analysis

The cumulative effects study area for Visual Resources encompasses 317,038 acres of the south Ruby Mountains and portions of Huntington Valley, Newark Valley, and Long Valley (Figure 4-1). It encompasses the area that could be visually impacted by the Proposed Action and includes the majority of viewpoints from which disturbance would be seen.

4.15.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The portion of the cumulative effects study area north of the Elko-White Pine county line is in the BLM Elko District. Recreational users of the Ruby Mountains and Ruby Lake National Wildlife Refuge (public land administered by the USFS and U.S. Fish and Wildlife Service, respectively) could be more sensitive to visual impacts to the natural landscape because of the scenic views. The portion of the cumulative effects study area south of the Elko-White Pine county line is within the boundaries of the Egan Field Office of the BLM's Ely District. Most of the BLM Ely District land in the cumulative effects study area is within Visual Resource Management Class III or IV. However, the land within one mile of the Pony Express Trail in the central portion of the cumulative effects study area is designated Visual Resource Management Class II (BLM, 2008d). The Pony Express Trail could attract viewers that are sensitive to visual impacts that would alter the historic setting of the trail.

Past and present mining projects and other land-disturbing activities (e.g., fires, grazing, farming, roads) in the cumulative effects study area have resulted in visual impacts that can be seen by viewers in the cumulative effects study area, including portions of the Pony Express Trail. The USFS Fuel Treatment Project disturbed approximately 500 acres of pinyon-juniper woodland, creating a visual contrast that would last until new vegetation has established. The Proposed Action would add to these impacts, as described in Chapter 3. These visual impacts would last until the disturbed land was successfully reclaimed.

If implemented, the reasonably foreseeable future mining projects and other activities presented in Table 4-1 could affect visual resources by removal of vegetation or changing vegetation communities. The Alligator Ridge Mine and Yankee Mine are too far south of the Pony Express Trail to be visible from this sensitive viewing area. However, other mining projects would likely be visible, at least in part. The effects of mining projects would last until active mining is completed and the disturbance was successfully reclaimed, although color and texture changes resulting from the change in vegetation communities would last much longer. The oil and gas wells described in Table 4-1 would likely be seen from only a small area and would have a much smaller effect on visual resources.

4.15.3 Cumulative Impacts Conclusion

Visual resources in the cumulative effects study area have been affected by past, present, and reasonably foreseeable future actions. Projects that could have impacts visible from the Pony

Express Trail are the most problematic since this is the most visually sensitive area within the cumulative effects study area. The Proposed Action would add cumulatively to the disturbances seen within the long range viewshed of this trail, but would not impact the one mile buffer of the Class II management area around the trail. The great majority of cumulative impacts would last until natural vegetation has become established in disturbed areas, which could take many years. Until then, form and color change would be apparent with altered vegetation communities. Open pits and structures associated with some proposed actions would be permanent. Most of the disturbances in the study area, including the Proposed Action, are within Class III and IV visual resource management areas. Class IV allows for strong contrast, while Class III allows for moderate contrast. Most of the Class III designations are along travel routes most visible to the public. These areas are also subject to periodic developments where the final design and/or reclamation should be such that only moderate visual contrast would occur, thus preserving the overall aesthetic appeal of the region. The Proposed Action would add cumulatively to these disturbances.

4.15.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only inconsequential differences in impacts to Visual Resources under either of the two action alternatives. Under the No Action Alternative there would be no impact on visual resources other than that already authorized.

4.16 Noise and Vibration

4.16.1 Geographic Area for Analysis

The cumulative effects study area for Noise and Vibration is the same as the geology and minerals cumulative effects study area because the primary additional noise sources within the area would most likely be from additional mining activity that would take place within the geology and minerals boundary. It encompasses approximately 199,258 acres.

4.16.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

There has been historic mining activity in the southern Ruby Mountains, including Bald Mountain. Historic projects besides BMM include the Casino/Winrock Mine, Little Bald Mountain, Alligator Ridge and Yankee mines, and White Pine Mine. All of these except BMM are inactive mines. Exploration that could lead to future mining activity is being undertaken throughout the cumulative effects study area. BMM proposes up to 400 acres of exploration. A resumption of mining is reasonable foreseeable at the Alligator Ridge Mine, and a 143-hole exploration program is being proposed for the Yankee Mine. Extensive exploration within the Barrick claim block is likely in the future. Mining activities would generally occur at elevations well above public activity or exposure, far from sensitive receptors in valley locations. Because of their dispersed locations, exploration activities are not expected to add much more direct noise impact to populated areas with sensitive receptors, except for intermittent blasting or air travel sounds. Those projects could increase traffic levels in the valleys and supporting communities to yield noise impacts at or within 100 yards of access or supply roadways. Numerous simultaneous mining operations in close proximity could have moderate impacts on nearby ranches and moderate to occasionally significant impacts along access roads.

One exploration oil well exists within the cumulative effects study area. Numerous others exist in close proximity to the cumulative effects study area. BLM has issued leases for oil and gas exploration in the valleys of the cumulative effects study area. Development associated with those leases has been limited to date, but lease holders have the right to drill exploratory wells and would be expected to bring those wells into production if exploration indicated a sufficient resource. Those leases include valley floor locations that have a chance of being close to

human activity areas and sensitive receptors in valley locations. Locations within one mile of an exploratory well or along primary access roads can experience moderate noise impacts during the construction and exploration stage, which typically lasts three to four months at a specific site. If exploration confirmed a find, production of oil and gas could cover a larger area and extend moderate noise impacts a couple of miles beyond the perimeter of the well field and at least 100 yards from primary access routes.

There have been a few gravel pits historically in the cumulative effects study area and more in the broader area around the BMM. Those pits are generally located along highways or main roads in easily accessible areas. Operation of existing and new gravel pits in the cumulative effects study area is anticipated in the future. Those gravel operations can have moderate noise impacts for between one quarter to one half mile, possibly longer in valleys where air and noise movement are channeled. Noise impacts should be considered in siting a gravel pit, which should reduce the number of such activities close enough to areas of regular human activity to minimize the noise impacts.

4.16.3 Cumulative Impacts Conclusion

Cumulative impacts would generally lead to minor noise increase across the cumulative effects study area. However, due to the isolated nature of the projects, no significant impacts to noise levels at sensitive receptors are anticipated. In most locations, noise impacts associated with projects throughout the cumulative effects study area would be small in comparison with natural background noise levels.

4.16.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

The variation in noise effects among the action alternatives is inconsequential. Under the No Action Alternative there would be no impact on noise levels other than those already authorized.

4.17 Socioeconomics

4.17.1 Geographic Area for Analysis

The cumulative effects study area for socioeconomics encompasses White Pine, Eureka, and Elko counties (Figure 4-2). The cumulative effects study area for socioeconomics was selected because all of the BMM employees would reside in one of these three counties.

4.17.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The economies of the three counties are dependent to a large degree on mining activity, which is determined to a large extent by the market price for gold, silver, and other extracted minerals. Consequently, economic activity tends to cycle between boom and bust. When mineral prices are high, employment and wages rise and a shortage of skilled workers develops. Home prices tend to rise as new employees move into the area and local businesses profit from increased spending. A drop in mineral prices or other limitations on mine development result in a reversal of this process; employment and spending fall and local businesses falter. This cyclical pattern is detrimental to the counties' financial stability and their ability to plan for the future and provide reliable services to the community.

Mining is likely to be the dominant industry in northeastern Nevada for the foreseeable future, and the counties can suppress the boom and bust cycle only by increasing economic diversity. Elko County is the most diversified of the three. Tourism spending in White Pine County has been increasing, and additional spending, independent of mining, comes from the State Prison

and federal, state, and local government offices. The economy of Eureka County is dominated by mining and will probably remain so for the foreseeable future.

The economy of Elko County is much larger than the economies of Eureka and White Pine counties. Existing mines in the county include Capstone Mine (produces gold and silver, operated by Newmont), Jerritt Canyon Mine (produces gold and silver, operated by Queenstake Resources), Meikle Mine (produces gold and silver, operated by Barrick), Midas Mine (produces gold and silver, operated by Newmont), Pilot Peak Lime Plant (produces limestone and lime, operated by Graymont Western), Tonkin Spring Mine (produced gold, currently closed with exploration by U.S. Gold) Rain Mine (produces gold, operated by Newmont), and Rossi Mine-Dunphy Mill (produces barite, operated by Halliburton Energy Services/Baroid). Newmont just finished constructing a 200-megawatt coal-fired power plant in the Carlin Trend area; excess capacity would be sold to a local utility. Even though most of the new employees of the Proposed Action are expected to reside in Elko County, the number of employees is small enough that the contribution to cumulative effects on socioeconomic conditions in the county would be minor.

The most significant recent effect on the White Pine County economy has come from renewed activity in the Robinson Mining District, a project that has largely restored the soundness of the county's finances. Several other reasonably foreseeable major projects have been proposed for White Pine County. These include the White Pine County Airport expansion, the Egan Range Wind Generating Project, the Clark, Lincoln and White Pine counties groundwater development project proposed by the Southern Nevada Water Authority, the Ely Energy Center proposed by Nevada Power and Sierra Pacific Power Company, and the White Pine Energy Station proposed by LS Power. These major projects have the potential to transform White Pine County's finances and reduce the effect of mining-related economic cycles. The projects could have major impacts on population size, housing, schools, and demand for utilities and county services such as road maintenance, law enforcement, and fire protection. A shortage of skilled workers could also develop (Rajala, 2007). When viewed in this context, the contribution of the Proposed Action to cumulative effects on the economy of White Pine County would be relatively minor.

In Eureka County the Betze-Post and Ruby Hill mines are operated by Barrick and the Eastern Nevada Operations mine is operated by Newmont. The proposed Mount Hope molybdenum mine, which is located about 23 miles northwest of Eureka, is projected to begin operation in 2010. The Mount Hope Mine would be the largest and one of the highest grade molybdenum projects in the world. The mine has 1.3 billion pounds of proven and probable reserves and a projected life of 53 years. The Mount Hope Mine could account for nearly eight percent of the annual global molybdenum supply. The Mount Hope Mine would have a significant impact on the socioeconomic resources of Eureka County. An estimated 800 people are anticipated to be employed during the construction of the mine and associated facilities, and 400 people during operation. This project would have a significant positive impact on Eureka County but could present problems such as inadequate housing and increased demand for sewage treatment, water, and other County services. The addition of the Proposed Action would have a much smaller impact to County services but would add to the overall cumulative impact to Eureka County. The contribution of the Proposed Action to cumulative effects on socioeconomics in Eureka County would be minimal compared with the existing and proposed mining projects.

4.17.3 Cumulative Impacts Conclusion

The Proposed Action would contribute to cumulative effects on socioeconomics by increasing employment, income, and the demand for housing, schools, law enforcement, fire protection, and other services and infrastructure. When viewed in the context of much larger existing and

reasonably foreseeable future actions in the cumulative effects study area, the contribution of the Proposed Action to cumulative impacts would be relatively minor.

4.17.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be no measurable differences in impacts to socioeconomic conditions under either of the two action alternatives. Under the No Action Alternative there would be no contribution to cumulative impacts on socioeconomic conditions other than those already authorized.

4.18 Cultural Resources

4.18.1 Assumptions for Analysis

Assumptions for analysis for the cumulative effects to prehistoric resources include:

- The density of prehistoric and historic sites within areas that have not yet experienced archaeological survey are based solely upon the density of sites elsewhere within the Bald Mountain Mining District with similar landforms, soils, and floristic relationships (Kautz and Simons, 2005).

4.18.2 Geographic Area for Analysis

The cumulative effects study area for cultural resources has been created from maps that describe the overall territories occupied by both prehistoric and historic mining populations. This area is approximately 1,211 square miles and encompasses 775,144 acres. Prehistorically, this area has been based on the Middle Archaic to Late Prehistoric migration pattern within the region as suggested by Steward (1938) and actually tested archaeologically by Thomas (1971).

4.18.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The existing Programmatic Agreement between the BLM and the Nevada State Historic Preservation Office has added to the archaeological study and knowledge of the region, while allowing most significant cultural resources to be avoided or mitigated (BLM, 1995b).

Four National Register of Historic Places-eligible prehistoric archaeological sites are located within the BMM Proposed Action area. Additionally, 16 unevaluated sites (15 prehistoric, 1 historic) are present in the Proposed Action area. These 16 unevaluated sites will have to be revisited and evaluated for their National Register status. As projected mining activities would result in an impact to archaeological sites prior to any ground-disturbing activities at or near an eligible site, they would be mitigated as specified in the Programmatic Agreement. Also, any exploration or development activity within 150 meters of any National Register of Historic Places-eligible or unevaluated archaeological site would be monitored by a federally permitted archaeologist to protect the site's integrity.

Past, present, and reasonably foreseeable future surface disturbance for the cultural resources cumulative effects area include past mining and proposed gold mining within approved areas as well as past and future oil and gas wells, Casino Winrock and Little Bald Mountain gold mining projects, and wind energy projects (Table 4-1). These latter non-mining projects account for fewer than 10 percent of the acres reserved for mining. As with all federal undertakings, these development activities will be guided by cultural resource laws designed to mitigate the effects of projects on archaeological and architectural resources.

4.18.4 Cumulative Impacts Conclusion

With reference to Table 4-1, the total acreage projected to experience surface disturbance within the cumulative effects study area for cultural resources within the foreseeable future is 14,373 acres, or approximately 1.9 percent of the cumulative effects study area. Cumulative impacts to the archaeological site resource can be estimated by calculating the number of archaeological sites that would be impacted by these estimated disturbances as the outcome of dividing total acreage by the average number of surveyed acres per site (14,851/38). The resulting number is an estimate predicting that approximately 390 archaeological sites may be cumulatively affected by past, present, and future actions.

4.18.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Cumulative impacts to prehistoric and historic resources, as estimated using the assumed density of sites discussed above, would be little different under any of the action alternatives. In contrast, selection of the No Action Alternative would result in no additional impacts to prehistoric and historic resources other than those already authorized.

4.19 Hazardous and Solid Waste/Hazardous Materials

4.19.1 Assumptions for Analysis

The following assumption was made for analysis of the cumulative effects to hazardous and solid waste/hazardous materials:

- The risk of a reportable spill amount or fuel released to the environment is more likely during transportation than during storage or use.

4.19.2 Geographic Area for Analysis

The hazardous and solid waste/hazardous materials cumulative effects study area consists of the project area, which includes storage and on-site disposal areas, and the transportation routes analyzed in this document and shown on Figure 4-1.

4.19.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Past projects that received chemical shipments on the routes analyzed in this DEIS include the Yankee Mine, the White Pine Mine, and the Casino/Winrock Mine. These properties were responsible for operating in accordance with applicable regulations, and there are no known current environmental impacts from the delivery of chemicals along the analyzed transportation routes from these operations.

The BMM and Mooney Basin Operations Area currently receive chemical shipments and store hazardous materials and waste on the property in accordance with applicable local, state, and federal requirements as described in this document. Other present actions which may involve the analyzed transportation routes include mineral exploration activities, oil and gas wells, and maintenance activities on the Silver State Fiber Optic Line. These activities bring increased vehicle traffic and may involve the transport of small amounts of chemicals to the sites for use in mining exploration, oil and gas production, and fiber optic maintenance activities. Increased traffic on the access roads also increases the potential for vehicle collision with a supply vehicle.

The reasonably foreseeable future actions shown in Table 4-1 could cause an increase in vehicular traffic on the analyzed transportation routes. New mining projects would require chemical deliveries to support construction, mining, and processing activities. Wind energy projects would require the mobilization of construction equipment, fuel, and possibly other

chemicals needed for construction equipment. The construction of production oil and gas wells would require material storage and transportation for the life of the projects.

4.19.4 Cumulative Impacts Conclusion

The cumulative impacts on hazardous waste are mainly due to industrial projects and especially mining. Therefore, the Proposed Action is one of the larger potential contributors within the cumulative effects study area. The increase in some hazardous waste shipment quantities and the extension of the delivery time period (10-year life-of-mine) would slightly increase and extend the risk period for the release of a hazardous substance as previously described in Chapter 3. The transport of hazardous materials for the Proposed Action represents a continuation (with some quantity increase) of shipments for the BMM and Mooney Basin Operations Area. The Casino/Winrock, Yankee, and White Pine mining projects, which previously received chemical shipments on routes analyzed in this document, are no longer active operations. An increase in traffic associated with the Proposed Action and other reasonably foreseeable future actions would increase the likelihood of vehicle collisions on the access roads, thus possibly increasing the probability of accidents resulting in a release of a hazardous material.

With the continued, proper implementation of the Emergency Response Plan for on- and off-site incidents and Design Features as described in Table 2-13, cumulative impacts associated with storage, use, and transportation of hazardous materials are not anticipated.

4.19.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Cumulative impacts for the action alternatives would be the same as those analyzed for the Proposed Action. The No Action Alternative would result in no impacts other than those already authorized.