

**United States Department of the Interior
Bureau of Land Management
Pecos District
Roswell Field Office
Roswell New Mexico**

Environmental Assessment #NM-510-2007-0166

Snowy River Access

FORT STANTON AREA OF CRITICAL ENVIRONMENTAL CONCERN



October 2007

I. INTRODUCTION

A. Purpose and Need

There is a need to continue the exploration and scientific research in Snowy River section of Fort Stanton Cave. In order to continue those activities in an efficient manner, a long-term safe access route is needed for the Snowy River section of Fort Stanton Cave. The Bureau of Land Management has received an application from New Mexico Institute for Mining and Technology (New Mexico Tech) for a temporary site right-of-way to drill an access shaft for access to the Snowy River passage. This environmental assessment (EA) will analyze the impacts and consequences of approving this application and drilling a shaft into a cave passage leading into Snowy River.

B. Background

Fort Stanton Cave is closed from November 1 to April 15 to protect bats hibernating near the cave entrance. While there is access to the Snowy River passage of the cave, the distance from the cave entrance, the difficulty of traversing the passages to Snowy River, and the increased scientific interest in Snowy River, has led to proposals to drill an access shaft that would allow all the management and scientific activities to be conducted when the other Fort Stanton Cave passages are closed due to bat hibernation. An additional concern is safety regarding the extraction of personnel from the distant cave passages due to a medical emergency.

C. Conformance with Land Use Planning

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the 1997 Roswell Resource Management Plan (RMP). This project Environmental Assessment (EA) addresses site-specific resources and/or impacts that are not specifically covered within the Roswell Resource Management Plan as required by the National Environmental Policy Act of 1969 (NEPA), as amended Public Law 91-90, 43 U. S.C. 4321 et seq.).

The proposed action is considered a minor right-of-way action and conforms to the terms and conditions for land actions and Cave and Karst Resource Management, of the Roswell Resource Management Plan and record of Decision of October 1997:

“Goal: To protect cave values while allowing for limited recreational, commercial and educational use. Research and scientific use would have priority over other uses.

“Surface Disturbance will not be allowed within up to 200 meters of known cave entrances, passages or aspects of significant caves, or significant karst features. Refer to Appendix 1 for more information on this requirement. Appendix 1 ...Waiver of this requirement will be considered for projects that enhance or protect renewable resource values, or when an approved plan of operations ensures the protection of cave or karst resources”.

Fort Stanton Cave was designated by the Secretary of the Interior as a National Natural Landmark (NNL) in 1975. Under the NNL program the area was designated because it is an outstanding example of a major biological and geological feature found within the boundaries of the United States. The area was also designated because of its exceptional value as an illustration of the nations natural heritage and contributes to a better understanding of mans environment. BLM is obligated to manage the cave and 950 surface acres above in a manner that will maintain the unique natural qualities that lead to the designation.

Federal Cave Protection Act of 1988:

Policy: "It is the policy of the United States that Federal land be managed in a manner which protects and maintains, to the extent practical, significant caves. Fort Stanton Cave has been nominated and accepted as a "significant cave" by the U.S. Congress.

Fort Stanton Cave Management Plan of 1988

Management Goals:

"Protection of the physical, scenic, biological, and cultural features must be the primary consideration of any management proposal. Recreation and other uses will be authorized if it can be shown that they will not conflict with management objectives".

Roswell Approved Resource Management Plan and record of Decision of October 1997 (RMP), Cave and Karst Resource Management:

"Goal: To protect cave values while allowing for limited recreational, commercial and educational use. Research and scientific use would have priority over other uses."

"Surface Disturbance will not be allowed within up to 200 meters of known cave entrances, passages or aspects of significant caves, or significant karst features. Refer to Appendix 1 for more information on this requirement. Appendix 1 ...Waiver of this requirement will be considered for projects that enhance or protect renewable resource values, or when an approved plan of operations ensures the protection of cave or karst resources".

Fort Stanton Area of Critical Environmental Concern Final Activity Plan NM-060-2000-0141 of March 2001:

Cave Resources:

"BLM will continue to monitor cave conditions with the aim of meeting the goals and objectives of this ACEC Plan. The total area of known passages above Fort Stanton Cave are protected by a "No Surface Disturbance" zone, see No Surface Disturbance map of page 2-7 of the ACEC Plan. The Goal of the ACEC Plan is to protect the natural and biotic values of caves within the ACEC.

Fort Stanton Area of Critical Environmental Concern Route Designation Plan and Environmental Assessment EA # NM-060-2002-0119 Dated July 09, 2003.

The Goal of the plan is to manage OHV's to protect the environment within the Fort Stanton Area of Critical Environmental Concern. The objectives are to Protect special use trails from unauthorized use; Close unwanted roads through a transportation plan; Designate roads, parking areas and trail heads.

D. Relationship to Statutes, Regulations, or Other Plans

This environmental assessment is being prepared in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA) and other statutes relevant to the proposal. Authority for the proposal and alternatives is contained in Section 501 Title V of the Federal Land Policy and Management Act of 1976 as amended and the regulations cited in 43 CFR 2800.

Other pertinent statutes affecting the proposed action include:

Federal Land Policy and Management Act (FLPMA) of October 21, 1976, as amended;
National Historic Preservation Act of 1966 (36 CFR 800);
Clean Air Act (CAA) as amended (42 U.S.C. 7401);
Safe Drinking Water Act (SDWA), as amended (42 U.S.C. 300f);
Clean Water Act (CWA) of 1977 (33 U.S.C)1251;
Resource Conservation and Recovery Act (RCRA) of 1976, as amended (42 U.S.C. 6901);
Federal Cave Protection Act of 1988
Roswell Approved Resource Management Plan and record of Decision of October 1997;
Fort Stanton Area of Critical Environmental Concern Final Activity Plan NM-060-2000-0141 Of March 2001;
Fort Stanton Area of Critical Environmental Concern Route Designation Plan and Environmental Assessment of EA # NM-060-2003-0119 of July 09, 2003;
Fort Stanton Cave Natural Natural Landmark Designation 1975
Cave Karst Driling Guide of 1993
Fort Stanton Cave Management Plan 1988

II. PROPOSED ACTION AND ALTERNATIVES

A. Description of the Proposed Action Drill Location SRT23-24

The proposed action would be to grant a temporary site right-of-way measuring 200 feet by 200 feet. The proposed action will disturb approximately 0.92 acres. All construction on public land would be located within the 200 feet by 200 feet site right-of-way. The proposed right-of-way grant would be issued for a 3-year period without an option to renew.

The location of the proposed action is T 09S Range 15E Fort Stanton ACEC in Lincoln County, New Mexico.

Within the site right-of-way, the grantee would drill a shaft 36 inches in diameter into the Mud Turtle passage leading into Snowy River. The shaft would allow easier and safer access to Snowy River and provide for an emergency extrication exit if personnel are injured during a cave expedition. Prior to commencement of drilling, a steel or prefabricated concrete 8' X 12' X 10' box with a 36-inch circular or rectangular hole in the middle of the bottom of the box would be placed at the top of the prospective shaft. The entry chamber and shaft casing will be fitted with collars and environmental closures. The top two feet of the box will be above the ground surface. This structure would serve as a secure entrance to the access shaft. The shaft would be approximately 160 feet deep based on the average of the radio surveys and the cave surveys.

A six inch diameter pilot hole would first be drilled from the surface into the cave. This small drill hole will assure that the driller is on target and assure that there are no problems with the underlying rock formations and to assure the stability of the roof of the cave. After the successful pilot hole the driller will follow up with the 36-inch drill bit to complete the process.

The drilling rig will be a rubber tire well drilling rig. The surface disturbance for the drilling location is expected to be 200 feet by 200 feet and would require no cut and fill. Location leveling would be accomplished using wedges. The total weight of the drill rig and ancillary equipment would be approximately 80,000 lbs. The drilling rig would be raised on steel support legs supported on broad wood or steel supports to assure that the rig will be stable while drilling. The shaft would be drilled with an air-water-mist system. The cuttings from the drill will be blown out to the side of the drilling rig and directed into a steel box that will be removed after the

drilling process is completed. Top soils and excavation spoils would be stock piled for use in re-contouring the site after the drilling completion. The re-contoured area over the concrete entry will be reseeded with native grasses as specified by the BLM.

The shaft would be cased with a “rhino” epoxy-coated steel casing and cemented into place. The inside of the casing would be at least 30 inches in diameter. The bottom of the steel casing would rest on the cave floor. A doorway would be cut into the bottom of the casing. The doorway would be large enough to accommodate a litter and would be fitted with a locking mechanism. This opening will allow personnel to enter the steel casing with a stretcher or retrieval apparatus in case of an emergency extraction or the lowering or raising of scientific equipment. The casing will extend 8 to 10 inches above the floor of the entrance chamber and be fitted with a collar to which a lockable environmental closure will be secured. The environmental closure is to prevent atmospheric or cave air from entering or exiting the cave. A lockable air tight bulk head door will be placed on the top of the box. Steel I beam would be set in the ceiling of the concrete entry chamber above the drill shaft to facilitate rigging points for the purpose of inserting persons and equipment and the extracting of equipment or patients from the cave.

Plastic sheeting and framing would be used to block off the Mud Turtle passage leading to Snowy River to prevent migration of dust and particles into extended sections of the cave and minimize the exchange of air flow until the shaft is cased and sealed.

Access to the proposed site would be via an existing two-track road that would need no additional improvements.

Security provisions for the entry way and shaft seal can be found in Appendix 2.

B. Alternatives

Alternative 1:

The proposed action would be to grant a temporary site right-of-way measuring 200 feet by 200 feet. The proposed action will disturb approximately 0.92 acres. All construction on public land would be located within the 200 feet by 200 feet site right-of-way. The proposed right-of-way grant would be issued for a 3-year period without an option to renew. The grantee would drill a 14-inch hole and construct a smaller concrete or steel enclosure over the drill hole for secure access at the same location as the proposed action. The shaft would provide for in cave scientific electronic monitoring and communication with personnel in the cave. A shaft this size, however, would not allow personnel to access the Snowy River passage. Therefore this alternative has the same impacts as the proposed action except for allowing year-round access to the Snowy River Passage.

No Action Alternative:

No shaft would be drilled into Fort Stanton Cave that would allow access to the Snowy River passage.

Alternatives Considered but Not Analyzed -

Granting temporary site rights-of-way for alternate drilling sites at SRT 5, SRT12, SRT 15-16 and SRT20 (see attached location Map) were considered but rejected as the projected surface disturbance exceeds that of SRT 23-24. All other impacts would be

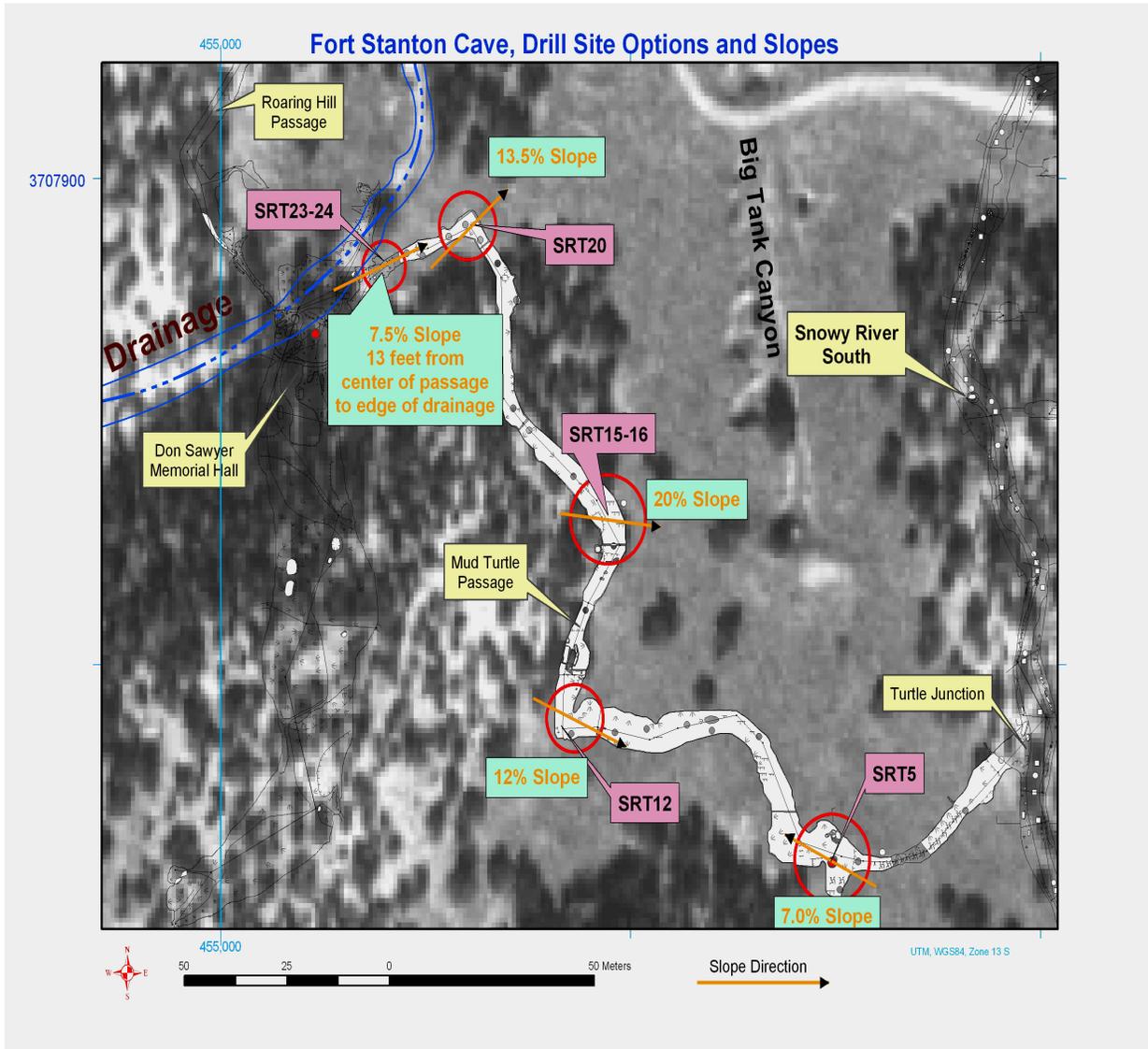
the same as either the proposed action or Alternative 1, therefore, no further environmental analysis will be conducted. See also Table 1.

Table 1. Preliminary estimated elevations and depth calculations for Drill Site Alternatives

Station	Surface Elevation	Cave Elevation	Depth (feet)	Passage Height (feet)	Ceiling Competency
SRT23-24	6178	6015	163	5 to 7	High – Limestone (~26 feet)
SRT20	6171	6018	153	5	High – Limestone (~33 feet)
SRT15-16	6186	6026	161	7 to 11	High – Limestone (~33 feet)
SRT12	6194	6024	170	3 to 6	High – Limestone (~43 feet)
SRT5	6177	6018	159	15 to 16	Moderate – Limestone (~43 feet) some breccia, possible faults.

DRILL SITE ALTERNATIVES

The following map shows the Drill Sites and alternatives considered



III. DESCRIPTION OF THE AFFECTED ENVIRONMENT

A. General Setting

Fort Stanton Cave is located within the Fort Stanton ACEC which was established by the 1997 Roswell RMP. The ACEC consists of approximately 24,000 acres surrounding the Fort Stanton State Monument managed by the State of New Mexico. Fort Stanton Cave is located in the eastern portion of the ACEC.

Known cave passages total approximately 11 miles. The Snowy River section was discovered via a digging project in the cave in September 2001 and is the source of three miles of new exploration and several scientific studies. The entire length of Snowy River is unknown at this time. Legislation is pending to designate Fort Stanton/Snowy River Cave as America's first National Cave Conservation Area.

Fort Stanton Cave generally has a 10 to 20 year cycle where water enters the cave or the cave dries out and water disappears. In the Spring of 2007 water started to enter the cave again. It appears we are now in a cycle where water is returning to the main passage down Conrad's Branch to Sewer Pipe Passage and is continuing to rise at a rate of 2.5 plus inches per week. If the cycle continues, we could experience water depths up to plus or minus 12 feet at Sewer Pipe Passage. Exploration teams, scientific teams, and potential rescue teams would have to negotiate this water obstacle to reach Snowy River.

B. Airflow

Generally, there have been numerous reports of noticeable airflow throughout the Snowy River complex. It appears that the airflow is typical of a barometric interchange between the Main cave system entrance and all other passages. Airflow patterns suggest that there are no other significant entrances to the cave system to provide air interchange or if such entrances exist, they are located at relatively remote locations so as to have little effect on the observations made so far.

There are three known airflow connections between the Snowy River Complex and the Main (old) cave.

- Mud Turtle passage to Don Sawyer Memorial Hall.
- Priority 7 to Snowflake Passage
- Snowflake #3 to Snowflake passage.

Airflow measurements are non-simultaneous spot measurements and only give approximate relative volumes or capacities for the passages observed. Airflow observations indicate bi-directional flow at all passage connections. This implies that the primary mechanism responsible for air movement is barometric pressure changes outside the cave result in a corresponding response by the cave system. The highest volume airflow observed is in the Snowy River South passage, indicating potential for significant passage beyond the known extent. The airflow volume in this passage as measured near survey station SRS108 is apparently greater than the sum of airflow from the known passage connections to the old parts of the cave system. This may be partially accounted for by leakage at other unknown passage connections or breakdown interfaces.

Airflow has been noticed in Snowy River North and in The Metro passages, but no measurements have been made and the reports do not mention strong airflow in these passages.

Airflow volumes related to Snowy River have been estimated from spot measurements at a few locations in the Snowy River section. The following table gives a summary of those estimates. Also included is a single measurement at the Main Gate near the entrance of the cave system for comparison.

Table 2. Airflow Measurements

Velocity (ft/sec)	Cross section (ft²)	Vol. (ft³/sec)	Description
8.8	0.7	6.2	Priority 7, first pinch, (Before digging), Corcoran 1970
2.0	1.5	3.0	Snowflake #3, 5' before end, Corcoran 1970
17.6	2.0	35.2	P7 Hair Dryer (Swartz, 2003)
15.8	2.0	31.6	P7 Hair Dryer (Swartz, 2001)
20.5	2.0	41.0	P7 Hair Dryer (Lyles trip, 2005)
7.3	40.0	292.0	SRS108 (Davis, 2003)
8.0	51.2	15.0	DSMH Dig, Env. Seal (open) McLean, 2007
2.9	7.5	21.8	DSMH Entry Pit (Corcoran, 2005)
2.2	9.5	20.9	Snowflake #3 (Corcoran, 2000)
1.8	26.0	46.8	Priority 7, near gate (Corcoran, 2000)
2.3	255.0	586.5	Main Gate (Corcoran, 2007)

C. Affected Resources/Critical Elements

The following critical elements have been evaluated and are either not present or would not have discernable adverse impacts from the Proposed Action or the alternative in this assessment: Farmland - Prime or Unique, Flood Plains, Native American Religious Concerns, Wastes-Hazardous or Solid, Wetlands/Riparian Zone, Wild and Scenic Rivers, Wilderness, and Livestock Grazing. Low income or Minority populations or communities will not be affected by the proposed action.

1. Air Quality

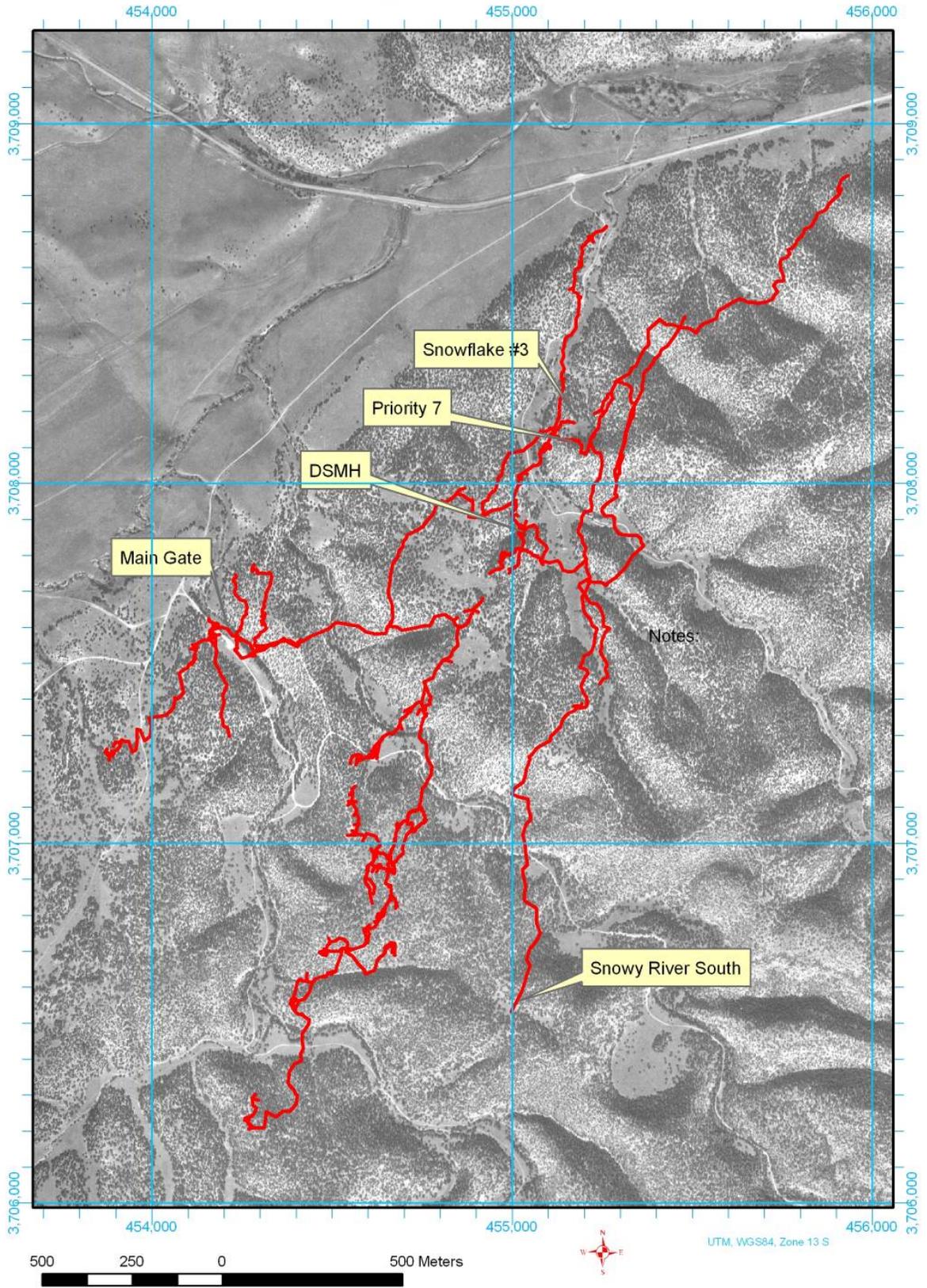
Air quality in the region is generally good. The project area is in a Class II area for the Prevention of Significant Deterioration of air quality as defined in the public Clean Air Act. Class II areas allow a moderate amount of air quality degradation.

2. Water Quality Drinking/Ground

Hydrogeology:

The rocks that outcrop in the project area range in age from Permian to recent. Several geologic formations are present on the surface of the project area. Terrace gravels outcrop from the Quaternary Alluvial deposits. Limestone outcrops from the Bonney Canyon Member of the San Andres Formation. The Bonney Canyon Member comprises the middle part of the San Andres Formation and ranges in thickness up to 300 feet. Limestone outcrops from the Rio Bonito Member of the San Andres Formation. The Rio Bonito is the lower and thicker bedded member of the San Andres Formation and ranges from 250 to 350 feet in thickness. The caves in the area occur in the San Andres Formation. The San Andres here dips gently west-northwest, away from the Mescalero Arch to the east and beneath the valley of the Rio Bonito. Most of the longer cave passages follow the strike of the limestone sub-parallel to the adjacent Rio Bonito. The cave complex is located to the

Fort Stanton Cave, Snowy River Airflow Measurement Sites



southeast of the Bonito Fault which trends from the southwest to the northeast. The Rio Bonito is intermittent from Rio Bonito Lake Dam to Government Spring, but the Rio Bonito is perennial from Government Spring to the Rio Hondo.

The groundwater in the shallow unconfined San Andres Aquifer moves generally in the northeast, east, and southeast direction. The San Andres Aquifer groundwater discharges into springs and seeps through portions of the cave complex and also discharges into Government Spring, other springs and seeps in the Rio Bonito. A sufficient quantity of water of good quality for stock and domestic supplies can be obtained from wells that range from 30 to 170 feet deep in the San Andres Aquifer. The water quality is considered good for human use.

3. Soils

The *Soil Survey of Lincoln County, New Mexico, (USDA Soil Conservation Service 1983)* was used to describe and analyze impacts to soils from the proposed action. The soil map units represented in the project area are:

Tortugas-Rock outcrop association, moderately sloping, 0 to 15 percent slopes (90)
Runoff of the soil is rapid. Permeability is moderate. The hazard of water erosion is high. The hazard of soil blowing is slight.

Tortugas-Rock outcrop association, extremely steep, 15 to 75 percent slopes (91) Runoff of the soil is rapid. Permeability is moderate. The hazard of water erosion is high. The hazard of soil blowing is slight.

Fort Stanton Cave contains deep deposits of sediment primarily deposited by streams flowing intermittently through the passages. These deposits are mostly clay and silt, with localized deposits of sand and gravel composed of limestone, sandstone, and in washed igneous rocks from surface gravel deposits.

4. Topography

The Fort Stanton ACEC is in the transition zone between the rolling hills that lead into the lower slopes of mountains surrounding Sierra Blanca. Fort Stanton Cave lies beneath the canyons that carve the slopes of mesa that dominates the southern half of the ACEC. The surface slopes in the project area range from 6 to 30 percent slope.

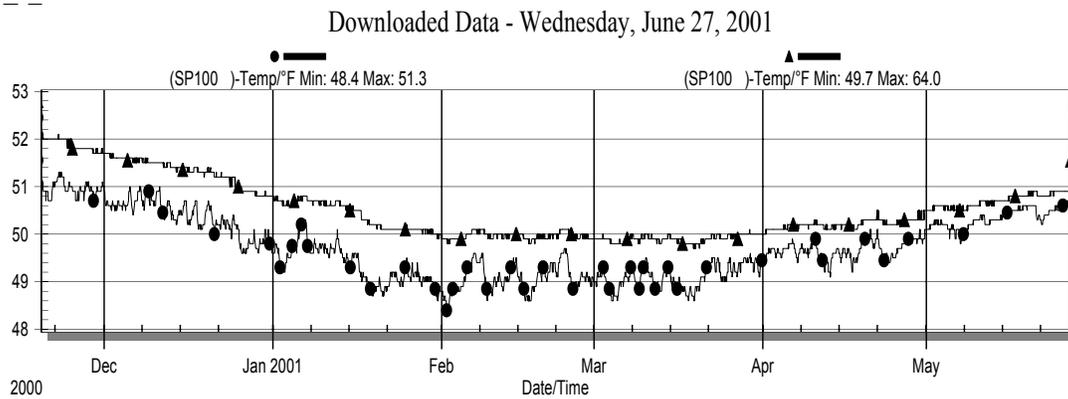
5. Climate

Temperatures vary from an average of 90 degrees F in the summer to 20 degrees F in the winter months. Precipitation averages 16.1 inches annually. The area is considered semi arid as the evaporation exceeds the precipitation.

Temperatures in the cave typically range from 48° F to 60° F, except very near the entrance where the variation is greater. The front part of Bat Cave and the Main Corridor passages act as a cold trap in the winter and thus show lower temperatures than areas further from the entrance. Generally, in the cave the further from the entrance the less variation in temperature, but the variation tracks the surface seasonal variations (cooler in winter and spring and warmer in summer and fall).

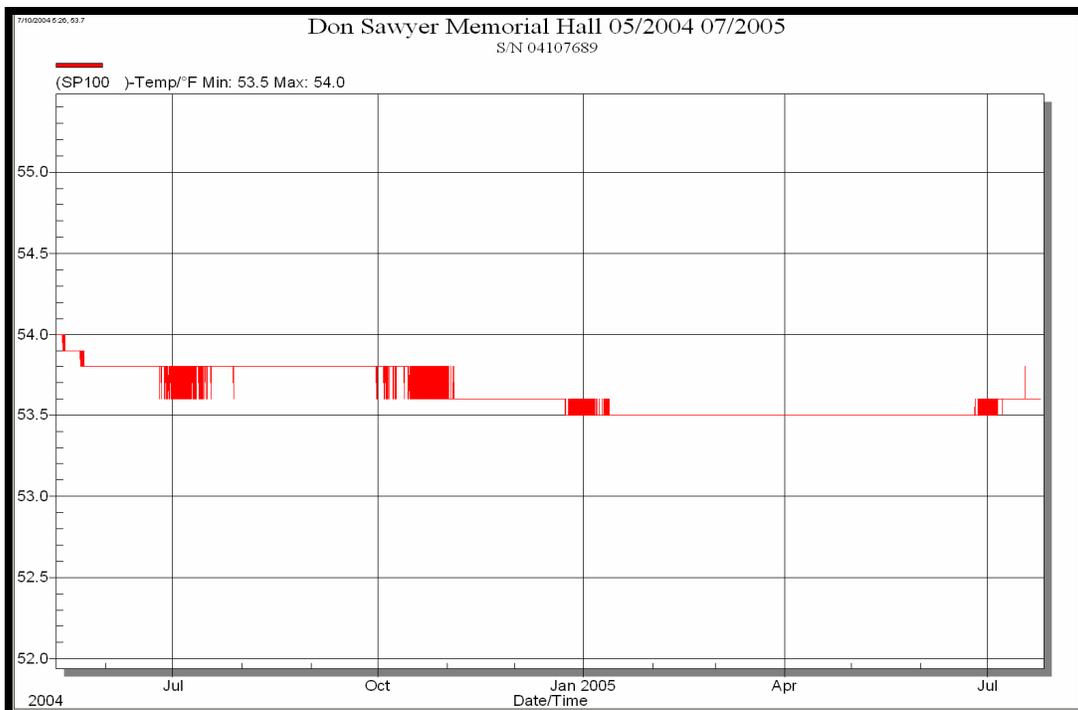
The two plotted curves shown below are extracted (ends truncated) from the overall data sets from data loggers placed in the Main Corridor. The min and max temperatures annotated at the top of the plots are with respect to the overall data. Thus the minimum and maximum temperatures in the Main Corridor data represent data that is not shown (outside the cave and truncated). The upper curve is from the Inscription Rock breakdown, and the lower curve is from a recorder placed near the top of the Devil's Backbone breakdown.

These two recorders were placed in the cave on November 18th, 2000 and retrieved May 27th, 2001



In the Don Sawyer Memorial Hall (DSMH) the average temperature is approximately 53.7⁰ F with little variation. This is demonstrated by the following plot where temperatures were recorded over a period of approximately 14 months.

A temperature data logger (Dickson SP100, S/N 04107689) was retrieved from the area across for survey station DS2 where it had been placed the previous year. The period of recording was from 5/2/2004 until 7/25/2005. Temperature readings were made every 20 minutes in this time frame and varied only 0.5 degrees F as shown in the graph below. This very smooth curve is probably due to the buffering effect of the recorder being placed under a rock which would damp out short-term variations in temperature. The location is over one mile from the entrance. However, the presence of frequent bi-directional airflow in this area (almost constant) indicates that the temperature in DSMH and in Mud Turtle Passage is probably equal and thus airflow is likely barometric in origin and a long distance from any entrance. On each trip to DSMH in the last three years, the airflow showed reversal in direction at least once which probably confirms a barometric rather than chimney effect or thermal flywheel airflow engine for this part of the cave system.



Spot measurements in the Snowy River complex further into the cave system (D. Davis, 2003) have shown slightly higher temperatures such as 58° F in Snowy River South.

Humidity in the cave, as indicated by spot measurements, tends to be in the range of 80-85% except in wet areas of the cave system where it will be higher.

The cave system exchanges air with the surface through the main entrance due to two mechanisms:

1. Barometric interchange. Air flows into the cave when the surface barometric pressure is higher than in the cave and air flows out when the surface barometric pressure is lower than the cave. Velocity of airflow tends to vary inversely with the diameter of the passages so that in large passage cross-sections the airflow is low and in smaller passages it may be significantly higher. Spot measurements at the Main Gate just inside the Entrance have varied from 0.15mph to 3mph. Velocities as high as 20.5mph have been reported at the constriction named the "Hair Dryer" in the Priority 7 passage. During times when surface barometric pressure is relatively stable for extended periods of time (days), there are often twice-daily airflow reversals due to the diurnal fluctuations in surface pressure due to atmospheric heating and cooling, particularly in the warmer seasons.
2. Density current interchange. During parts of the year when the surface air temperature is significantly lower than that in the cave, cold air flows into the cave along the floor and a corresponding warmer air current flows out along the roof particularly when the barometric pressure is not a factor. This results in cold air pooling in lower areas of the cave such as the Main Corridor. No measurements are available to quantify this type of airflow.

Strong barometric airflow in the Fort Stanton Cave system is a good indicator of extensive volume of passages.

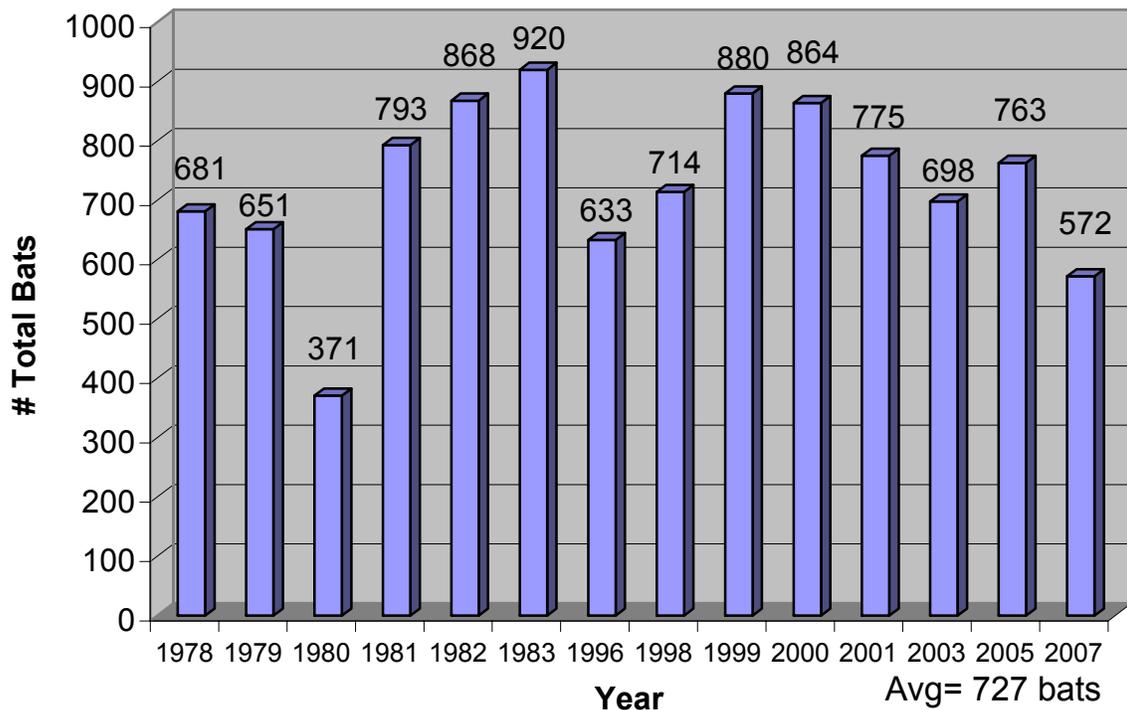
Fort Stanton Cave is usually a relatively dry system. There is relatively little direct infiltration of surface precipitation into the cave (dripping from the roof) with the exception of inflow from the entrance sink during heavy rains which penetrates less than 300 feet into the cave typically. Periodic springs inside the Main Corridor of the cave can deliver water into the cave system from apparent stream piracy from the Rio Bonito. This water flows east and north along the Main Corridor, into the Snowflake passage in the north end of the cave and exits the cave slowly into springs, particularly Government Spring) further east along the Rio Bonito.

6. Wildlife

Wildlife species inhabiting the area include mule deer, elk, coyote, pronghorn, rabbit, raccoon, skunk, bobcat, badger, occasional cougars, bears, and various small rodents and reptiles. Common bird species observed include mourning doves, pinyon jays, bushtits, robins, western bluebirds, spotted towhees, northern mockingbirds, western pewees, and red-tailed hawks.

Ft. Stanton cave is closed for the winter season to protect a hibernaculum of about 700 Townsends Big-eared Bats, *Corynorhinus Townsendii*. This is a listed sensitive species in New Mexico. Other bats reported at the cave include *Myotis Ciliolabrum* (Small Footed Bat), *Myotis velifer* (Cave Myotis), Pipistrelle, and Hoary Bats (a tree roosting species).

Ft. Stanton Hibernating Bat Counts



Feather Cave hosts a maternity colony of 300 Townsends Big-eared Bats, a listed sensitive species in New Mexico, during the summer. There have also been reports of individual hibernating Townsends Big-eared Bats in the entrance area in the winter.

7. Recreation

Fort Stanton Cave is the second most visited cave in New Mexico besides Carlsbad Caverns National Park. Fort Stanton Cave is also the third longest cave in New Mexico. The Cave receives approximately 200 cave permits per year which equates to about 2000 visitors per year. The majority of the permits are recreational visits. Approximately 20 percent of the permits are administrative permits, one or two permits per year are for research, and there are 3 active digs on going in the cave.

The Snowy River passage of the cave, however, is not accessible to the public and would continue in that condition under the proposed action and the alternatives. Locked gates within the cave currently block passages to Snowy River. Access to Snowy River would continue to be only for scientific data collection or survey of cave passages. Protocol for survey and data collection was previously analyzed in the Discovery and Documentation Procedures in Fort Stanton Cave, EA No. NM-060-2003-113. BLM continue to monitor activities within Snowy River through the administration of special recreation use permits (SRUPs).

8. Vegetation

This proposed action is within the Piñon-Juniper Grassland vegetative community as identified in the Roswell Resource Management Plan/Environmental Impact Statement (RMP/EIS). Appendix 11 of the Draft RMP/EIS describes the Desired Plant Community (DPC) concept and identifies the components of each community. The primary features in

this community are piñon, juniper, cottonwood, shrubs and grasses indicative for this portion of the Sacramento mountains. Dominant grasses include blue grama (*Bouteloua gracilis*), western wheatgrass (*Agropyron smithii*) and sideoats grama (*Bouteloua curtipendula*).

The Ecological Site Description for the proposed action is Limestone Hills CP-3 (Pecos-Canadian Plains & Valleys)

9. Karst

The word Karst is defined as a type of topography formed by dissolution of rocks like limestone and gypsum that is characterized by sinkholes, caves, and subterranean passages.

Fort Stanton Cave is only one of several limestone caves found on the 24,000 acres of Fort Stanton ACEC. Fort Stanton ACEC is located in a High Cave/Karst Occurrence Area.

10. Non-native/Invasive Species

Six species of noxious weeds are known to occur within five miles of the proposed area. They are musk thistle (*Carduus nutans*), dalmatian toadflax (*Linaria genistifolia* ssp. *dalmatica*), common teasel (*Dipsacus fullonum*), hoary cress (*Cardaria draba*), poison hemlock (*Conium maculatum*) and saltcedar (*Tamarix* spp). However, common teasel and poison hemlock are generally associated with riparian areas. Musk thistle is spread by seed and is a biennial. It spreads rapidly, forming extremely dense stands which crowd out desirable forage vegetation. Dalmation toadflax is a perennial spreading by seed and underground root stalks. It is aggressive and crowds out other desirable native vegetation. An extensive and deep root system along with a waxy leaf make this plant difficult to control. Vehicles may carry some noxious weeds into the area.

11. Threatened and Endangered Species

No threatened or endangered species occur in the project area. Kuenzler Cactus (*Echinocereus fendleri* var *Kuenzleri*), an endangered species, is found on portions of Fort Stanton, but no suitable habitat is found in the project area.

12. Cultural Resources

A cultural resource inventory was completed by the Bureau of Land Management on the project site in June 2007. The results of the cultural resource inventory indicated the project will have no effect on any properties listed on or eligible to the National Register of Historic Places of the New Mexico State Register of Cultural Properties.

13. Paleontological Resources

Prehistoric bones have been found within the confines of Fort Stanton Cave. One of the latest disarticulated bone found within the cave is from a prehistoric horse. Prehistoric bones have been found within the cave at various locations. No intact skeletons of prehistoric mammals have been discovered within the cave. Because the water flow within the cave at various times during the cave development, bones have washed into the cave and have been deposited within the silt deposits within the cave.

14. Visual Resources

The proposed action is located in a Class II Objective zone. Changes in this zone may be visible but does not attract attention. The objective of this class is to retain the existing character of the Landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

15. Areas of Critical Environmental Concern (ACECs)

The Fort Stanton ACEC was established by the 1997 Roswell RMP, the ACEC consists of 24,000 acres with the management goal of protecting the biological, archaeological and scenic qualities of Fort Stanton, while providing for quality recreation opportunities. Fort Stanton Cave is within the eastern half of the ACEC.

IV. ENVIRONMENTAL IMPACTS

A. IMPACT OF PROPOSED ACTION

1. Air Quality

The air-water mist drilling of a 36 inch hole would bring the drill cutting fines to the surface and deposit the cutting fines on the surface in a steel box to be later removed from the area. There may be a scattering of cuttings that escape the cuttings box.

Once the drill enters into the Mud Turtle Passage of Fort Stanton Cave, debris and dust may occur in the area of breakthrough. A small area of cave passage may become contaminated by dust and cuttings.

Dust levels under the proposed action would be slightly higher during the drilling operation. The levels would be within the limits allowed in a Class II area for the Prevention of Significant Deterioration of air quality.

2. Water Quality

Direct impacts to surface water quality would be minor, short-term impacts may occur during storm flow events. Indirect impacts to water-quality related resources, such as fisheries, would not occur. The proposed action would not have a significant effect on ground water.

3. Soils and Vegetation

Surface disturbance would occur to a closed two track road to the drill site by the drilling rig and support vehicles concrete trucks and other vehicles traveling on the closed road. Support vehicles and concrete trucks would add to the surface disturbance of the site selected for the drilling operation.

The proposed action would result in surface disturbance where the area is excavated to install the concrete block, pre-stressed concrete or steel vault. Excavated dirt would have to be removed to a suitable location. Cuttings from the air-water mist drilling may spray over the catchments box and would have to be shoveled into a container and removed.

There would be less surface disturbance because no drill pad would be constructed and levelers would be used during the drilling process. The ground surface is less than eight percent slope which would allow the drill to set up without additional dirt work to level the site.

4. Wildlife

Impacts to wildlife would be minimal. Some small wildlife species may be killed and their dens or nests destroyed during construction. Once construction is completed, the changes in habitat aboveground would be minimal and should have little impact on wildlife. Most species would habituate to the small blockhouse in a short time. There are no known wildlife species other than microbes in the portion of the cave involved in this project. Bats are only known to occur nearer the natural cave entrance. The use of two airtight bulkheads would prevent any changes to the cave environment that could affect bats or other wildlife in

other portions of the cave. There would be specific procedures in place to prevent opening both doors simultaneously.

5. Threatened and Endangered Species

Since there are no threatened or endangered species within the project area, there would be no impacts to listed species. Additionally, there are no special status species within the project area.

6. Recreation

Recreation visits to Fort Stanton Cave via permits would remain unchanged and, therefore, the impacts of those visits would remain the same as those previously analyzed. Impacts to Snowy River would be minimized by the mitigation measures listed later in this EA; granting access to through the special recreation use permit system; and the survey and data collection protocol analyzed in the Discovery and Documentation Procedures in Fort Stanton Cave, EA No. NM-060-2003-113.

7. Non-Native and Invasive Species

The risk of introducing invasive species by the proposed action would not be discernible because the project area is accessible by vehicles via public roads.

8. Cultural and Paleontological Resources

Per the cultural resource survey conducted by BLM; the Proposed Action will have no effect on historic properties or archaeological sites.

9. Visual Resources

Impacts to the view shed would be temporary, lasting only as long as the drill rig would be in place. Surface disturbance would present impacts until the area was reclaimed and the vegetation restored, probably less than four growing seasons in length. There would be no changes in visual class presented by the blockhouse at the top of the shaft since it would extend only two feet above the surface.

10. Areas of Critical Environmental Concern (ACECs)

Impacts to the Fort Stanton ACEC would be temporary. The shortest duration of these impacts would be traffic along the roads used to support the drilling as well as the dust and noise associated with vehicle traffic and the actual drilling operation. Surface disturbance associated with the drilling would reclaim in one growing season. Reclamation of the disturbed areas would reduce the time needed for recovery.

B. IMPACTS OF ALTERNATIVES

Alternative 1

This alternative would allow only equipment, scientific instruments and supplies to be passed through the shaft. The shaft is not large enough to allow the access by personnel, therefore, the closure of the cave to protect hibernating bats would preclude year-long access to Snowy River. Safety concerns due to medical emergencies occurring in Snowy River would not be alleviated by this alternative. This alternative has the same impacts as the proposed action except for allowing year-round access to the Snowy River Passage.

No Action Alternative

The No Action alternative would be to not allow a shaft to be drilled. This alternative denies the Proposed Action. This alternative would result in no new environmental

impacts. However, a No Action alternative may reduce BLM's management options and capabilities within the cave management area. Safety concerns due to medical emergencies occurring in Snowy River would not be alleviated by this alternative.

C. MITIGATION MEASURES

The cave passage on both sides of the drill hole would be sealed during drilling operations with heavy plastic sheeting to prevent outside air and migrating debris from affecting the cave passage other than right in the vicinity of the drill shaft.

In order to reduce the possibility of a weed infestation the following measures would be implemented. Clean the equipment (power or high-pressure cleaning) of all mud, dirt, and plant parts before moving into the area. Remove a minimum of vegetation in effort to retain shade. Shade retention acts to suppress weeds. Reseeding would be completed on all disturbed soil within seven days of work completion with an approved seed mix. The seed mix would include fast, early-growing species to provide quick, dense revegetation. Seed mixes would be certified weed free. Options that may be considered are applying weed-free mulch with the seed in our effort to prevent or reduce surface erosion and to hold the seed in place. In the event that non-native/invasive species are introduced, an approved herbicide would be used to spot kill weeds within the impacted access and drilling area. Herbicides would be applied as per the restrictions or specifications outlined in Appendix 9, Treating Vegetation with Herbicides, 1997 Roswell RMP.

The areas of surface disturbance and the closed road would be reclaimed by the drilling company upon completion of the drilling and construction of the 8'X12' concrete or steel box. Any disturbed surface area needed to accommodate the drilling of the drill shaft, would be reclaimed by the right-of-way grantee upon completion of the drill site and construction of the concrete blockhouse.

BLM would have an on-site inspector from the Roswell Field Office during construction and drilling operations to insure compliance with the conditions of approval contained in the temporary Right of Way.

D. RESIDUAL IMPACTS

The proposed action would leave a scar on the landscape surrounding the drill site and the construction site of the blockhouse due to vehicle traffic, construction activity for the blockhouse, and drilling operation. This impact would be expected to disappear after reclamation efforts are complete. Vegetation re-growth would be expected to recover after one season of annual rainfall

E. CUMULATIVE IMPACTS

Recreation and Cave Specialists would expect surface disturbance to occur around the blockhouse location due to caving exploration in Snowy River especially during winter months when the natural entrance into Fort Stanton Cave is closed due to bat hibernation in compliance with the Resource Management Plan (RMP) of 1997. Other high use times would be during high water cycles in the main cave passage of Fort Stanton Cave. Mitigation measures to decrease these impacts would include disallowing vehicle traffic into the site and requiring caver groups to adhere to the leave no trace and tread lightly land use ethics.

V. CONSULTATION AND COORDINATION

The proposal has been presented to the caving community involved in the ongoing study and dig in Fort Stanton. Presently there is no opposition to the proposal but a recognition that it needed to be thoroughly examined through the NEPA process before a decision could be reached as to what would be best for the long term protection, access and research of the cave.

PERSONS CONSULTED

BLM staff:

Melvin Moe, Wildlife Biologist
Joseph Navarro, Rangeland Management Specialist
John Spain, Rangeland Management Specialist
Howard Parman, Planning Coordinator
Irene Gonzales, Realty Specialist
Dan Baggao, Wildlife Biologist
Michael McGee, Hydrologist
Pat Flanary, Archaeologist
Paul Happel, Natural Resource Specialist
Helen Miller, Range Mgt. Specialist /Noxious Weeds
Bill Murry, Outdoor Recreation Planner/Cave Specialist
Jerry Dutchover, Geologist
Richard Hill, Environmental Protection Specialist
Tim Kreager, Assistant Field Manager, Resources
Al Collar, Safety Officer (collateral position)
Angel Mayes – Assistant Field Manager, Lands and Minerals
James Goodbar, NMSO Cave Specialist

Others:

National Cave Karst Research Institute, (NCKRI)
Dr. Lewis Land, Cave Hydrologist, NCKRI
Fort Stanton Cave Study Group, Lead cooperater in Snowy River project work
New Mexico Technical University, Socorro, NM
Dr. Penelope Boston, Cave Microbiologist, New Mexico Technical University
Dr. Diana Northup, New Mexico Technical University

VI. REFERENCES

Mourant, W. A., 1963, Water Resources and Geology of the Rio Hondo Drainage Basin Chaves, Lincoln, and Otero Counties, New Mexico., and Kelley, V. C., 1971, Geology of the Pecos country southeastern New Mexico.

FINDING OF NO SIGNIFICANT IMPACT/RATIONALE

FINDING OF NO SIGNIFICANT IMPACT: After studying the potential impacts of the proposed action as described in this Environmental Assessment, I do not anticipate any significant impacts on the quality of the human environment. I base my finding of no significant impacts on the factors related to context and intensity of impacts as defined by the Council on Environmental Quality (CEQ) at 40 CFR, parts 1500-1508. I conclude that the implementation of the proposed action would not result in any undue or unnecessary environmental degradation and an Environmental Impact Statement is not required.

Rational for Recommendations: The proposed action would not result in any undue or unnecessary environmental degradation. The proposed action will be in compliance with the Roswell Resource Management Plan and Record of Decision (October, 1997)

Eddie Bateson
Roswell Field Office Manager

Date

DECISION RECORD
EA# NM-510-2007-166

Decision: It is my decision to approve the Proposed Action in the attached environmental assessment (EA No. NM-510-2007-166), which is to authorize a minor category right-of-way to New Mexico Tech to drill a 30 – 36 inch shaft into Mud Turtle passage at survey station SRT23-24, 8' X 8'X6' or slightly larger hole in the ground surface above the proposed drill site to house an 8X8X8 foot steel-reinforced concrete entry chamber.

The proposed project will be 200' x 200' site right-of-way. The proposed action will disturb approximately .92 acres. All construction on public land would be located within the 200' x 200' site right-of-way. The proposed right-of-way grant would be issued for a 3-year period without an option to renew.

The mitigation measures identified in the attached EA along with specific project design features have been formulated into stipulations. This decision incorporates, by reference, those stipulations identified in the attached Environmental Assessment.

Authority of this action is the National Environmental Policy Act of 1969 (42 U.S.C. 4321, es seq.), as amended.

Rationale for Decision: The Proposed Action is conformance with the 1997 Roswell Resource Management Plan and the Fort Stanton ACEC Activity Plan. The Proposed Action is the most economical and environmentally acceptable method of achieving the Purpose and Need for this environmental assessment.

Any person who is adversely affected by a final decision of the authorized officer may file a written appeal to the Final Decision for the purpose of a hearing before an administrative law judge under 43 CFR 4.410. A period of 30 days after the decision becomes final is provided in which to file an appeal and a petition for stay of the decision in this office.

Eddie Bateson
Roswell Field Office Manager

Date

Appendix 1. FORT STANTON CAVE CURRENT MANAGEMENT

Fort Stanton Cave lies within the Fort Stanton ACEC, which was established by the 1997 Roswell Resource Management Plan. The RMP made the following management decisions:

- Fort Stanton Cave will be closed annually to recreation use from November 1 to the following April 15, to protect hibernating bat populations.
- Recreation developments at Fort Stanton, including trails and camping areas, will continue to be maintained or upgraded, when needed, to meet requirements for visitor health and safety.
- All public land in Fort Stanton will be open to saleable mineral disposal. All public land in Fort Stanton will remain withdrawn from the general mining laws, and closed to the disposal of leasable minerals and to the leasing of oil and gas.
- Major rights-of-way will be excluded on about 24,630 acres of public land to protect important plant and animal habitat, significant riparian, wetland and aquatic habitats, and visual quality.
- Livestock grazing will be considered to the extent it would be used as a tool to accomplish management plan objectives. Livestock grazing will be limited or excluded in riparian pastures, highly erodible areas, cave entrances, campgrounds and day-use areas, and sensitive archaeological sites. No grazing preference will be established.
- Saltcedar treatments will be conducted on as many as 300 acres of selected riparian/wetland habitat along the Rio Bonito and Salado Creek using prescribed fire, mechanical control (chain saws), or chemicals, except that chemicals will not be applied aerially.
- Prescribed burns will be conducted in selected pinon-juniper, riparian and grassland community types at Fort Stanton to improve wildlife habitat and reduce fuels. Fuelwood sales will be permitted in selected areas.
- Camping at Fort Stanton will be managed by:

Permitting “vehicle campers” (those who drive motorized vehicles to a campsite) to drive no more than 100 feet off a BLM-designated road or trail to a campsite. But, in no case will camping be allowed within 100 feet of the Rio Bonito and Salado Creek. About 250 acres will be closed to the use of OHVs in these areas.

Permitting back country camping throughout Fort Stanton, except within 100 feet of the Rio Bonito and Salado Creek and no closer than 300 yards of any seeps or springs, manmade water hole, water well or watering tank used by wildlife or domestic livestock.

Limiting all camping to no closer than one-quarter mile from waysides, overlooks, interpretive trails or state highways, except at developed campgrounds and designated campsites.

- Approximately 24,000 acres will be designated as limited to designated roads and trails for OHV use, to protect soil, cultural resources, and vegetation, including threatened or endangered species.
- BLM will recommend to the New Mexico State Game Commission that Fort Stanton be designated as a special hunt draw area or a restricted area open only to primitive hunting (bow and arrow or muzzle-loader). Additionally, vehicles will not be allowed off of designated roads or trails to retrieve downed game.
- Big game or upland game transplants and reintroductions will be conducted on public lands when cooperatively prescribed by the BLM and the NMDGF. Transplants and reintroductions include, but are not limited to:

Pronghorn in pastures that meet the suitability criteria (see Appendix 12 in the Draft RMP/EIS);

Mule deer in areas of low population density or areas to enhance gene pools;

Wild turkey;

Other big game or upland game species recommended by the New Mexico Department of Game and Fish.

In March 2001, BLM completed the Fort Stanton ACEC Activity Plan. This plan further refined the management prescriptions of the RMPA. Those prescriptions that would affect the NCA are:

Threatened or Endangered Species – Kuenzler’s hedgehog cactus is listed as an endangered species by the federal government and the State of New Mexico. The Kuenzler’s cactus can be found on 14,000 acres within the ACEC which supports the largest known population of cactus in New Mexico. All BLM authorized activities must avoid surface disturbance in habitat crucial for the cactus including the proposed NCA. See No Surface Disturbance Map in the ACEC activity plan.

Watershed Improvement Projects - Projects will be designed to meet the Goals of the Watershed Management, Riparian & Wetland Habitat Management, Vegetation Management, Threatened & Endangered Species Management, Fuels & Fire Management, and Visual Resource Management sections of this plan. Goals for these projects include reducing the amount of juniper invading the grasslands, altering the plant species mix to improve watershed health, eliminate or control salt cedar and other noxious, nonnative plant species, restore the watershed to a more historical condition, reduce the amount of fuels available to a wildfire in rural/urban interfaces, and enhance water quality and quantity in the Rio Bonito and Salado Creek. Methods will include mechanical (chainsaws and ground-based machinery) and prescribed fire (either broadcast burns or pile burning). Debris removal may also include chipping. Firewood and fence post material would be made available to the public. An environmental assessment will be prepared that will analyze the impacts of the project.

Livestock Grazing - BLM will offer livestock grazing within the ACEC when grazing would contribute to meeting the Vegetation Management Goals. BLM will control the number of animals and timing of grazing within the ACEC.

Visual Resource Management - Provide architectural/design guidelines for all new structures within the ACEC which will include requiring sites to be below ridgelines and colors that blend with the natural landscape.

Road and Recreation Trail Management - BLM will begin a route designation planning process that will guide trail development and possible road closures within the ACEC. The goal of the plan will be to eliminate as much of the current road/trail dual designation as possible. This will be a public process and include environmental analysis.

Law Enforcement - Continue patrol and education activities within the ACEC with the aim of meeting the Goals and Objectives of this ACEC Plan.

Camping – Objectives are to provide dispersed camping where appropriate; provide interpretive signs and displays for the camping public; and provide information through internet or printed media on camping on public lands within the ACEC. To meet these objectives, BLM will continue to monitor the impacts of camping on the resources within the ACEC. BLM will close the Fort Stanton Cave Road to camping and identify dispersed camping sites within the ACEC. See map in the ACEC activity plan.

Special Recreation Use Permits - BLM will continue to issue special use permits for events within the ACEC and will monitor the impacts of those events on the resources within the ACEC. BLM will identify sites within the ACEC that could serve as base camps for major events. BLM will attempt to rotate use of these sites so that each site is used only once in a calendar year. This would distribute impacts throughout the ACEC and lessen impacts to individual sites.

Cooperative Management of Historic Fort Stanton - BLM will cooperate with interest groups, local and state government so that management of the ACEC is compatible with uses of the historic fort. BLM will also cooperate in the development of plans and activities within the historic fort.

Other plans that affect the surface area included in the proposed NCA are:

- Fort Stanton Route Designation Plan (2003 EA) – designates recreation trails and their users (hike, bike, horse) and which roads within the ACEC to be closed.
- Fort Stanton Cave Campground (2005 EA) – covers improvements (concrete pads and shelters at the existing campground).
- Lincoln County Overland Stage Company Route Extension (2002 EA) – Covers SRUP for using existing roads for commercial stagecoach rides.

**Bureau of Land Management, Roswell Field Office
Environmental Assessment Checklist, EA# NM-510-2007-166**

Resources	Not Present on Site	No Impacts	May Be Impacts *	Mitigation Included	BLM Reviewer	Date
CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT *must be addressed in document						
Air Quality			X		Hydrologist	
Floodplains	X				/s/ Michael McGee	7/11/07
Water Quality - Surface/Ground			X	X	Geologist/Hydrologist /s/ Michael McGee	7/11/07
Cultural Resources	X				Archaeologist	
Native American Religious Concerns		X			Pat Flanary	6/28/07
Environmental Justice		X			/s/J H Parman	6/20/07
Areas of Critical Environmental Concern			X		Plan & Env. Coord.	
Farmlands, Prime or Unique	x				Realty Irene Gonaes	6-11-2007
Invasive, Non-native Species			X	X	Range Mgmt. Spec. /s/ H. Miller	7/13/2007
Wastes, Hazardous or Solid		X			Richard G. Hill - SPS Haz. Mat Spec	12/12/07
Threatened or Endangered Species	X				Biologist Melvin Moe	7/3/07
Wetlands/Riparian Zones	X					
Wild and Scenic Rivers	X				Outdoor Rec. Plnr.	
Wilderness	X				/s/ Bill Murry	6/29/07
NON-CRITICAL ELEMENTS						
General Topography/Surface Geology		X			Environ .Prot. Spec. Richard G. Hill	12/12/07
Solid Mineral Resources		X			Geo/SPS /s/ Jerry Dutchover	07/03/07
Fluid Mineral Resources		X			Pet Engr/Geo /s/ John S. Simitz	1/3/08
Paleontology		X			Archaeology Pat Flanary	6/28/07
Soil			X	X	Hydrologist	
Watershed/Hydrology			X	X	/s/ Michael McGee	7/11/07
Vegetation			X	X	Range Mgmt . Spec.	
Livestock Grazing	X				/s/ H. Miller	7/13/2007
Special Status Species	X				Biologist	
Wildlife			X	X	Melvin Moe	7/3/07
Recreation			X		Outdoor Rec. Plnr.	
Visual Resources			X		/s Bill Murry	6/29/07
Cave/Karst			X			
Public Health and Safety		X			RFO Safety Officer /s/ Al Collar	7/19/2007

