



Timpanogos Cave National Monument Facility Development Environmental Assessment and General Management Plan Amendment

June 2012



"Temporary" visitor center facility after a rockfall event.

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Facility Development Environmental Assessment and General Management Plan Amendment Timpanogos Cave National Monument

6

Summary

7

8 Timpanogos Cave National Monument (Monument) proposes to improve current Monument
9 operations and visitor experience with new facilities, safety improvements, and visitor
10 management strategies. In 1991, a fire at the Monument destroyed the visitor center and the
11 administrative office headquarters in the canyon. Since the fire, the visitor center has been
12 operated from a temporary modular building, while the administrative offices have occupied a
13 modified residence building on the opposite side of Utah Highway SR 92 (SR 92). The proposed
14 redesign of facilities at the Monument cave trailhead would provide safety improvements by
15 relocating a visitor contact facility out of the most hazardous rock fall area. The redesign would
16 also include new parking facilities and revised traffic flow patterns, potentially, including the
17 realignment of SR 92 to reduce the need for visitors to cross the highway. Administrative
18 functions and a visitor center would be constructed at the mouth of the American Fork Canyon
19 in Highland City. This facility would be shared with the United States Forest Service (USFS)
20 Pleasant Grove Ranger District (PGRD). Demand management strategies would also be
21 employed to better match visitation times and levels to available safe, parking capacity or a
22 potential shuttle bus service.

23

24 This Environmental Assessment (EA) evaluates five Alternatives: a No Action Alternative and
25 four action Alternatives. The No Action Alternative describes the current condition of the project
26 areas with no changes to the facilities and in the way the Monument currently manages the
27 areas. Alternative B describes a mandatory shuttle system to provide access to the cave
28 trailhead. Alternative C describes an optional peak-system shuttle system to provide access to
29 the cave trailhead in addition to using personal vehicles. Alternative D (the Preferred
30 Alternative) describes a realignment of SR 92 and reconfigured parking layout at the Monument.
31 Alternative E describes a reconfigured parking layout at the cave trailhead. The action
32 alternatives also address the construction of a new interagency facility in Highland City, safety
33 improvements, reassigning facilities for administrative and staff operations, and enhancing a
34 cave tour ticket reservation system.

35

36 Implementation of Alternatives D or E would constitute an amendment to the 1993 Timpanogos
37 Cave National Monument General Management Plan (GMP) (NPS 1993). The Monument
38 operates with three existing safety issues including rockfall hazard, a flood hazard, and safety
39 concerns associated with SR 92. In the GMP, a transportation shuttle system for visitors from
40 the interagency center to the cave trail is recommended to mitigate the existing hazards;
41 however, Alternatives D and E mitigate hazards without the installation of a transportation
42 system. Alternatives D and E would include amendments to the GMP that remove the necessity
43 of the transportation system.

44

45 This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) to
46 provide the decision-making framework that 1) analyzes a reasonable range of Alternatives to
47 meet objectives of the proposal, 2) evaluates potential issues and impacts to the Monument's
48 resources and values as well as impacts to the location of an interagency visitor orientation

1 center in Highland City, and 3) identifies mitigation measures to lessen the degree or extent of
2 these impacts. Resource topics included in this document (because the resultant impacts may
3 be greater-than-minor) include geology, floodplains, vegetation, wildlife, park operations, visitor
4 and employee safety, and visitor use and experience. No major effects are anticipated as a
5 result of this project. Public scoping was conducted to assist with the development of this
6 document with several new ideas included for consideration and analysis.

7
8 **Public Comment**

9
10 If you wish to comment on the EA, you may post comments online at
11 <http://parkplanning.nps.gov/tica> or mail comments to: Superintendent; Timpanogos Cave
12 National Monument, R.R. 3 Box 200, American Fork, Utah 84003.

13
14 This EA will be on public review for 30 days. Before including your address, phone number, e-
15 mail address, or other personal identifying information in your comment, you should be aware
16 that your entire comment – including your personal identifying information – may be made
17 publicly available at any time through a Freedom of Information Act Request. While you can
18 ask us in your comment to withhold your personal identifying information from public review, we
19 cannot guarantee that we will be able to do so.

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32 Monument, Utah
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36

PURPOSE AND NEED

Introduction

Timpanogos Cave National Monument (Monument) is located in American Fork Canyon along Utah Highway SR 92 (SR 92) near the city of Highland, Utah. Since the Monument was established in 1922, the Monument's mission has been to preserve the cultural, natural, and scientific resources of the area, specifically the Timpanogos Cave system, while providing for public use and enjoyment. The Timpanogos Cave system, actually a man-made joining of three caves, has 42 different types of cave formations. Formations of the caves are believed to be a combination of factors including fault line fracture, natural carbonic acid dissolution, and thermal water activities.

American Fork Canyon and the Monument are located within the Pleasant Grove Ranger District (PGRD) Uinta-Wasatch-Cache National Forest. PGRD's mission under the mandate of the USFS includes fostering and preserving the year-round, recreation resources of the forest including the American Fork Canyon-Alpine Loop area. PGRD is a popular destination due to its diversity of year-round recreation.

Public Law (P.L.) 107-329, Title I, Timpanogos Interagency Land Exchange Act was signed into law on December 6, 2002, and a copy of P.L. 107-329 is provided in Appendix A. This act provided legislation for the acquisition of 37.5 acres of land in Highland City, Utah and construction of an interagency administration and visitor facility. The Act authorized the following, pending appropriations:

- Authorized the acquisition of the land for the facilities via land exchange with Forest Service lands (Completed);
- Directed the National Park Service (NPS) to construct an administrative and visitor facility on that acquired land; and
- Directed the United States Forest Service (USFS) and NPS to cooperate in the development, construction, operation and maintenance of the facility.

The purpose of this environmental assessment (EA) is to examine the environmental impacts associated with the proposed new facilities, transit systems, safety improvements, and demand management strategies at the Monument and future site in Highland City. This EA evaluates five Alternatives: a No Action Alternative and four Action Alternatives.

Implementation of Action Alternatives D and E would constitute an amendment to the 1993 Timpanogos Cave National Monument General Management Plan (GMP) (NPS 1993). To improve safety for visitors, a transportation shuttle system for visitors from the interagency center to the cave trail is recommended in the GMP to mitigate the existing hazards associated with rockfall, flooding, and SR 92 traffic; however, Alternatives D and E mitigate hazards without the installation of a transportation system. Alternatives D and E would address amendments to the GMP that remove the necessity of the transportation system.

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ) (40 CFR §1508.9), and the NPS Director's Order (DO)-12 (*Conservation Planning, Environmental Impact Analysis, and Decision-Making*).

1 Background

2
3 The project area consists of two areas less than three (3) miles apart, the Canyon site and the
4 Highland site. Figure 1 shows the approximate project site locations. The Canyon site is located
5 in American Fork Canyon at the Monument and includes the Monument visitor center and public
6 recreation areas, maintenance and staff facilities, and cave trail. The project area at the
7 Canyon site is approximately 5 acres and is shown in Figure 2a. The Highland site is the future
8 location of the interagency facility to be co-utilized by the PGRD and the Monument
9 administrative staff and is located at the entrance of American Fork Canyon in Highland City.
10 The project area at the Highland site is approximately 17 acres and is shown in Figure 2b.

11 Canyon Site

12 The Canyon site includes two project areas shown on Figure 2a: the cave trailhead and the
13 Swinging Bridge Picnic Area.

14 Cave Trailhead Project Area

15
16
17 In 1991, a fire at the Timpanogos Cave National Monument destroyed the Monument visitor
18 center and the administrative office headquarters at the cave trailhead. Since then, the visitor
19 center has been operated from a “temporary” double-wide modular building and the
20 administrative offices have occupied a modified residence building. The thin-walled modular
21 structure used for the visitor center is expensive to heat and cool. The existing, temporary
22 visitor center has reached the end of its lifecycle and requires extensive maintenance and
23 upkeep.

24
25
26 The current visitor center is the primary location to educate visitors about safety hazards on the
27 trail and in the cave, and to educate them about appropriate behavior to protect the Monument’s
28 resources. Space in the visitor center is inadequate to properly support all the visitor and
29 Monument functions required of a NPS visitor center.

30
31
32 Each year, the Monument is open to visitors seven days a week between early May and mid-
33 October. During this time, about 120,000 visitors use the visitor facilities at the Canyon site
34 cave trailhead and as many as 85,000 of these visitors purchase tickets prior to hiking the 1.5
35 mile cave trail to begin their cave tour. Cave tour ticket fees range from \$3 to \$7 depending on
36 the age of the visitor. On weekdays, tour utilization decreases between 2PM and 3PM. On days
37 with peak visitor demand (weekends and holidays), tours start early in the morning, more mid-
38 day tours are offered, and tour utilization decreases at approximately 4PM. Advanced ticket
39 sales are conducted by phone up to 30 days in advance. This reservation feature is used by
40 more visitors during weekend and holidays when cave tours typically sell out.

41
42 Parking durations indicate that on average, 50 percent of vehicles (including visitors and some
43 employees) stay at the cave trailhead parking area for 3 hours or less and the other 50 percent
44 of vehicles stay longer than 3 hours. Visitor duration at the Monument typically increases as
45 cave tours sell-out and visitors have to remain at the cave trailhead longer to take a cave tour.
46 On both weekdays and weekends, visitor demand exceeds the paved parking capacity of the
47 cave trailhead parking area. (CS 2012)

1 The cave trailhead parking area includes two paved parking lots, the North Lot and the South
2 Lot, with a total of 74 parking spaces and the Canyon Nature Trail lot provides 11 paved parking
3 spaces. There are currently no formal parking spaces for large, recreational vehicles or buses.
4 Additional parking along SR 92 is legally allowed in specified gravel pullouts and can potentially
5 accommodate 70 vehicles depending on the parking patterns. During times with peak visitor
6 demand, parking occurs outside of the designated parking areas along SR 92. These overflow
7 parking patterns result in safety conflicts between vehicles and pedestrians, impede access for
8 traffic and emergency response vehicles on SR 92, and encourage social trailing by visitors
9 through undisturbed areas of the Canyon site cave trailhead.

10
11 SR 92, also referred to as the Alpine Loop Scenic Byway and shown on Figure 1, provides
12 access to the Monument and the American Fork Canyon-Alpine Loop Recreation area. The
13 existing cave trailhead parking area is located on both the north and south sides of SR 92. SR
14 92 roadway through the Monument does not have shoulders for parking and curves in the road
15 reduce the sight distance for traffic in either direction. Vehicles traveling near the Monument
16 often do not slow down despite warning signs. Visitors cross SR 92 at a designated crosswalk
17 across from the cave trailhead, but visitors also cross the highway randomly and walk along the
18 highway to access the cave trailhead from informal parking spaces along the highway. The
19 pedestrian traffic across and along SR 92 as well as the parking maneuvers by visitors parking
20 along SR 92 increase the potential for accidents on SR 92 near the cave trailhead.

21
22 Rockfall in the narrow, steep walled American Fork Canyon is common. Multiple injuries from
23 falling rocks have been documented in and around the Monument since its establishment. As
24 recent as the 1990s, a visitor was killed by falling rock ¼ mile up canyon from the Monument
25 boundary. At the cave trailhead, the existing, temporary visitor center is located in an area of
26 frequent rockfall and rocks have damaged and penetrated the building.

27
28 The shape of American Fork Canyon also contributes to the flood potential of the American Fork
29 River at the Monument. The American Fork River runs along SR 92 and transects the
30 Monument. Many of the existing cave trailhead facilities are located within or adjacent to the
31 100- and 500-year floodplain of the American Fork River, including the existing, temporary
32 visitor center and concession building. Additionally, Tibble Fork Dam and Silver Lake Flat Dam
33 are located approximately 5 and 7 miles, respectively, upstream from the Monument and if
34 these dams failed, the probable maximum flood (PMF) would affect an area greater than the
35 500-year floodplain, impacting all Monument facilities.

36
37 There is a continual problem with rodents at the current visitor center – mice, wood rats,
38 squirrels, raccoons, and ring-tailed cat, use the crawl space, walls and ceilings of the temporary
39 building to forage and nest. Insulation has been shredded into nests, phone and electrical cable
40 insulation has been gnawed off causing shorts, and rodent droppings have the potential to
41 spread hanta virus to employees and visitors.

42 43 **Swinging Bridge Picnic Area Project Area**

44
45 The Swinging Bridge Picnic Area is located on the north side of SR 92 approximately ¼ mile
46 west of the cave trailhead. The picnic area includes 22 parking spaces and a historical restroom
47 facility. Visitors typically utilize the picnic area or the restrooms and do not use the area as
48 parking for the cave trailhead facilities and services. Unlike the cave trailhead, the Swinging
49 Bridge Picnic Area does not have the hazards associated with SR 92 and rockfall. The picnic
50 area, except for the restroom, is located out of the 100-year and 500-year floodplain, but is
51 located within the PMF floodplain.

1 **Additional Monument Facilities and Operations**

2
3 In addition to the project areas, the Monument has several other facilities that are utilized for
4 Monument operations shown in Figure 2a. North of the existing, temporary visitor center and
5 across SR 92 are picnic areas and several Monument buildings including Residences #8 and #9
6 and the area referred to as Teepee Flats. Residence #8 is currently used for Monument
7 housing and Residence #9 has been modified to support administrative operations as the
8 Monument headquarters. There are currently 15 parking spaces in this area designated for
9 employee parking, however, during times with peak visitor demand, these spaces cannot
10 accommodate all Monument employees and employees utilize visitor parking spaces. The Rock
11 House, located in the Historic District, is used for Resource Management staff offices, while
12 maintenance operations use the maintenance building. These additional facilities are located
13 within the 100-year, 500-year, and PMF floodplains.
14

15 The current semi-annual operations of the Monument facilities limit exhibits, education
16 programs, interpretation, book sales, and other visitor services to a semi-annual schedule.
17 Additionally, both the Monument and PGRD lack storage space, adequate space for library
18 materials, map/photograph storage, information technology capacity, and records storage.
19

20 **Highland Site**

21
22 The Highland site is 37.5 acres of land in Highland City, Utah. The property was acquired by the
23 USFS and is the future location of the interagency facility to be co-utilized by the PGRD and the
24 Monument administrative staff. The site is currently vacant, but was previously used for cattle
25 grazing.
26

27 **PGRD Office Site**

28
29 The PGRD site is not included in the analysis of this EA. However, the existing conditions of the
30 PGRD operations and facilities at the PGRD site influence the purpose and need for the future
31 project at the Highland site. The PGRD site is currently located in Pleasant Grove, Utah
32 approximately five miles south of the entrance to American Fork Canyon. The 1960s-era PGRD
33 facilities are past their functional life, have inadequate space and infrastructure, and are no
34 longer a conforming facility within the surrounding residential community. The stone and wood
35 building is too small to accommodate the space needs of crews and equipment. A modular unit
36 was placed in the PGRD parking lot in 2003 to serve as office space and a conference room to
37 alleviate some of this need, but the maintenance and office spaces are still sub-standard. The
38 PGRD fire operations are very active during fire season and the noise associated with the
39 operations is a nuisance for the surrounding neighborhood. PGRD facilities are difficult for the
40 public to find and far from the main visitor traffic to the district.
41

42 **Purpose and Need**

43
44 The Monument proposes to improve current Monument operations, visitor and employee safety,
45 and visitor experience in compliance with goals and objectives of current plans and policy.
46

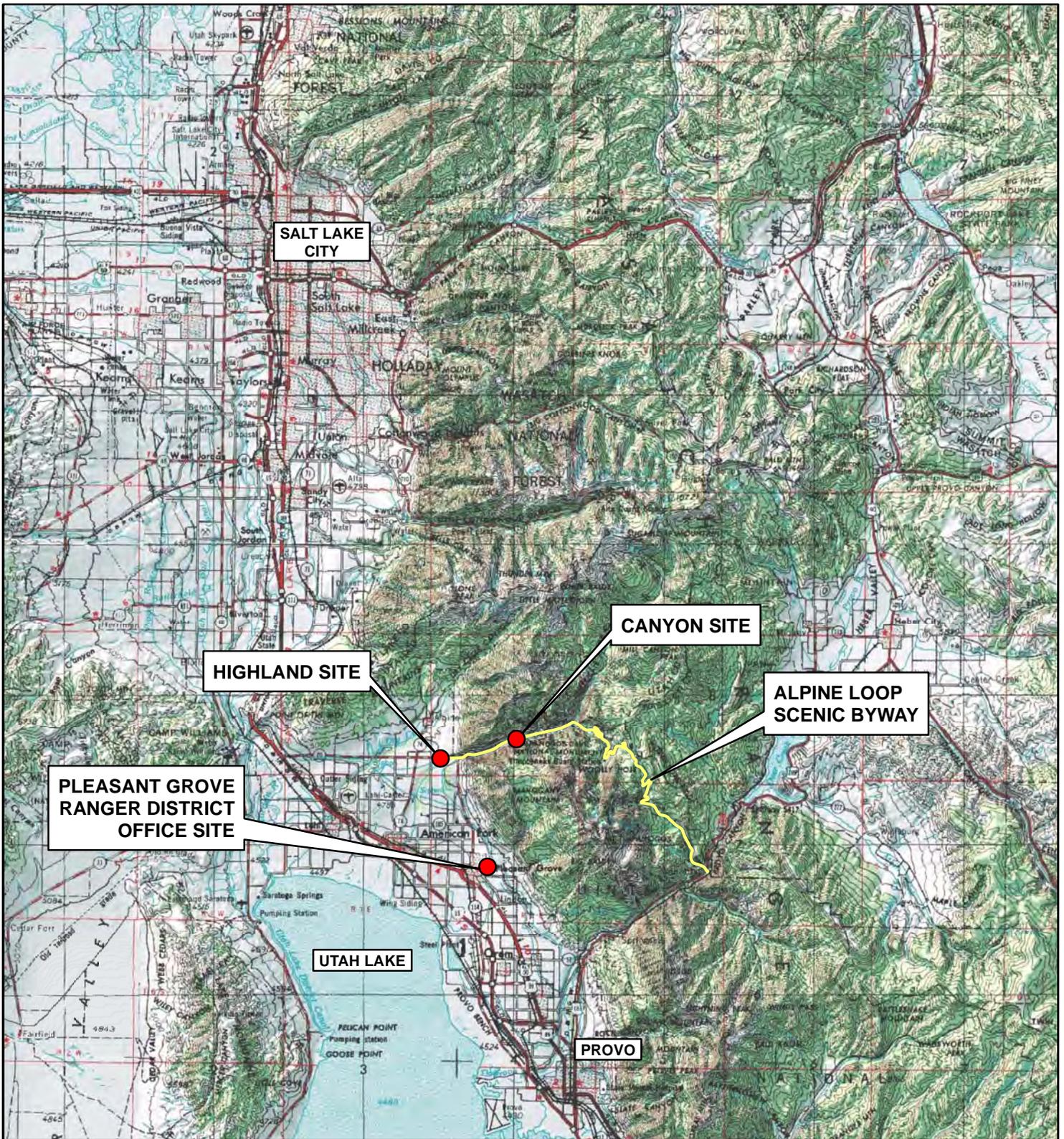
47 The project is needed to accomplish the following objectives:

- 48 • Provide for visitor enjoyment and education with quality visitor services and facilities in
49 the optimal locations for their purposes.

-
- 1 • Improve visitor and employee safety from hazards including rockfall, flood, and highway
 - 2 hazards.
 - 3 • Provide facilities for the Monument and PGRD that consolidate and facilitate the
 - 4 Monument's and forest district's operations.
 - 5 • Minimize impacts to the natural and cultural resources of the Monument.
 - 6

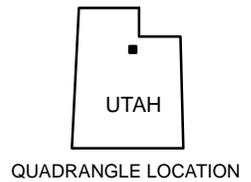
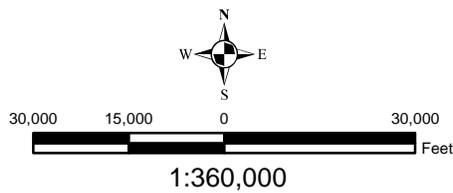
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Base:
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TIMPANOGOS CAVE FACILITY UPGRADES

TIMPANOGOS CAVE NATIONAL MONUMENT UTAH

UNITED STATES DEPARTMENT OF INTERIOR NATIONAL PARK SERVICE

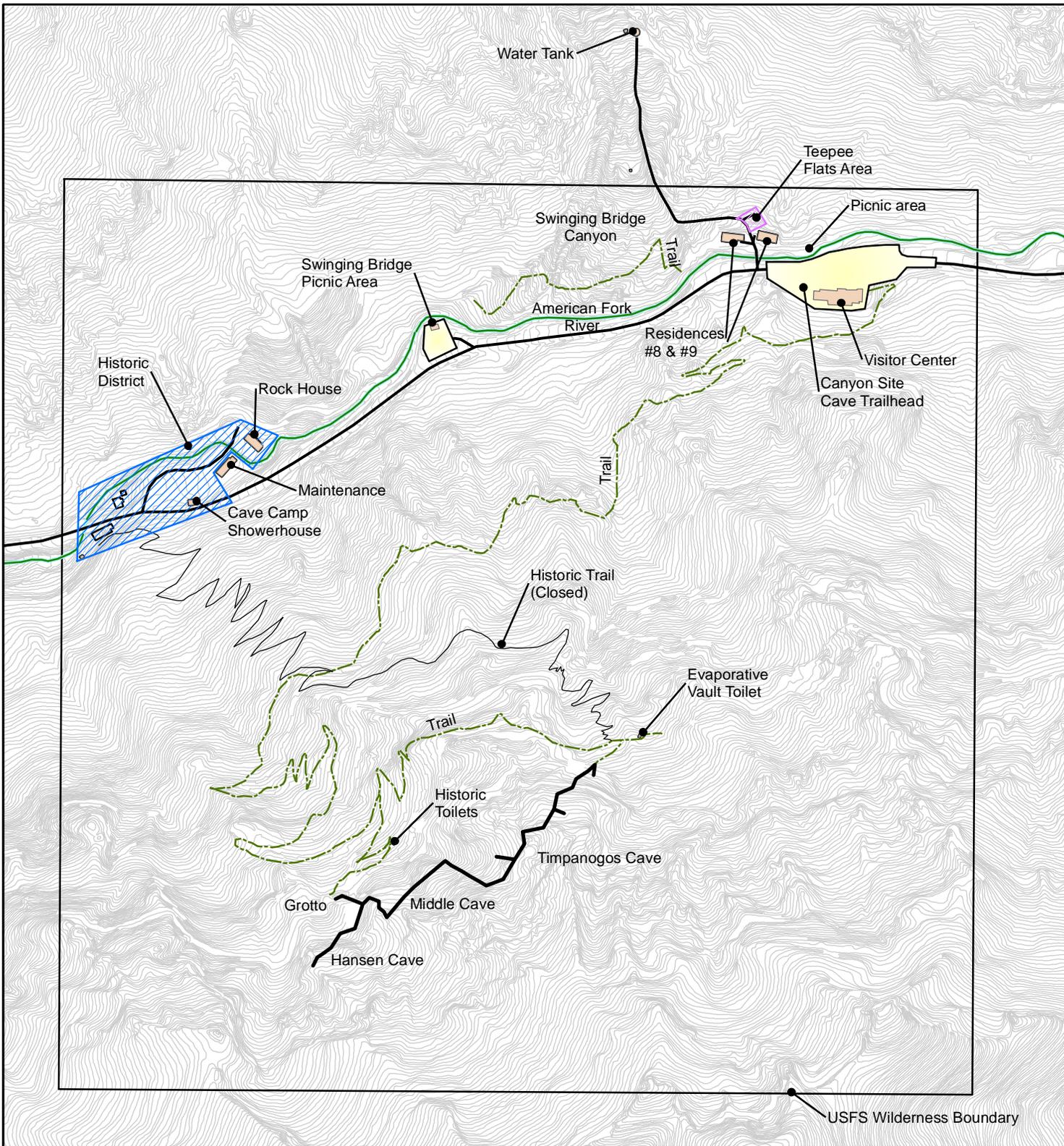
FIGURE 1

SITE VICINITY MAP

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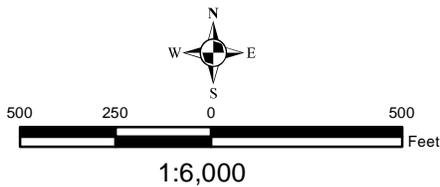
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Legend

-  Potential Project Area
-  Historic District
-  Teepee Flats Area



TIMPANOGOS CAVE FACILITY UPGRADES

FIGURE 2a

TIMPANOGOS CAVE NATIONAL MONUMENT UTAH

CANYON SITE MAP

UNITED STATES DEPARTMENT OF INTERIOR NATIONAL PARK SERVICE



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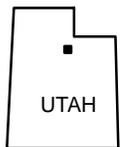
PROPERTY BOUNDARY

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QUADRANGLE LOCATION



TIMPANOGOS CAVE FACILITY UPGRADES

TIMPANOGOS CAVE NATIONAL MONUMENT UTAH

UNITED STATES DEPARTMENT OF INTERIOR NATIONAL PARK SERVICE

FIGURE 2b

HIGHLAND SITE MAP

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1 Relationship to Other Plans and Policies

3 1993 Timpanogos Cave National Monument General Management Plan

5 The 1993 GMP addressed safety hazards in the canyon by relocating the visitor center to an
6 interagency center site outside the canyon mouth and minimizing facilities at the Canyon site
7 cave trailhead, including elimination of the concession operation. Visitors would be required to
8 use a mandatory transportation system between the interagency center and a shuttle staging
9 area and visitor contact facility at the cave trailhead. SR 92 would be realigned to accommodate
10 the staging area.

12 After consulting with staff from the U.S. Geological Survey who conducted a rockfall analysis of
13 the proposed visitor facility site at the Canyon site cave trailhead in August 2009 (Appendix B)
14 and working with NPS staff from the NPS Water Resources Division to examine the flooding
15 situation (Appendix C) within American Fork Canyon, several changes have been identified that
16 could be made to the 1993 GMP to minimize the safety hazards without implementation of a
17 transportation system.

19 Changes that would constitute an amendment to the 1993 GMP are summarized below and are
20 included under alternatives C, D and/or E in this EA.

- 22 • Eliminate or provide an optional transportation system. Without the mandatory
23 transportation system, adequate visitor parking to support cave trail tours would need to
24 be located at the Canyon site cave trailhead. The new cave trailhead visitor contact
25 station would be relocated to an area of significantly lower rock fall hazard and out of the
26 100- and 500-year floodplains, however the parking area would remain within the
27 floodplains and primary rock fall zone. Minimizing visitor service and facilities at the
28 trailhead and implementing visitor management strategies would reduce time spent by
29 visitors at the Canyon site cave trailhead parking area where they would be exposed to
30 rockfall and flooding hazards. A flood mitigation and evacuation plan would further
31 address flooding hazards.
- 32 • Relocate SR 92 as identified in the GMP but for the purpose of accommodating as much
33 parking as practical on the same side of the highway as the proposed visitor contact
34 station and Canyon site cave trailhead, requiring fewer pedestrians to cross the highway
35 to reach these facilities.
- 36 • Relocate the concession operations to the Swinging Bridge Picnic Area to reduce time
37 spent by visitors at the Canyon site cave trailhead parking area.

41 Draft Timpanogos Cave National Monument Cave Management Plan

42 The proposal is also consistent with the goals and objectives of the NPS *Draft Timpanogos*
43 *Cave National Monument Cave Management Plan*. The plan will establish guidelines that
44 provide long term management strategies and set resource condition goals for the Monument's
45 caves. These management strategies will identify opportunities for visitors to experience the
46 caves while protecting the natural and cultural resources within the cave.

1 Timpanogog Cave National Monument Safety Plan

2
3 The proposal is consistent with NPS policy and the goals of the 2011 *Timpanogog Cave National Monument Safety Plan*. It is the policy of the NPS to provide and maintain a safe and
4 healthful work environment. Of primary importance in the plan are the protection of NPS
5 employees and Monument visitors from accident or illness, and the protection of property from
6 damage resulting from recognized hazards in the Monument environment.
7
8

9 Timpanogog Cave National Monument Wildland Fire Management Plan

10
11 The 2004 Wildland Fire Management Plan is the primary planning document directing park
12 wildland fire management activities at the Monument. The primary goals of the wildland fire
13 management program are to protect human health and safety, protect property, enhance
14 community protection, diminish risk and consequences of severe wildland fires, and to the
15 extent possible, increase health of the ecosystem. The proposal is consistent with these goals.
16

17 NPS Management Policies

18
19 The proposal is consistent with the goals and objectives of the NPS *Management Policies* (NPS
20 2006) that state that major Monument facilities within Monument boundaries should be located so
21 as to minimize impacts to Monument resources. The proposed sites of the new facilities were
22 identified to minimize harm to all park resources. Previously disturbed sites are used where
23 possible and the site of the interagency visitor orientation facility is on previously disturbed property
24 owned by the USFS on the eastern edge of Highland City, Utah.
25

26 Public Scoping

27
28 Scoping is a process to identify the resources that may be affected by a project proposal, and to
29 explore possible alternative ways of achieving the proposal while minimizing adverse impacts.
30 The Monument conducted internal scoping with appropriate NPS staff, as described in more
31 detail in the *Consultation and Coordination* chapter of this document. The Monument also
32 conducted two external scoping events with the public and interested/affected groups and
33 agencies.
34

35 The initial external scoping was conducted in the summer of 2009. The Monument distributed a
36 scoping brochure to inform the public of the proposal to construct an interagency facility on the
37 eastern edge of Highland City and a new visitor center at the Canyon site cave trailhead, and to
38 generate input on the preparation of the EA. The scoping brochure was mailed in July 2009 to
39 approximately 90 residents and others in the surrounding region. In addition, the scoping
40 brochure was mailed to various federal and state agencies, affiliated Native American tribes,
41 local governments, and local news organizations. Press releases were distributed to a variety
42 of news organizations. Scoping information was also posted on the Monument's website. An
43 open house was held in the Monument on July 29, 2009 with about 42 individuals in attendance.
44

45 During the initial 30-day scoping period, approximately 27 responses were received. Many
46 expressed their support for the visitor center at the Canyon site cave trailhead and the
47 interagency visitor orientation facility. There was strong support for the road realignment.
48 There was very strong support for the retention of the concession operations facility at the
49 Canyon site cave trailhead. A signed petition with 1599 signatures was sent to the park by the
50 Concessionaire in support of retaining the concession operations. The remaining responses

1 included some in favor of the project, some opposed to the project, and some requesting more
2 project information.

3
4 As part of a transit feasibility study (CS 2012), new alternatives were developed, thus the
5 Monument conducted an additional external scoping event in February 2012. Again, scoping
6 brochures were mailed to approximately 90 residents and others in the surrounding area. An
7 open house was hosted by the Monument in Highland City and all people in attendance were
8 encouraged to provide comments on the NPS Planning, Environment, and Public Comment
9 (PEPC) website for the Monument. Press releases were also distributed to a variety of news
10 organizations.

11
12 During the February 2012 scoping period, 23 comments were received on the PEPC website
13 and 4 comments were received in writing with 1 written letter duplicating a PEPC comment.
14 There was very strong support for the retention of concession operations at the Canyon site.
15 There were comments both in favor of and against the shuttle system. Many comments
16 addressed the possible effects of proposed changes on visitor experience, including visitor
17 confusion regarding the shuttle system, traffic congestion on SR 92, the need for snack bar and
18 gift shop concession operations at the Canyon site, and the need for parking availability for
19 visitors not taking a cave tour. Many comments suggested that the cost of the alternatives was
20 too expensive. Finally, some comments suggested that the proposed alternatives did not
21 address all possible solutions. Some of these comments presented suggestions that are
22 included in the alternatives, but were not discussed in the scoping brochure. Some of these
23 comments included suggestions for new alternatives including adding a traffic light at the
24 Monument, moving administrative services to the Rock House and using the residence buildings
25 for visitor services, constructing the visitor center below the existing grade with a parking garage
26 on top to protect visitors from rockfall, and no visitor contact station at the Canyon site.
27 Alternatives dismissed from further analysis are discussed in further detail in the *Impact Topics*
28 *Dismissed from Further Analysis* in the *Alternatives* section.

29
30 The remaining responses included some in favor of the project, some opposed to the project,
31 and some requesting more project information including a final copy of the transit feasibility
32 study. More information regarding scoping can be found in *Consultation and Coordination*.

33 34 **Impact Topics Retained for Further Analysis**

35
36 Impact topics for this project have been identified on the basis of federal laws, regulations, and
37 orders; *NPS Management Policies* (NPS 2006); and NPS knowledge of resources at
38 Timpanogos Cave National Monument. Figures 3a and 3b show the proposed project area for
39 the Canyon site and Highland site, which is the area that would be affected physically and/or
40 visually by the undertaking of the project. Impact topics that are carried forward for further
41 analysis in this EA include:

- 42
- Topography, Geology, and Soils
 - Vegetation
 - Wildlife
 - Floodplains
 - Visitor Use and Experience
 - Human Health and Safety
 - Park Operations

1 Impact Topics Dismissed From Further Analysis

2
3 In this section, NPS takes a “hard look” at all potential impacts by considering the direct,
4 indirect, and cumulative effects of the proposed action on the environment, along with
5 connected and cumulative actions. Impacts are described in terms of context and duration. The
6 context or extent of the impact is described as localized or widespread. The duration of impacts
7 is described as short-term, ranging from days to three years in duration, or long-term, extending
8 up to 20 years or longer. The intensity and type of impact is described as negligible, minor,
9 moderate, or major, and as beneficial or adverse. The NPS equates “major” effects as
10 “significant” effects. The identification of “major” effects would trigger the need for an EIS.
11 Where the intensity of an impact could be described quantitatively, the numerical data is
12 presented; however, most impact analyses are qualitative and use best professional judgment
13 in making the assessment.

14
15 The NPS defines “measurable” impacts as moderate or greater effects. It equates “no
16 measurable effects” as minor or less effects. “No measurable effect” is used by NPS in
17 determining if a categorical exclusion applies or if impact topics may be dismissed from further
18 evaluation in an EA or Environmental Impact Statement (EIS). The use of “no measurable
19 effects” in this EA pertains to whether NPS dismisses an impact topic from further detailed
20 evaluation in the EA. The reason NPS uses “no measurable effects” to determine whether
21 impact topics are dismissed from further evaluation is to concentrate on the issues that are truly
22 significant to the action in question, rather than amassing needless detail in accordance with
23 CEQ regulations in 1500.1(b).

24
25 In this section of the EA, NPS provides a limited evaluation and explanation as to why some
26 impact topics are not evaluated in more detail. Impact topics are dismissed from further
27 evaluation in this EA if:

- 28
- 29 • they do not exist in the analysis area, or
 - 30
 - 31 • they would not be affected by the proposal, or the likelihood of impacts are not reasonably
32 expected, or
 - 33
 - 34 • through the application of mitigation measures, there would be minor or less effects (i.e. no
35 measurable effects) from the proposal, and there is little controversy on the subject or
36 reasons to otherwise include the topic.

37 Due to there being no effect or no measurable effects, there would either be no contribution
38 towards cumulative effects or the contribution would be low. For each issue or topic presented
39 below, if the resource is found in the analysis area or the issue is applicable to the proposal,
40 then a limited analysis of direct and indirect, and cumulative effects is presented.

41 Special Status Species

42
43
44 The Endangered Species Act of 1973 requires examination of impacts on all federally-listed
45 threatened, endangered, and candidate species. Section 7 of the Endangered Species Act
46 requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any
47 action authorized, funded, or carried out by the agency does not jeopardize the continued
48 existence of listed species or critical habitats. In addition, the NPS *Management Policies* (NPS
49 2006) and Director’s Order-77 *Natural Resources Management Guidelines* require the NPS to
50 examine the impacts on federal candidate species, as well as state-listed threatened,

1 endangered, candidate, rare, declining, and sensitive species (NPS 2006). For the purposes of
2 this analysis, the U.S. Fish and Wildlife Service and the Utah Division of Wildlife Resources
3 were contacted with regards to federally- and state-listed species to determine those species
4 that could potentially occur on or near the project areas of the Canyon and Highland sites.

5
6 To conduct this analysis, information from the U.S. Fish and Wildlife Service and the Utah
7 Division of Wildlife was gathered to determine those special status species that could potentially
8 occur on or near the project area. There are seven federally-listed species in Utah County
9 including Canada lynx, clay phacelia, desert milk-vetch, June sucker, Utah valvata snail, Ute
10 Ladies'-tresses, and the yellow-billed cuckoo (USFWS 2009). There are nineteen state-listed
11 species of concern including fringed myotis, greater sage-grouse, kit fox, least chub, Lewis's
12 woodpecker, long-billed curlew, northern goshawk, roundtail chub, short-eared owl, smooth
13 greensnake, southern Bonneville springsnail, southern leatherside chub, spotted bat, three-toed
14 woodpecker, Townsend's big-eared bat, Utah physa, western red bat, western toad, and the
15 white-tailed prairie dog (UDOW 2009). Townsend's big-eared bats have been spotted within the
16 Monument, but the project area at the Canyon site does not serve as appropriate habitat for the
17 species. There are no records of any of the other listed species in the project areas of the
18 Canyon and Highland sites, nor does the project have any designated critical or essential
19 habitat for these species. According to the Endangered Species Act, this would constitute a
20 finding of "no effect".

21
22 Protection under the Migratory Bird Treaty Act makes it unlawful to pursue, hunt, kill, capture,
23 possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts,
24 nests, eggs, or migratory bird products. In addition, this act serves to protect environmental
25 conditions for migratory birds from pollution or other ecosystem degradations. Some migratory
26 birds may be potential transients of the general area, but the immediate project areas at both
27 the Canyon and Highland sites contain little to no suitable habitat for migratory birds. There are
28 no known nesting sites in these areas and these lands are not vital for foraging or roosting.
29 Construction-related noise could potentially disturb transient bird species, but these adverse
30 impacts would be 1) temporary, lasting only as long as construction, and 2) negligible, because
31 suitable habitat for transient birds is found throughout the region.

32
33 No threatened, endangered, or other species of concern are known to occur in the project area,
34 and impacts to transient bird species would be temporary and negligible. Because these effects
35 are minor or less in degree, this topic is dismissed from further analysis.

36 37 **Water Resources**

38
39 NPS policies require protection of water quality consistent with the Clean Water Act. The
40 purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological
41 integrity of the Nation's waters." To enact this goal, the U.S. Army Corps of Engineers has been
42 charged with evaluating federal actions that result in potential degradation of waters of the
43 United States and issuing permits for actions consistent with the Clean Water Act. The U.S.
44 Environmental Protection Agency also has responsibility for oversight and review of permits and
45 actions, which affect waters of the United States.

46
47 The proposed project areas do contain surface waters, but are otherwise mostly dry, except for
48 periodic runoff during storm events. Water quality, water quantity, and drinking water are not
49 expected to be affected by the project. At the Canyon site cave trailhead, the size of a new
50 visitor center could increase the amount of impervious surface in the area, which could possibly
51 increase the erosion potential of the area. The American Fork River flows north of the existing,

1 temporary visitor center and SR 92. No construction would take place below the Creek's
2 ordinary high water mark. At the Highland site, the size of the new interagency visitor
3 orientation center would increase the amount of impervious surface in the area. American Fork
4 River, two irrigation canals, and one historic dry ditch run across the Highland site (shown in
5 Figure 2b). Construction at the Highland site would not impact the irrigation canals or the river.
6 To further assist with erosion control and protection of water quality, disturbed areas at both the
7 Canyon and Highland sites would be re-vegetated and re-contoured following construction. The
8 proposed action would result in negligible effects to water resources. Because these effects are
9 minor or less in degree, this topic is dismissed from further analysis in this document.

10 **Wetlands**

11
12
13 For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that
14 are inundated or saturated by surface or ground water at a frequency and duration sufficient to
15 support, and that under normal circumstances do support, a prevalence of vegetation typically
16 adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs
17 and similar areas."

18
19 Executive Order 11990 *Protection of Wetlands* requires federal agencies to avoid, where
20 possible, adversely impacting wetlands. Further, §404 of the Clean Water Act authorizes the
21 U.S. Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge or
22 dredged or fill material or excavation within waters of the United States. NPS policies for
23 wetlands as stated in NPS *Management Policies* (NPS 2006) and Director's Order 77-1
24 *Wetlands Protection* strive to prevent the loss or degradation of wetlands and to preserve and
25 enhance the natural and beneficial values of wetlands. In accordance with DO 77-1 *Wetlands*
26 *Protection*, proposed actions that have the potential to adversely impact wetlands must be
27 addressed in a statement of findings for wetlands.

28
29 No wetlands are located in the project areas at either the Canyon or Highland sites; therefore, a
30 statement of findings for wetlands would not be prepared. Because there are no wetlands in the
31 project area, this topic is dismissed from further analysis in this document.

32 **Wilderness**

33
34
35 The Wilderness Act of 1964 defines wilderness as "...an area where earth and its community of
36 life are untrammelled by man, where man himself is a visitor who does not remain..." and further
37 as "...an area of undeveloped Federal land retaining its primeval character and influence, without
38 permanent improvements or human habitation, which is protected and managed so as to
39 preserve its natural conditions" (P.L. 88-577 1964).

40
41 The Lone Peak Wilderness was designated by the United States Congress in 1978 and is
42 managed by the USFS. The Lone Peak Wilderness is located in both the Wasatch-Cache and
43 Uinta National Forests and it shares its southern boundary with the Monument. Because no
44 wilderness area would be disturbed or eliminated, this topic is dismissed from further analysis in
45 this document.

46 **Climate Change/Energy Conservation Potential/Sustainability**

47
48
49 Although climatologists are unsure about the long-term results of global climate change, it is
50 clear that the planet is experiencing a warming trend that affects ocean currents, sea levels,

1 polar sea ice, and global weather patterns. Although these changes will likely affect winter
2 precipitation patterns and amounts in the parks, it would be speculative to predict localized
3 changes in temperature, precipitation, or other weather changes, in part because there are
4 many variables that are not fully understood and there may be variables not currently defined.
5 Therefore, the analysis in this document is based on past and current weather patterns and the
6 effects of future climate changes are not discussed further.

7
8 The proposed projects at the Canyon and Highland sites would improve the energy
9 conservation of the Monument and PGRD operations. Both the Monument and PGRD operate
10 from temporary, doublewide modular structures. These structures require significant
11 maintenance each year and are not energy efficient to heat and cool. Energy conservation
12 upgrades to the structures would not be monetarily feasible. The proposed actions would
13 remove the need to use modular structures with the construction of energy-efficient structures at
14 both the Canyon and Highland sites.

15
16 The proposed operational changes would reduce or have no change to miles driven to and from
17 the Monument. By moving the Monument administrative staff to the proposed interagency visitor
18 orientation center at the Highland site and assuming that staff live on the west side of the
19 Monument, the Monument staff would reduce the distance to and from work by approximately
20 six miles per trip to work. Some of the action alternatives introduce a shuttle system which
21 would reduce vehicle miles driven for the 70 percent of visitors that enter the Monument from
22 the west. The 30 percent of Monument visitors that approach from the eastern entrance of the
23 Alpine Loop would have an increased driving distance. Some of the other action alternatives do
24 not have a shuttle system, but require advanced ticket purchases. A variety of ticket sales
25 options are being explored, but if tickets must be retrieved from the Highland site, visitors
26 approaching from the east would drive an additional six miles approximately to visit the
27 Monument and visitors approaching from the west would see no change. Additionally,
28 transferring PGRD operations to the Highland site would make the facility easier to access by
29 the public and reduce the vehicle miles traveled by PGRD visitors.

30
31 Changes to energy consumption at the Monument would be minor or less when compared to
32 energy consumption in the region. The improved energy efficiency of the proposed facilities
33 would be a minor benefit to regional energy consumption. Vehicle miles traveled as a result of
34 Monument visitation and staff use are a small component of regional travel and changes in
35 energy requirements resulting from the changes in personal vehicles or bus trips under the
36 alternatives would be minimal. Transportation related energy consumption within the project
37 area is minor or less compared to transportation related energy consumption within the region
38 as a whole.

39
40 Because the climate change/energy conservation/sustainability effects of the proposed project
41 are minor or less in degree, this topic is dismissed from further analysis.

42 43 **Archeological Resources**

44
45 The Monument, including the Canyon site cave trailhead site, was evaluated for archeological
46 potential in 1975 (Anderson 1975). Only one archeological site, a petroglyph, was located within
47 the Monument. It has not been formally evaluated for inclusion in the National Register of
48 Historic Places (NRHP), but would not be affected by the proposed construction. Potential work
49 and staging areas near the housing units would be located away from the petroglyph to protect
50 it in place. Dry laid stone walls were inventoried in 2007 (IRAPM 2007) along the cave trail.
51 These have not been formally evaluated, but would be avoided by the proposed work. The

1 developed area of the Canyon site cave trailhead has low archeological sensitivity due to
2 previous development and work associated with the building of the road.

3
4 In 2004, the USFS conducted an archeological survey of the Highlands site when it was being
5 considered for potential acquisition for an interagency center. Two modern historic sites were
6 located. These included the remnants of a 1960 farmhouse and an historic trash scatter. The
7 scatter dated between 1935 and 1970 but had little integrity for the older period. Information
8 about both sites was sent to the State Historic Preservation Officer (SHPO) and the sites were
9 determined to be ineligible for listing in the NRHP due to lack of integrity or further information
10 potential.

11
12 No significant archeological sites are expected to occur within the project areas. If previously
13 unknown archeological resources were discovered during construction, all work in the
14 immediate vicinity of the discovery would be halted until the resources could be identified and
15 documented and, if the resources cannot be preserved *in situ*, an appropriate mitigation strategy
16 would be developed in consultation with the Utah SHPO and, as necessary, American Indian
17 tribes. In the unlikely event that human remains, funerary objects, sacred objects, or objects of
18 cultural patrimony are discovered during construction, provisions outlined in the Native
19 American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed. If
20 non-Indian human remains were discovered, standard reporting procedures to the proper
21 authorities will be followed, as will all applicable federal, state, and local laws. Since no
22 archeological resources are expected within the project areas, archeological resources were
23 dismissed from further analysis in this document.

24 25 **Ethnographic Resources**

26
27 NPS's DO-28 *Cultural Resource Management* defines ethnographic resources as any site,
28 structure, object, landscape, or natural resource feature assigned traditional legendary,
29 religious, subsistence, or other significance in the cultural system of a group traditionally
30 associated with it. Ethnographic resources are associated with the cultural practices, beliefs,
31 the sense of purpose, or existence of a living community that is rooted in that community's
32 history or is important in maintaining its cultural identity and development as an ethnically
33 distinctive people.

34
35 There are no known ethnographic resources at or near either of the proposed project areas.
36 Under the supervision of the USFS, a survey of cultural resources was conducted at the
37 Highland site in 2004 and no cultural resources were identified at the site (USFS 2004). During
38 scoping American Indian tribes traditionally associated with park lands (Paiute Indian Tribe of
39 Utah, Skull Valley Band of Goshute Indians of Utah, and Ute Indian Tribe of Uinta and Ouray
40 Reservation) were apprised by letter of the proposed action. The tribes were requested to
41 respond with any issues or concerns. No comments were received. Copies of the EA will be
42 forwarded to each associated tribe for review and comment. If subsequent issues or concerns
43 are identified, appropriate consultations would be undertaken. Because it is very unlikely that
44 ethnographic resources would be affected, and because appropriate steps would be taken to
45 protect any human remains, funerary objects, sacred objects, or objects of cultural patrimony
46 inadvertently discovered, ethnographic resources was dismissed as an impact topic.

47 48 **Cultural Landscapes**

49
50 According to the NPS's DO-28 *Cultural Resource Management Guideline*, a cultural landscape
51 is a reflection of human adaptation and use of natural resources, and is often expressed in the

1 way land is organized and divided, patterns of settlement, land use, systems of circulation, and
 2 the types of structures that are built. Cultural landscapes are either associated with significant
 3 historic events, activities, or people or exhibit other cultural or aesthetic values.

4
 5 At the Canyon site, the proposed visitor center facility would be constructed to replace the
 6 current modular building and is not located in the Monument historic district where there is the
 7 greatest likelihood of cultural landscapes existing at the Monument. At the Highland site, the
 8 interagency visitor orientation center would be constructed on land that was previously used as
 9 a grazing pasture. Neither project area is significant for its associations with important events,
 10 activities, nor persons. Neither project area significantly illustrates peoples' values or attitudes
 11 toward the land or important patterns of settlement, use, and development over time.
 12 Therefore, cultural landscapes was dismissed as an impact topic.

13
 14 **Historic Structures**

15
 16 Several structures at the Monument are listed in the NRHP and on the NPS List of Classified
 17 Structures (LCS). The Monument's registered historic structures which constitute the
 18 Monument's Historic District are listed in Table 1.

19
 20 **Table 1 - Registered Historic Structures at Timpanogos Cave National Monument**

Structure Name	Alternative Name	NRHP ID Number	LCS ID Number
Cold Storage behind the site of the Custodian's Residence	---	HS-001B	---
Storage Building	Historic Ticket Booth	HS-001D	11585
Stone Bridge	---	HS-001E	---
Rock House	Resource Management Office/Stone House/ Superintendent's Residence	HS-002	11587
Cold Storage behind the Rock House	---	HS-002A	---
Cave Comfort Station	Historic Rock Outhouse	HS-127	11586
Stone Retaining Wall next to SR 92	---	HS-150A	---
Stone Retaining Wall next to American Fork River	---	HS-150B	---
Old Timpanogos Cave Trail	---	HS-RT5	---

21
 22 None of these structures are located in the proposed project area and would not be impacted by
 23 the proposed construction activities.
 24

1 On April 12, 2010, the Monument submitted documentation to the Utah SHPO for the Quarters
2 #8 (Residence #8), Quarters #9 (Residence #9 or Headquarters), the Swinging Bridge comfort
3 station, the Concessions building and other structures not within the project area. The SHPO
4 concurred that none of these structures were eligible for listing in the NRHP (see Appendix D).

5
6 Implementation of the project to improve Monument facilities would not impact the existing
7 Monument historic structures. Historic structures was dismissed as an impact topic.

8 9 **Museum Collections**

10
11 According to DO-24 *Museum Collections*, the NPS requires the consideration of impacts on
12 museum collections (historic artifacts, natural specimens, and archival and manuscript material),
13 and provides further policy guidance, standards, and requirements for preserving, protecting,
14 documenting, and providing access to, and use of, NPS museum collections. The Monument
15 museum collections would not be affected by this project because the Monument has already
16 planned to relocate the current museum collection to the University of Utah within the next five
17 years. The University of Utah building that would house the museum collections has completed
18 construction and the Monument anticipates no changes in conditions or in impacts to the
19 museum collections with the implementation of any of the Action Alternatives. Because museum
20 collections would be unaffected, this topic is dismissed from further analysis in this document.

21 22 **Air Quality**

23
24 The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) was established to promote the public health
25 and welfare by protecting and enhancing the nation's air quality. The act establishes specific
26 programs that provide special protection for air resources and air quality related values
27 associated with NPS units. Section 118 of the Clean Air Act requires a park unit to meet all
28 federal, state, and local air pollution standards. The Monument is designated as a Class II air
29 quality area under the Clean Air Act. A Class II designation indicates the maximum allowable
30 increase in concentrations of pollutants over baseline concentrations of sulfur dioxide and
31 particulate matter as specified in §163 of the Clean Air Act. Further, the Clean Air Act provides
32 that the federal land manager has an affirmative responsibility to protect air quality related
33 values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor
34 health) from adverse pollution impacts.

35
36 Construction activities such as hauling materials and operating heavy equipment could result in
37 temporary increases of vehicle exhaust, emissions, and fugitive dust in the general project area
38 at both the Canyon and Highland sites. Any exhaust, emissions, and fugitive dust generated
39 from construction activities would be temporary and localized and would likely dissipate rapidly
40 because air stagnation in the project areas is rare. Overall, the project could result in a
41 negligible degradation of local air quality, and such effects would be temporary, lasting only as
42 long as construction. The Class II air quality designation for the Monument would not be
43 affected by the project. Because there would be negligible effects on air quality, this topic is
44 dismissed from further analysis in this document.

45 46 **Soundscape Management**

47
48 In accordance with NPS *Management Policies* (NPS 2006) and DO-47 *Sound Preservation and*
49 *Noise Management*, an important component of the NPS's mission is the preservation of natural
50 soundscapes associated with national park units (NPS 2006). Natural soundscapes exist in the

1 absence of human-caused sound. The natural ambient soundscape is the aggregate of all the
2 natural sounds that occur in park units, together with the physical capacity for transmitting
3 natural sounds. Natural sounds occur within and beyond the range of sounds that humans can
4 perceive and can be transmitted through air, water, or solid materials. The frequencies,
5 magnitudes, and durations of human-caused sound considered acceptable varies among NPS
6 units as well as potentially throughout each park unit, being generally greater in developed
7 areas and less in undeveloped areas.
8

9 The Canyon site and the Highland site proposed project areas and all associated construction
10 activity would occur in what can be considered the developed zone of the Monument or in
11 Highland City, respectively. Existing sounds in these areas are most often generated from
12 vehicular traffic, people, climate controls on the buildings, some wildlife such as birds, and wind.
13 Sounds at the interagency visitor orientation center at the Highland site are more typical of what
14 you would expect to hear in a city, with routine noise from vehicular traffic on SR 92 which
15 borders the northern boundary of the site. Sound generated by the long-term operation of the
16 buildings may include climate controls such as heating or air conditioning units and people using
17 the building. Because the project areas at both the Canyon and Highland sites already contain
18 man-made noises, the long-term operations of the buildings are not expected to appreciably
19 increase the noise levels in the general areas.
20

21 During construction, human-caused sounds would likely increase due to construction activities,
22 equipment, vehicular traffic, and construction crews. Any sounds generated from construction
23 would be temporary, lasting only as long as the construction activity is generating the sounds,
24 and would have a negligible to minor adverse impact on visitors and employees. Because
25 these effects are minor or less in intensity, this topic is dismissed from further analysis in this
26 document.
27

28 **Lightscape Management**

29
30 In accordance with NPS *Management Policies* (NPS 2006), the NPS strives to preserve natural
31 ambient lightscapes, which are natural resources and values that exist in the absence of human
32 caused light. The Monument strives to limit the use of artificial outdoor lighting to that which is
33 necessary for basic safety requirements and also strives to ensure that all outdoor lighting is
34 shielded to the maximum extent possible, to keep light on the intended subject and out of the
35 night sky. At the Canyon site cave trailhead, the current visitor center and administration
36 building are the primary sources of light. The Highland site does not have an existing light
37 source, but the current site lightscape includes light from sources in nearby subdivisions and
38 Highland City.
39

40 The proposed actions may incorporate minimal exterior lighting on the buildings, but the lighting
41 would be directed toward the intended subject with appropriate shielding mechanisms and
42 would be placed in only those areas where lighting is needed for safety reasons. The amount
43 and extent of exterior lighting on the buildings would have negligible effects on the existing
44 outside lighting or natural night sky of the area. Because these effects are minor or less in
45 intensity, this topic is dismissed from further analysis in this document.
46

47 **Socioeconomics**

48
49 The Monument is within Utah County, which is the state's second largest populated county with
50 a population in 2010 of 520,049. Economic activity within the county is primarily focused in
51 Provo and Orem, with Brigham Young University and Utah Valley University being the main

1 economic drivers. The primary employment industries in the county included
2 education/health/social services, trade/transportation/utilities, government, and
3 professional/business services. Preliminary estimates for nonfarm jobs in the county in 2011
4 were approximately 181,000. The total population for Highland, Utah in 2010 was 15,523.
5 Retail, accommodation, and food service sales in 2007 for Highland were approximately \$49
6 million. The concessioner's 2010 annual gross receipts from food and beverage service and
7 merchandise sales was \$134,173.

8
9 In most of the action alternatives, the existing Monument concession operations would be
10 eliminated and limited food, drink, and convenience items would be offered by vending
11 machines at the trailhead contact station. This would reduce the concession business
12 opportunities and employment for the concession operations employees. The change in
13 concession operations would adversely affect a small part of the overall local economy and
14 employment. Some beneficial effects to other local businesses from visitors seeking services no
15 longer provided within the Monument may also occur. Impacts to the local/regional
16 socioeconomic conditions would be minor or less impacts. Implementation of the action
17 alternatives could provide a minor beneficial impact to the local/regional economy due to
18 increases in employment opportunities for the construction workforce and revenues for local
19 businesses and governments generated from these additional construction activities and
20 workers. Any increase in workforce and revenue, however, would be temporary, lasting only as
21 long as construction. Over the long-term, possible implementation of a shuttle service could
22 increase local employment opportunities. Because the impacts to the socioeconomic
23 environment would be minor, this topic is dismissed.

24 25 **Prime and Unique Farmlands**

26
27 The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider
28 adverse effects to prime and unique farmlands that would result in the conversion of these lands
29 to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of
30 Agriculture's Natural Resources Conservation Service (NRCS), and is defined as soil that
31 particularly produces general crops such as common foods, forage, fiber, and oil seed; unique
32 farmland produces specialty crops such as fruits, vegetables, and nuts. According to the
33 NRCS, the project area does not contain prime or unique farmlands (NRCS 1976). Because
34 there would be no effects on prime and unique farmlands, this topic is dismissed from further
35 analysis in this document.

36 37 **Indian Trust Resources**

38
39 Secretarial Order 3175 requires that any anticipated impacts to Indian Trust resources from a
40 proposed project or action by the Department of Interior agencies be explicitly addressed in
41 environmental documents. The federal Indian trust responsibility is a legally enforceable
42 fiduciary obligation on the part of the United States to protect tribal lands, assets, resources,
43 and treaty rights, and it represents a duty to carry out the mandates of federal law with respect
44 to American Indian and Alaska Native tribes.

45
46 There are no Indian Trust resources at the Canyon and Highland sites. The lands comprising
47 the Monument and the Highland site are not held in trust by the Secretary of the Interior for the
48 benefit of Indians due to their status as Indians. Because there are no Indian Trust resources,
49 this topic is dismissed from further analysis in this document.

1 Environmental Justice

2
3 Presidential Executive Order 12898, *General Actions to Address Environmental Justice in*
4 *Minority Populations and Low-Income Populations*, requires all federal agencies to incorporate
5 environmental justice into their missions by identifying and addressing the disproportionately
6 high and/or adverse human health or environmental effects of their programs and policies on
7 minorities and low-income populations and communities. According to the Environmental
8 Protection Agency, environmental justice is the:

9 ...fair treatment and meaningful involvement of all people, regardless of race,
10 color, national origin, or income, with respect to the development,
11 implementation, and enforcement of environmental laws, regulations and
12 policies. Fair treatment means that no group of people, including a racial, ethnic,
13 or socioeconomic group, should bear a disproportionate share of the negative
14 environmental consequences resulting from industrial, municipal, and
15 commercial operations or the execution of federal, state, local, and tribal
16 programs and policies.

17 The goal of 'fair treatment' is not to shift risks among populations, but to identify potentially
18 disproportionately high and adverse effects and identify Alternatives that may mitigate these
19 impacts.

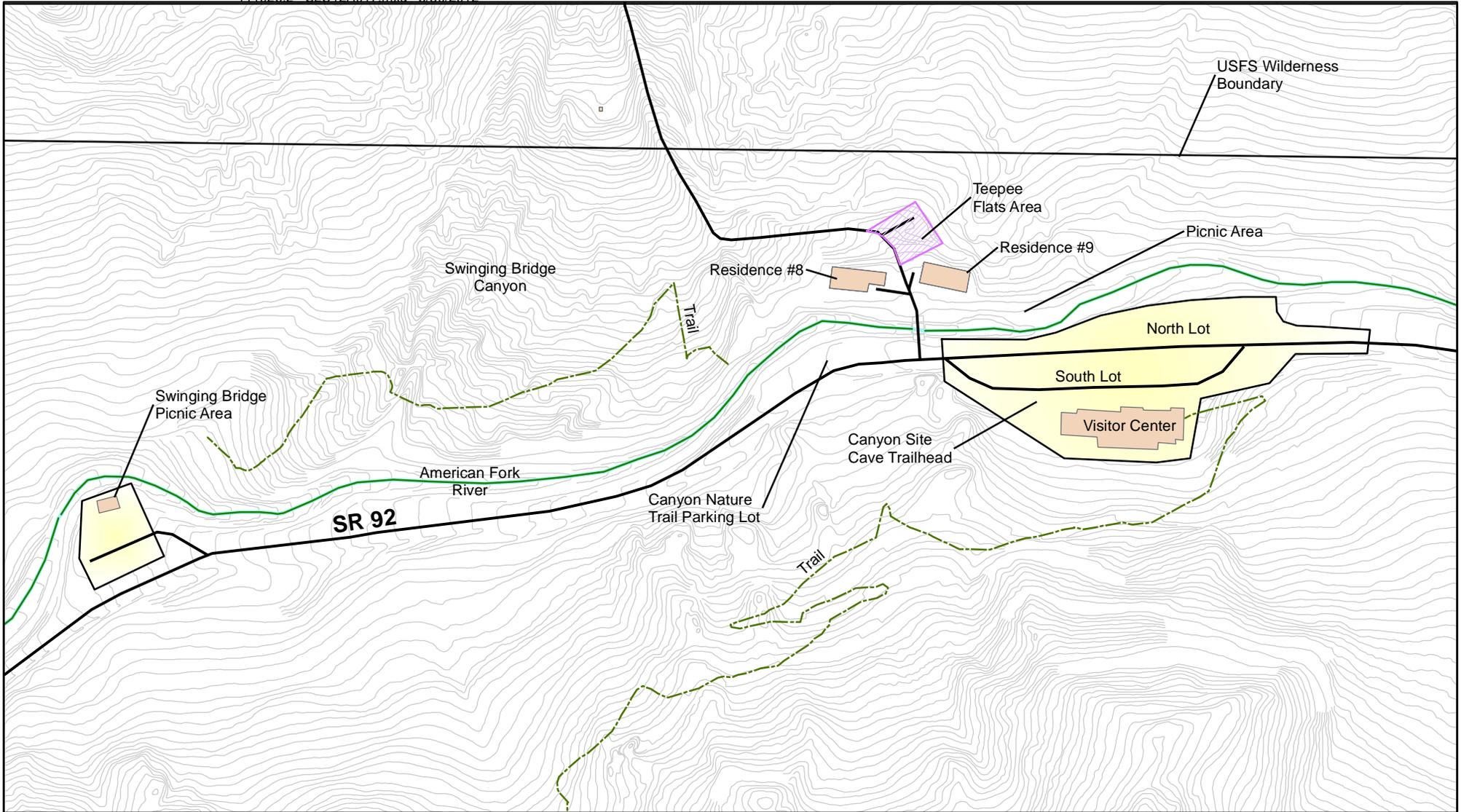
20
21 The communities surrounding the Monument contain both minority and low-income populations;
22 however, environmental justice is dismissed as an impact topic for the following reasons:

- 23 • The Park staff and planning team actively solicited public participation as part of the
24 planning process and gave equal consideration to all input from persons regardless of
25 age, race, income status, or other socioeconomic or demographic factors.
- 26 • Implementation of the Preferred Alternative would not result in any identifiable adverse
27 human health effects. Therefore, there would be no direct or indirect adverse effects on
28 any minority or low-income population.
- 29 • The impacts associated with implementation of the Preferred Alternative would not
30 disproportionately affect any minority or low-income population or community.
- 31 • Implementation of the Preferred Alternative would not result in any identified effects that
32 would be specific to any minority or low-income community.

33
34 Because there would be no disproportionate effects to minority or low income populations, this
35 topic is dismissed from further analysis in this document.

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Legend

-  Potential Project Area
-  Teepee Flats Area



TIMPANOGOS CAVE FACILITY UPGRADES

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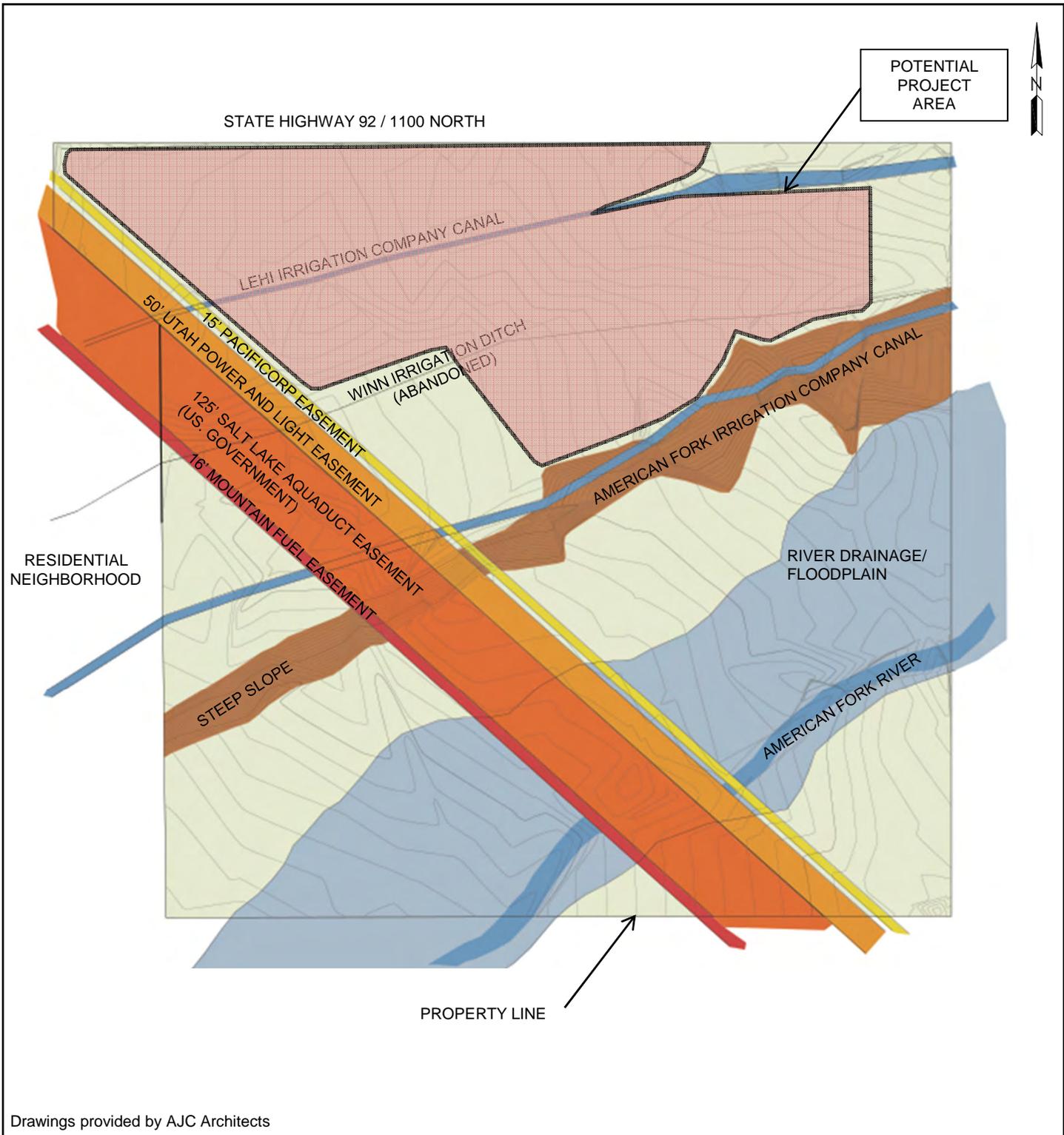
QUADRANGLE LOCATION

FIGURE 3a

CANYON SITE
POTENTIAL PROJECT AREA

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Drawings provided by AJC Architects

 Potential Project Area

0' 120' 240'

 APPROXIMATE SCALE: 1" = 240'


 QUADRANGLE LOCATION



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FIGURE 3b

**HIGHLAND SITE
 POTENTIAL PROJECT AREA**

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1 **ALTERNATIVES**

2 3 **Development of the Alternatives**

4
5 A value analysis study (VA) was conducted by an interdisciplinary NPS team on December 14
6 and 15, 2010. Value analysis is a structured, value-based decision-making process that focuses
7 on the key functions to be provided by a proposed investment and how well each alternative
8 met project goals and functions. The 2010 VA identified and evaluated a number of functional
9 and operational alternatives to determine needed park facilities at the Canyon site and the
10 Highland site. The Preferred Alternative from that evaluation included a visitor center and
11 administrative facility in Highland with the Forest Service, minimal visitor contact station at the
12 Canyon site cave trailhead, and parking at the Highland site with a transit system shuttling
13 visitors to the Canyon site cave trailhead. The VA recommended further analysis of shuttle bus
14 capital and operational costs.

15
16 The NPS further evaluated the project in 2011 and conducted an alternative transportation
17 feasibility study that identified and analyzed four alternatives to determine their financial
18 feasibility, operational requirements, and impacts on visitation (CS 2012). Two alternatives
19 involved the operation of a shuttle service between the Highland site and the Canyon site cave
20 trailhead. The other two alternatives did not involve a shuttle operation. All four alternatives
21 involved some degree of visitor demand management, particularly to manage available capacity
22 of parking facilities and the scheduling of cave tours. The alternatives were then assessed and
23 compared using the VA process that was conducted on January 10 and 11, 2012. Alternative D
24 — Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management,
25 was identified as the Preferred Alternative.

26
27 As a result of the VA studies and input received during the public scoping process a total of four
28 Action Alternatives and the No Action Alternative were identified for this project and have been
29 carried forward for further evaluation in this environmental assessment. The level of detail
30 presented in the alternatives is based on conceptual designs. A summary table comparing
31 Alternative components is presented at the end of this chapter.

32 33 **Alternative A – No Action**

34
35 Under this Alternative, operations at the Canyon and Highland sites would continue as they are
36 currently conducted.

37
38 At the Canyon site cave trailhead, the Monument facilities and visitor services would remain
39 unchanged from current conditions including ticket sales and snack bar and gift shop
40 concession operations. Cave tour ticket fees would continue to range from \$3 to \$7 depending
41 on the age of the visitor. Advanced ticket sales would continue to be provided by phone. Visitor
42 demand throughout the season would continue without demand management strategies to
43 match visitation times and levels to available, safe parking capacity. During the peak visitor
44 season (six to eight weeks each summer) parking demand exceeds parking capacity available
45 at the visitor center and at informal parking areas located along SR 92.

46
47 Visitor parking would be available in a total of 119 paved parking spaces including 44 in the
48 North Lot, 30 spaces in the South Lot, 11 at the Canyon Nature Trail parking lot, and 22 parking
49 spaces at the Swinging Bridge Picnic Area. Additional parking along SR 92 would continue to

1 legally provide approximately 70 gravel informal parking spaces. No parking spaces for large
2 recreational vehicles would be available at the Canyon site cave trailhead. During times with
3 peak visitor demand, visitors would continue to use informal gravel turn-outs along SR 92 for
4 parking and walk along SR 92 or trails through vegetated areas to access the Canyon site cave
5 trailhead.

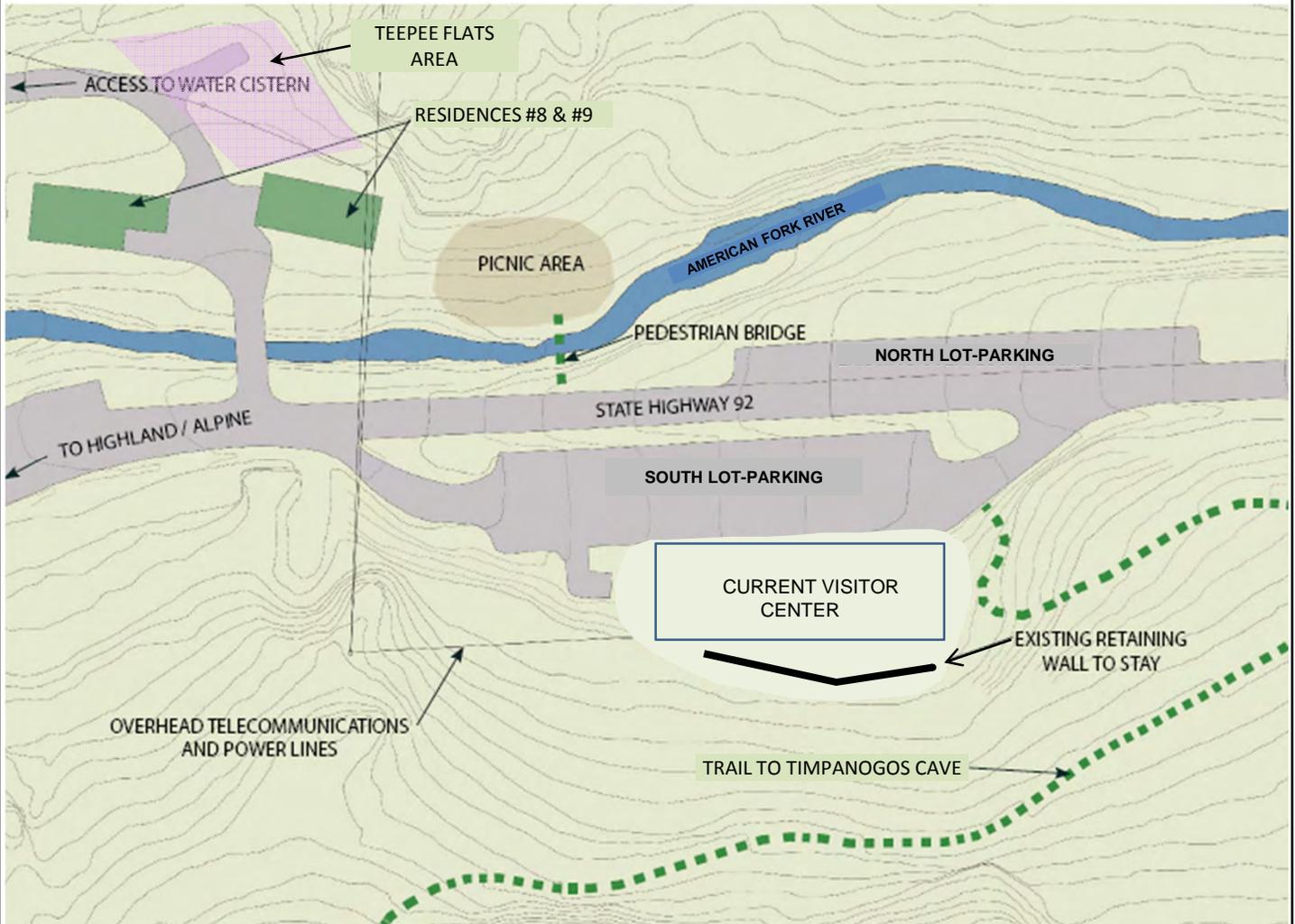
6
7 Vehicle and pedestrian hazards along SR 92 would not be mitigated. Existing pedestrian
8 crossings would remain without improvement. Traffic congestion associated with parking
9 limitations and pedestrians crossing SR 92 would continue and at times, would require
10 Monument staff assistance. Traffic on SR 92 would continue to move through the Monument at
11 speeds greater than the posted 20 miles per hour speed limit.

12
13 A new visitor center would not be constructed. The existing, temporary visitor center would
14 continue to be located in a temporary modular structure with rodent infestation and no additional
15 protection or mitigation from the rockfall or flood hazards.

16
17 The administrative and maintenance facilities would continue to provide inadequate space for
18 the Monument operations. The staff would remain located in the visitor center and the modified
19 Residence #9 building, and seasonal staff would not have adequate work and storage space.

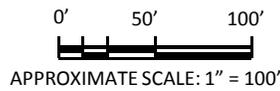
20
21 At the Highland site, the interagency orientation center would not be built. The Monument
22 educational and interpretative materials and programs would continue to only be available to
23 visitors when the Monument is operating between early May and mid-October.

24
25 See Figures 4a and 4b for a plan of the existing conditions.
26



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Drawings provided by AJC Architects



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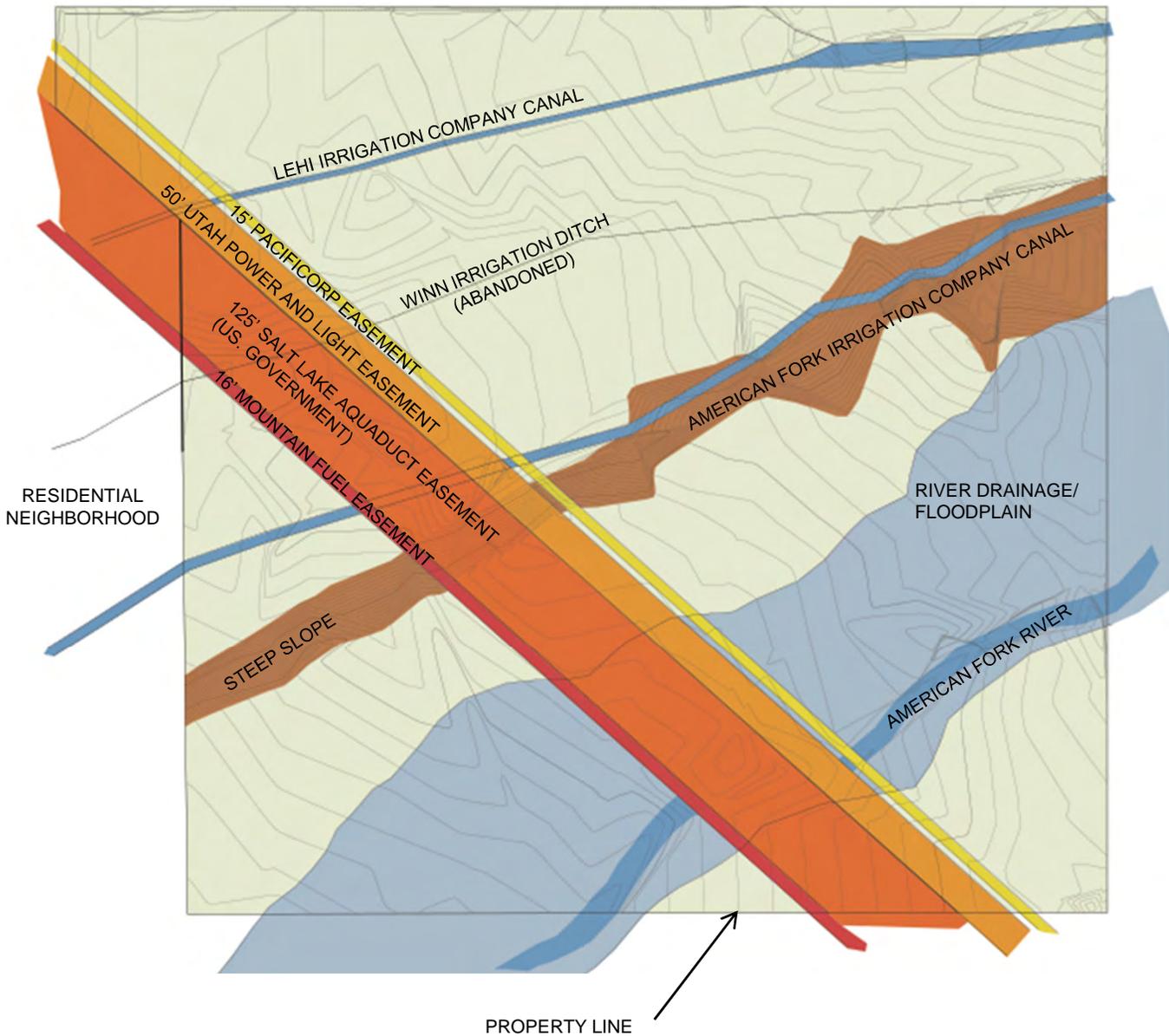
FIGURE 4a

**ALTERNATIVE A – NO ACTION
 CANYON SITE**

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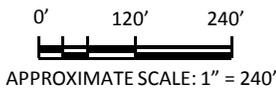
STATE HIGHWAY 92 / 1100 NORTH



PROPERTY LINE

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TIMPANOGOS CAVE FACILITY UPGRADES

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FIGURE 4b

ALTERNATIVE A – NO ACTION
HIGHLAND SITE

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1 Elements Common to the Action Alternatives

2
3 Several elements are common to Action Alternatives B, C, D, and E. Common elements at the
4 Canyon site include construction of a new visitor contact station, approval of a flash flood
5 mitigation plan, some parking areas, and designation of a seasonal operations center. The
6 common elements at the Highland site include the construction of an interagency visitor
7 orientation center for use by both PGRD and the Monument administrative staff, a maintenance
8 building for PGRD, available parking areas, and utilities for the buildings.
9

10 All facilities and associated parking areas would be fully compliant with the American with
11 Disabilities Act (ADA) and the Architectural Barriers Act (ABA). The principles of sustainable
12 design and development would also be incorporated into all facilities and their operation.
13 Sustainable practices minimize the short- and long-term environmental impacts of
14 developments and other activities through resource conservation, recycling, waste minimization,
15 and the use of energy efficient and ecologically responsible materials and techniques.
16

17 Canyon Site

- 18
19 • New Visitor Contact Station — The existing, temporary visitor center at the Canyon site
20 cave trailhead, a modular structure, would be demolished along with the existing snack
21 bar and gift shop concession operations facility. A new visitor contact station would be
22 an approximately 2,300 square-foot building. The visitor contact station would serve as a
23 basic information resource to provide visitors safety information and guidance for the
24 Canyon site cave trailhead. The visitor contact station would also include public
25 restrooms and vending machines with limited food, drink, and visitor convenience items
26 available for purchase. The size of the building and the building's purpose remain
27 constant throughout the Action Alternatives, but the location of the visitor contact station
28 is different for some of the Action Alternatives.
- 29 • Parking – The parking layout and capacity of the Canyon site cave trailhead parking
30 area varies under each Action Alternative, however, parking at the Swinging Bridge
31 Picnic Area would remain unchanged and provide 22 parking spaces in all Action
32 Alternatives. Long term use of the Canyon site cave trailhead parking area would be
33 prohibited and enforced by Monument staff.
- 34 • Ticket Sales - Same day ticket sales would be discontinued at the Canyon site cave
35 trailhead. Tickets would be issued at the Highland site interagency visitor orientation
36 center and the Monument would encourage visitors to stop there prior to their cave tour
37 to have the opportunity to receive additional information and education that would
38 enhance their cave tour and protect the resource. However, various other methods for
39 obtaining tickets, such as online preprinting, would be considered in order to minimize
40 back and forth travel and traffic congestion in the lower canyon to obtain tickets at the
41 Highland site.
- 42 • Visitor management strategies – Strategic approaches to managing the demand for
43 cave tours would be employed with the overall goal of accommodating increasing cave
44 visitation to the degree possible consistent with protection of cave resources and
45 providing a high quality cave experience. The reservation system would be the primary
46 tool used to redistribute visitor demand to times and days outside of the peak visitor use
47 periods which are typically late morning to early afternoon weekends and holidays. This
48 approach spreads the number of visitors over time and would optimize visitor use of the
49 cave, given that the capacity of the cave and hours in the day to accommodate visitation

1 are limited. The alternatives vary in the extent that cave tour tickets would be available
2 for advance purchase.

3 Visitor demand strategies would continue to be integrated with other visitor management
4 strategies that modify visitor use or behavior such as providing visitor information and
5 interpretation that encourage visitors to adopt appropriate minimal impact behaviors, or
6 setting tour size and frequency that help control the extent of negative impacts on
7 resources and experience.

- 8 • Updated Cave Tour Schedules – Cave tour schedules and maximum tour group capacity
9 would be adjusted based on the transit and parking capacity of the Action Alternative.
10 Additionally, the updated cave tour schedule would incorporate the results of the
11 Monument’s cave management plan. The visitor management strategies discussed in
12 this EA would be required to follow any guidance developed by the cave management
13 plan.
- 14 • Monument Seasonal Schedule – For all alternatives, the Monument’s seasonal schedule
15 would remain the same. Cave tours would continue to be offered from early May through
16 October. The exact start and end dates for cave tours would continue to be weather
17 dependent.
- 18 • Traffic Control Signage – Improved instructional signage to inform visitors of parking and
19 traffic conditions at the Monument would be installed. A variety of additional wayfinding
20 signs, permanent informational signs, and temporary message boards would be installed
21 within the canyon and near the existing ticket stations.
- 22 • Pedestrian Access Improvements – Improved pedestrian crosswalks would also be
23 installed along SR 92 near the Canyon site cave trailhead.
- 24 • Visitor Information and Signage – Visitor information about the Monument would be
25 improved. Information on the website would explain transit options and parking capacity
26 limitations. The specific information and methods are different for some of the Action
27 Alternatives, but the general improvements are applicable to all Action Alternatives and
28 are summarized below:
 - 29 • Informational signage would be installed at both east and west entrances to
30 Uinta-Wasatch-Cache National Forest. The signage would incorporate the
31 necessary technology to communicate updates on parking and tour availability as
32 needed.
 - 33 • Various additional methods of providing cave ticket information would be
34 explored in the future to maximize visitor convenience, such as, expanded cave
35 ticket information on the park website; intelligent transportation system message
36 boards, radio messages, smart phone apps with ticket information; etc.
 - 37 • Various methods of providing cave safety and resource protection information
38 would also be explored, such as, an on-site safety briefing by Monument staff; a
39 pre-recorded safety video on-site, on the shuttle, or when purchasing tickets
40 online; expanded general safety information on the park website, etc.
- 41 • Flash Flood Mitigation – An Emergency Flood Evacuation Plan would be developed and
42 implemented. Flood Drills would be conducted by the Monument staff to assist in the
43 preparation of park action if a flood were to occur. The Monument would pursue the
44 installation of an automated flood warning system at the base of the Tibble Fork Dam

1 that would notify the Monument, PGRD, the towns of Highland, Cedar Hills, and
2 American Fork, and the National Weather Service of imminent flooding.

- 3 • Seasonal Operations Center – With the construction of the proposed interagency visitor
4 orientation center at the Highland site, the administrative offices at the Canyon site,
5 currently located in a modified residence, Residence #9 (Headquarters), would be
6 relocated to the Highland site. Residence #9 would be converted to a Seasonal
7 Operations Center for the interpretive staff and provide seasonal office space, work
8 space, and storage for the interpretive operations at the cave and cave trailhead. This
9 building would be shut down and winterized from October through April in order to
10 reduce operating costs and energy use.
- 11 • Rock Fence – A rock fence would be installed behind the existing, temporary visitor
12 center to protect visitors, employees, and property from rocks that fall from the base of
13 the cliff. This rock fence would not stop rocks that fall high on the cliff and project
14 outwards from the cliff onto the parking area of the Canyon site cave trailhead.

15 **Highland Site**

- 16 • New Interagency Visitor Orientation Center – The USFS, represented by the PGRD,
17 acquired 37 acres of land on the east edge of the town of Highland, outside of American
18 Fork Canyon. Approximately one third of this tract of land is developable, and one or
19 more structures would be designed to meet the administrative needs of both the
20 Monument and the PGRD. An interagency visitor orientation center would be
21 constructed at the Highland site. The building would be approximately 14,000 square-
22 feet in size. The interagency visitor orientation center would be designed to
23 accommodate the needs of both the PGRD and the Monument administrative staff and
24 would include year-round visitor services including educational resources and public
25 restrooms. Photovoltaic panels would also be considered to offset the buildings energy
26 usage and would also be available as an interpretive exhibit to demonstrate how the
27 PGRD and the Monument are using alternative energy sources to supplement energy
28 usage by the facility. The construction of the facility may be conducted in phases
29 pending available funding. The location, size, and purpose of the building would remain
30 constant throughout the Action Alternatives.
- 31 • Parking – Parking at the Highland site is designed to serve the interagency visitor
32 orientation center, the PGRD facilities, and any parking associated with transit systems
33 between the Highland site and the Canyon site cave trailhead. In all Action Alternatives,
34 approximately 40 PGRD maintenance building parking spaces and approximately 80
35 overflow parking spaces would be available at the Highland site. The parking layout and
36 parking capacity associated with the interagency visitor orientation center and transit
37 system parking is different for some of the Action Alternatives.
- 38 • Additional PGRD Facilities – The PGRD would also have one building, approximately
39 6,000 square feet in size, to address their maintenance and fire operations and the size
40 and location of the building remains the same through all Action Alternatives. The
41 existing PGRD property in Pleasant Grove would no longer be needed and would be
42 disposed in accordance with federal law.
- 43 • Highland Site Utilities – Facilities at the Highland site would be connected into the local
44 jurisdictions for power (Utah Power – Pacific Corp), gas (Questar), water (Highland City),
45 and sewer (Timp Sewer System).

1 Description of Action Alternatives

3 Alternative B – Mandatory Shuttle System

5 Alternative B would implement a mandatory shuttle system that would operate seven days a
6 week to transport visitors between the Highland site and the Canyon site cave trailhead at the
7 Canyon site. The Canyon site cave trailhead would include a small visitor contact station, shuttle
8 staging, and a shuttle stop structure. Visitor parking areas would be substantially reduced and
9 much of the area would be restored to natural conditions. The Highland site would be equipped
10 with a shuttle stop structure and adequate parking to accommodate Monument visitors. Visitors
11 would be required to park at the Highland site and ride a shuttle to the Canyon site cave
12 trailhead. At the Canyon site cave trailhead, a visitor contact station and a shuttle stop structure
13 would be constructed east of the existing parking lot. Visitor parking at the Canyon site cave
14 trailhead parking area would be eliminated and parking spots for Monument staff would be
15 limited. Figures 5a and 5b show the conceptual site studies for Alternative B. Final designs may
16 vary slightly from these conceptual studies. The following text further describes the components.
17

18 Canyon Site

- 20 • Visitor Contact Station — The visitor contact station at the Canyon site cave trailhead
21 would be built east of the existing, temporary visitor center. The building would remain
22 within the rockfall hazard zone, but would be located out of the 100-year floodplain. A
23 shuttle stop structure, approximately 600 square-feet in size, would be constructed near
24 the visitor contact station.
- 25 • Parking – Visitor parking for cave tours at the Canyon site cave trailhead parking area
26 would be eliminated except for ADA accessible parking for visitors. Approximately 10
27 parking spaces would be provided at the Canyon site cave trailhead for emergency and
28 maintenance use and to accommodate disabled visitors. Existing staff parking would be
29 retained at Residences #8 and #9 for seasonal staff and maintenance vehicles. The ten
30 existing spaces would be retained at the Canyon Nature Trail lot for trail users. Swinging
31 Bridge Picnic Area parking would be retained and may also be utilized by early morning
32 trail hikers, but signage and parking enforcement would prohibit extended parking by
33 cave tour visitors at this location.
- 34 • Visitor management strategies – Most cave tour tickets would be available in advance to
35 better manage peak visitor demand in coordination with the shuttle operations. Cave tour
36 schedules would be adjusted to coordinate with the shuttle system schedule and to
37 reduce spikes in demand. Tour capacity, based on the Monument’s cave management
38 plan, could be maximized with continuous shuttle operation and no dependence on
39 parking capacity.
- 40 • Visitor Information – Wayfinding and informational signage would be provided en-route
41 to the Monument to inform visitors about mandatory shuttle operations, parking
42 availability at the Highland site, and cave ticket information.
43

44 Highland Site

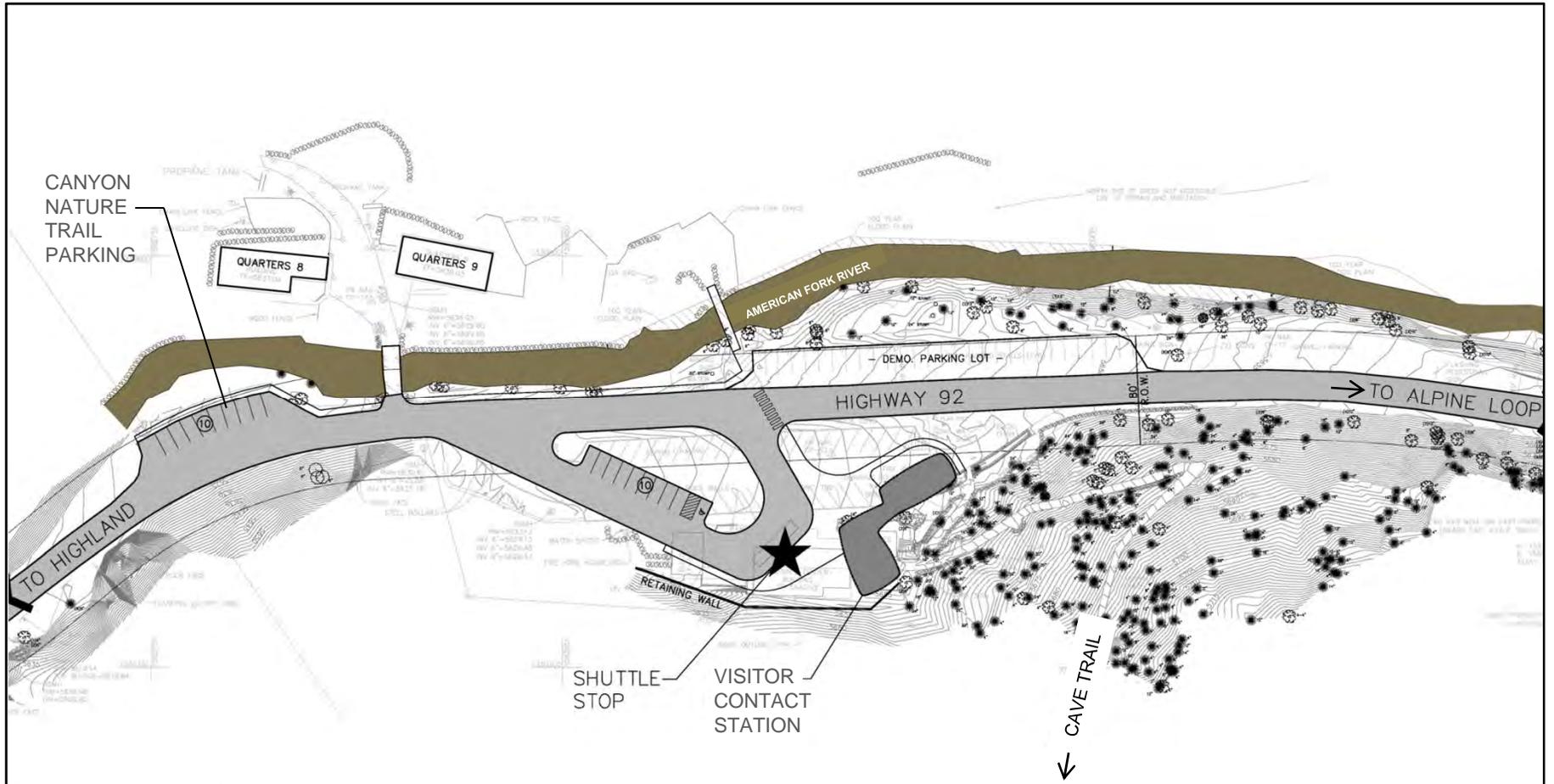
- 46 • Transit System — A mandatory shuttle system would be implemented between the
47 Highland site and the Canyon site cave trailhead. All visitors would be required to park at
48 the interagency visitor orientation center and take the shuttle to and from the Canyon
49 site cave trailhead. The shuttle would operate between 6:30 AM and 9:30 PM with either

1 10 or 15-minute wait times between shuttles and would provide visitors ample time to
2 hike to and from the cave tour and the shuttle stop. To cover the cost of the transit
3 system, cave tour fees would increase between \$3 and \$10 depending on the operator
4 of the service and the terms of the NPS arrangement with them. The shuttle service
5 would be contracted by the Monument or provided as a partnership with Utah Transit
6 Authority and the shuttle vehicles would be in compliance with ADA requirements.

- 7 • Shuttle Stop Structure – At the interagency visitor orientation facility, a shuttle stop
8 structure, approximately 600 square-feet in size, would be constructed to facilitate visitor
9 access to the shuttle system.
- 10 • Interagency Visitor Orientation Center Parking – Sufficient visitor parking to meet the
11 peak demand for cave tours would be provided at the Highland site. Oversize tour group
12 vehicles would be required to drop-off their passengers at the Canyon site cave trailhead
13 and return to the Highland site to park while passengers were on the cave tour.
14 Approximately 250 parking spaces including large vehicle parking spaces would be
15 provided for visitors riding the shuttle and for visitors using the visitor center but not
16 taking the cave tour. NPS staff parking would also be provided at the Highland site.
17 Employees would be encouraged or required to carpool or ride shuttle buses to their
18 work locations.

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QUADRANGLE LOCATION



TIMPANOGOS CAVE FACILITY UPGRADES

TIMPANOGOS CAVE NATIONAL MONUMENT UTAH

UNITED STATES DEPARTMENT OF INTERIOR NATIONAL PARK SERVICE

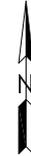
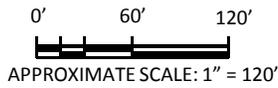


FIGURE 5a
ALTERNATIVE B
MANDATORY SHUTTLE SERVICE
CANYON SITE

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QUADRANGLE LOCATION



TIMPANOGOS CAVE FACILITY UPGRADES

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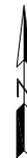
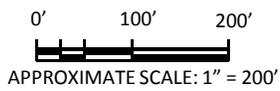


FIGURE 5b

**ALTERNATIVE B
MANDATORY SHUTTLE SERVICE
HIGHLAND SITE**

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1 **Alternative C – Peak-Period Optional Shuttle System**

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3 Alternative C would provide some parking at the Canyon site cave trailhead parking area as well
4 as an optional shuttle system between the Canyon site cave trailhead and the Highland site
5 during times with peak visitor demand (i.e. weekends and holidays). At these times, visitors
6 would have the option of parking at the Canyon site cave trailhead or taking the shuttle from the
7 Highland site. The Highland site would include a shuttle stop and sufficient parking for visitors.
8 At the Canyon site cave trailhead, a visitor contact station and a shuttle stop structure would be
9 constructed east of the existing parking lot. Visitor parking at the Canyon site cave trailhead
10 would be redesigned to accommodate average weekday visitor demand with parking on both
11 sides of SR 92. Figures 6a and 6b show the conceptual site studies for Alternative C. Final
12 designs may vary slightly from these conceptual studies. The following text further describes
13 the components:

14 **Canyon Site**

- 15
16
17 • Visitor Contact Station — The visitor contact station at the Canyon site cave trailhead
18 would be built east of the existing, temporary visitor center. The building would remain
19 within rockfall hazard zone, but would be located out of the 100-year floodplain. A
20 shuttle stop structure, approximately 600 square-feet in size, would be constructed near
21 the visitor contact station.
- 22 • Parking – Visitor parking at the Canyon site cave trailhead parking area would be
23 redesigned and existing gravel, road-side parking would be paved into formal parking
24 spaces. Approximately 65 parking spaces would be available on the north side of SR 92
25 including the existing 10 parking spaces at Canyon Nature Trail lot. At the visitor contact
26 station parking lot, approximately 40 spaces would be created including ADA parking
27 spaces and 2 parking spaces for Monument staff. The new layout would accommodate
28 parking on both sides of SR 92 and create approximately 105 total parking spaces at the
29 Canyon site cave trailhead.
- 30 • Visitor Demand Strategies – Most cave tour tickets would be available in advance to
31 better manage peak visitor demand in coordination with the shuttle operations and cave
32 tour schedules. The guaranteed availability of parking at the Highland site and the
33 opportunities for interpretation at the Highland site and on the shuttle may incentivize
34 use of the shuttle service. The Monument would use the cave management plan and the
35 parking capacity to set the number of cave tours. Since the parking capacity is reduced,
36 the number of cave tours would be slightly reduced. However, cave tour visitor capacity
37 could be maximized with the shuttle operating during peak visitor demand eliminating the
38 dependence on parking capacity at those times.
- 39 • Visitor Information – Informational signage would include real-time information about the
40 parking availability at the Canyon site cave trailhead and cave tour ticket availability.
41 Signage would also direct visitors to the Highland site overflow parking and shuttle
42 service when parking at the Canyon site cave trailhead nears capacity.

43 **Highland Site**

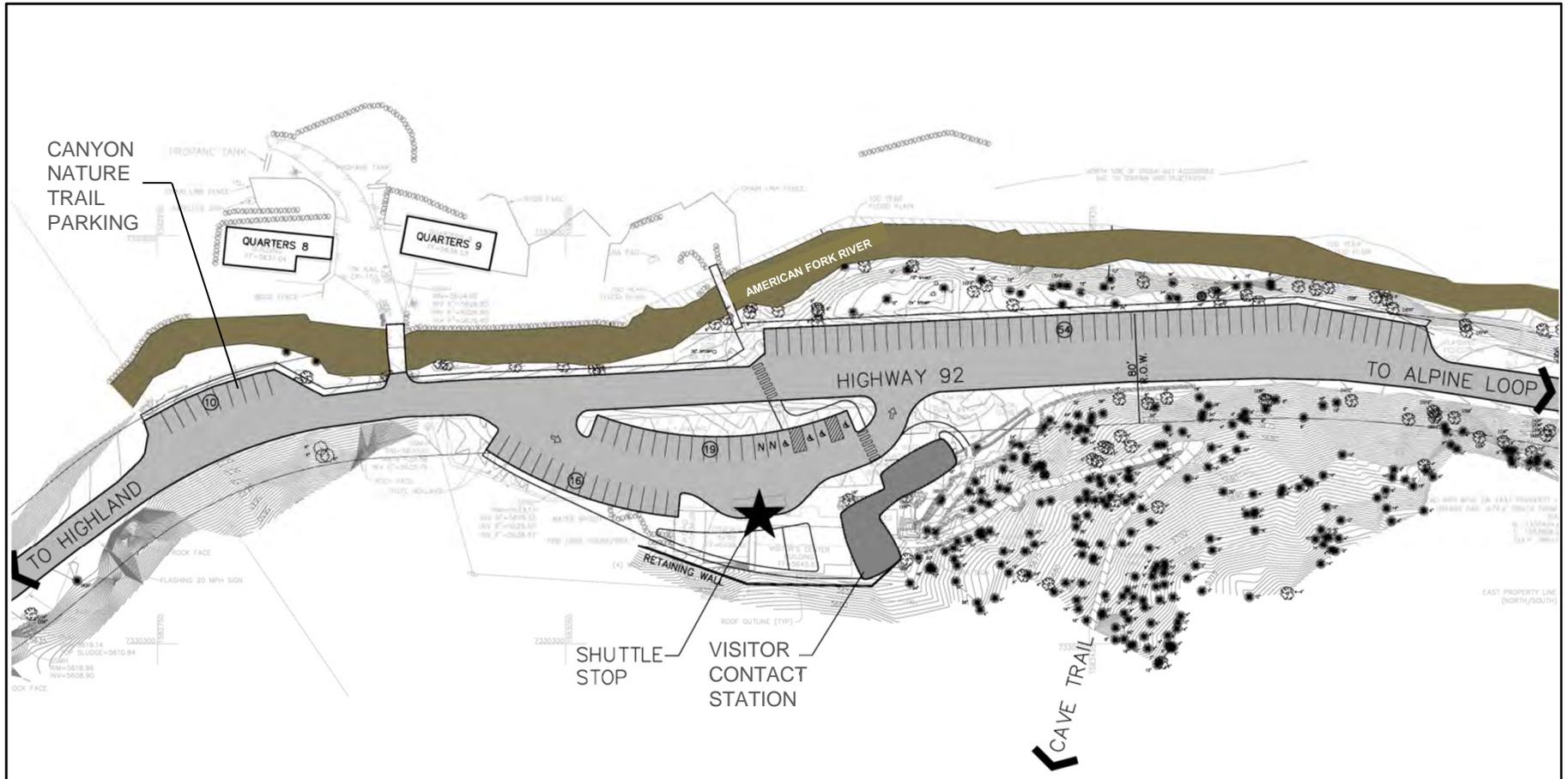
- 44 • Transportation System — An optional shuttle system would be implemented between
45 the Highland site and the Canyon site cave trailhead on days with peak visitor demand
46 including weekends and holidays. Visitors that are unable to park at the Canyon site
47 cave trailhead parking area or visitors that opt to take the shuttle system would park at
48
49

1 the interagency visitor orientation center and take the shuttle to and from the Canyon
2 site cave trailhead. The shuttle would operate between 6:30 AM and 9:30 PM with either
3 10 or 15-minute wait times between shuttles and would provide visitors ample time to
4 hike between the cave tour and shuttle stop for the first and last cave tours. To cover the
5 cost of the transit system, cave tour fees would increase between \$1 and \$4 depending
6 on the operator of the service and the terms of the NPS arrangement with them. Visitors
7 that park at the Monument and take the cave tour would pay the increased cave tour
8 ticket price. The shuttle service would be contracted by the Monument or provided as a
9 partnership with Utah Transit Authority and the shuttle vehicles would be in compliance
10 with ADA requirements.

11 • Shuttle Stop Structure – At the interagency visitor orientation facility, a shuttle stop
12 structure, approximately 600 square-feet in size, would be constructed to facilitate
13 visitors to the shuttle system.

14 • Interagency Visitor Orientation Center Parking – Sufficient visitor parking to meet the
15 peak demand for cave tours would be provided at the Highland site. Oversize tour group
16 vehicles would be required to drop-off their passengers at the Canyon site cave trailhead
17 and return to the Highland site to park while passengers were on the cave tour.
18 Approximately 150 parking spaces including large vehicle parking spaces would be
19 provided for visitors riding the shuttle and for visitors using the visitor center but not
20 taking the cave tour. NPS staff parking would also be provided at the Highland site.
21 Employees would be encouraged or required to carpool or ride shuttle buses to their
22 work locations.

23
24



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QUADRANGLE LOCATION



TIMPANOGOS CAVE FACILITY UPGRADES

TIMPANOGOS CAVE NATIONAL MONUMENT UTAH

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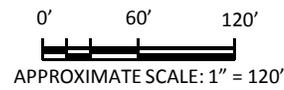
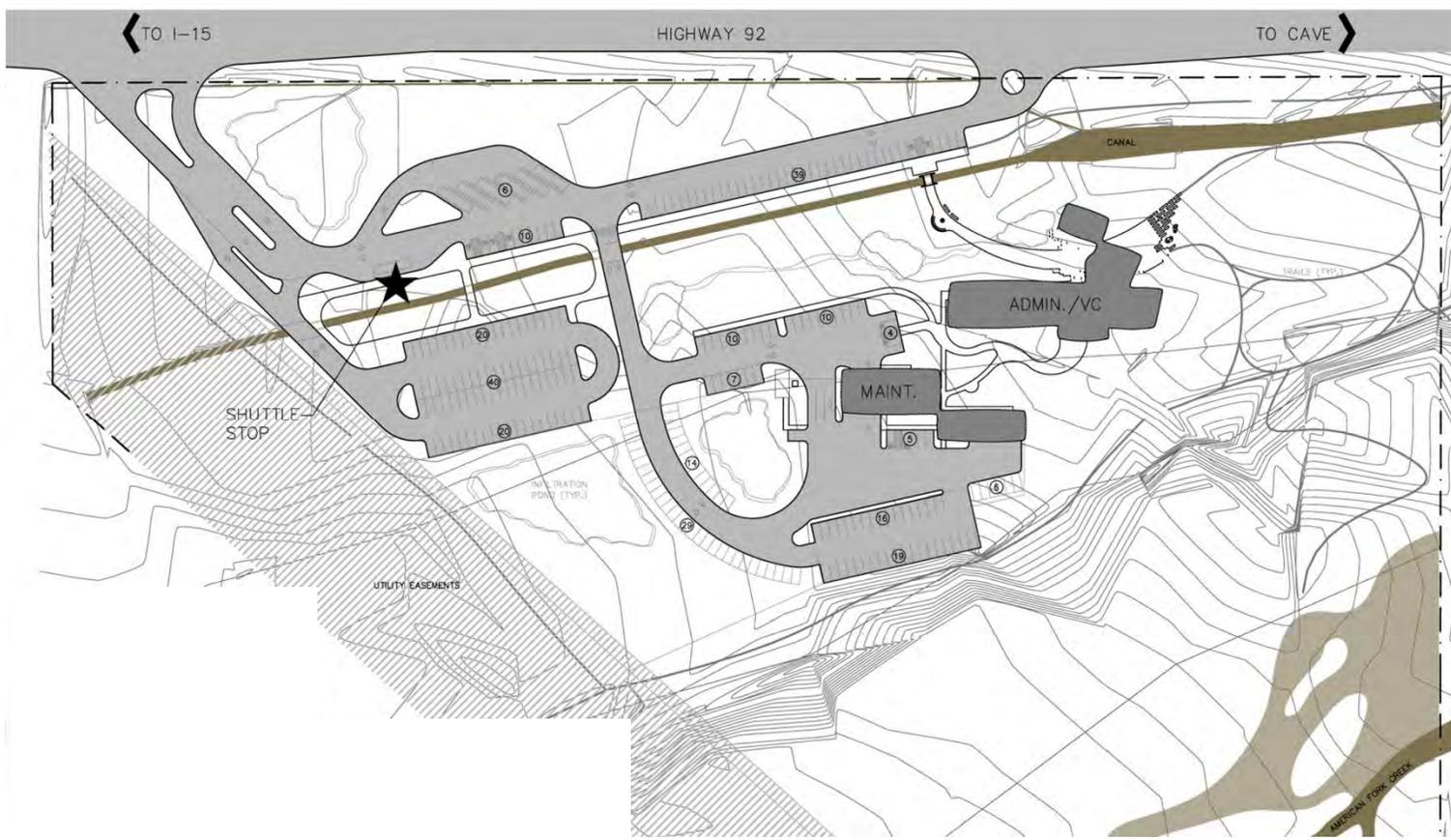


FIGURE 6a
ALTERNATIVE C
PEAK PERIOD OPTIONAL SHUTTLE SERVICE
CANYON SITE

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QUADRANGLE LOCATION



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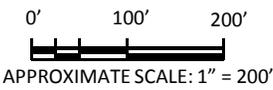


FIGURE 6b
ALTERNATIVE C
PEAK PERIOD OPTIONAL SHUTTLE SERVICE
HIGHLAND SITE

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1 **Alternative D – (Preferred Alternative) – Canyon Site Safety Improvements with** 2 **Realignment of SR 92 and Demand Management**

3
4 Alternative D would incorporate safety improvements to mitigate hazards at the Canyon site. At
5 the Canyon site cave trailhead, the visitor contact station would be located east of the existing,
6 temporary visitor center out of the most hazardous rockfall area and out of the 100- and 500-
7 year floodplains. SR 92 would be realigned along the American Fork River in the existing gravel
8 parking areas. All Canyon site cave trailhead parking, with the exception of the Canyon Nature
9 Trail parking lot, would be constructed south of SR 92. The parking configuration would reduce
10 the number of parking spots and require more visitor demand management from the Monument
11 staff to reduce traffic congestion at the Monument. At the Highland site, parking necessary for
12 the interagency visitor orientation center operations would be constructed. Figures 7a and 7b
13 show the conceptual site studies for Alternative D. Final designs may vary slightly from these
14 conceptual studies. The following text further describes the components:

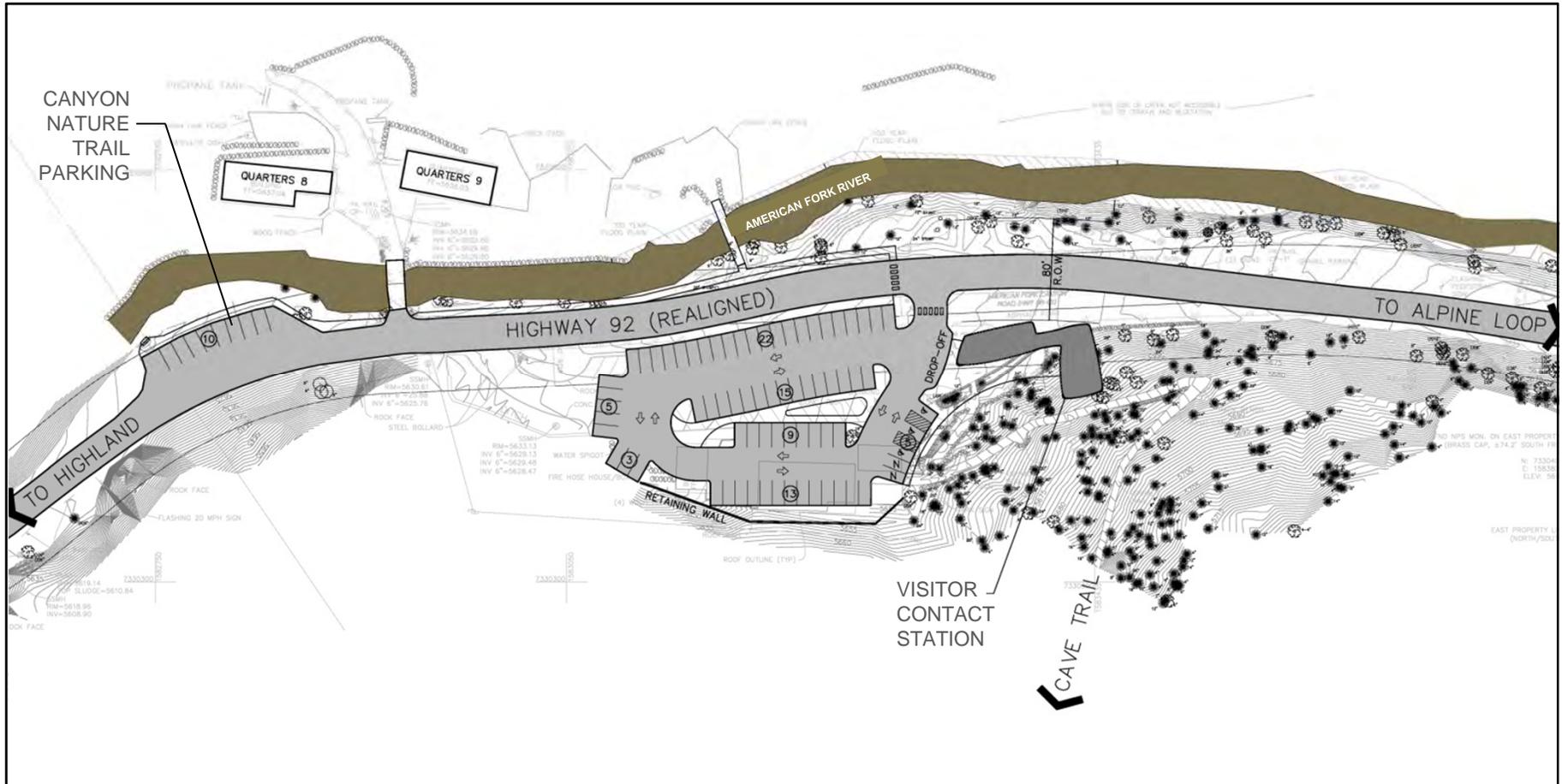
15 16 **Canyon Site**

- 17
18 • Visitor Contact Station — The visitor contact station at the Canyon site cave trailhead
19 would be built east of the existing, temporary visitor center. The realignment of SR 92
20 would allow the building to be located out of the most hazardous rock fall area and out of
21 the 100- and 500-year floodplains.
- 22 • SR 92 Realignment — SR 92 would be moved closer to the American Fork River and a
23 majority of parking located on the north shoulder of the road opposite of the visitor
24 contact area would be eliminated. The road would be constructed in the previous
25 disturbed areas of the existing gravel parking spots currently used by visitors.
- 26 • Parking – A majority of visitor parking at the Canyon site cave trailhead parking area
27 would be redesigned south of the SR 92 realignment. The existing ten parking spaces at
28 the Canyon Nature Trail lot on the north side of SR 92 would remain unchanged.
29 Approximately 80 parking spaces would be provided at the visitor contact station
30 including ADA parking spaces and 2 Monument staff parking spaces at the Canyon site
31 cave trailhead.
- 32 • Visitor management strategies – All cave tour tickets would be available in advance to
33 maximize the number of tour groups filled to capacity and encourage visitor use of non-
34 peak times. The Monument would strongly discourage same day sales. The Monument
35 would use the cave management plan and the parking capacity to set the number of
36 cave tours.
- 37 • Visitor Information – Wayfinding and informational signage would be provided en-route
38 to the Monument to inform visitors about limited and legal parking opportunities, real-
39 time information about parking opportunities, advanced ticket sales, and tour schedules.
40 Additional information would need to be published to tourists and possible visitors
41 identifying the mandatory reservation system and the limited parking at the Canyon site.

42 43 **Highland Site**

- 44
45 • Interagency Visitor Orientation Center Parking – Sufficient visitor parking to meet the
46 demand for visitors accessing the interagency orientation center would be provided.
47 Oversize tour group vehicles would be required to drop-off their passengers at the
48 canyon trailhead and return to the Highland site to park while passengers were on the

1 cave tour. Approximately 60 parking spaces including large vehicle parking spaces
2 would be provided for visitors riding the shuttle and for visitors using the visitor center
3 but not taking the cave tour. NPS staff parking would also be provided at the Highland
4 site. Employees would be encouraged or required to carpool or ride shuttle buses to
5 their work locations.
6



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QUADRANGLE LOCATION



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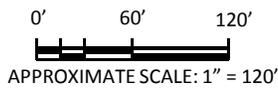


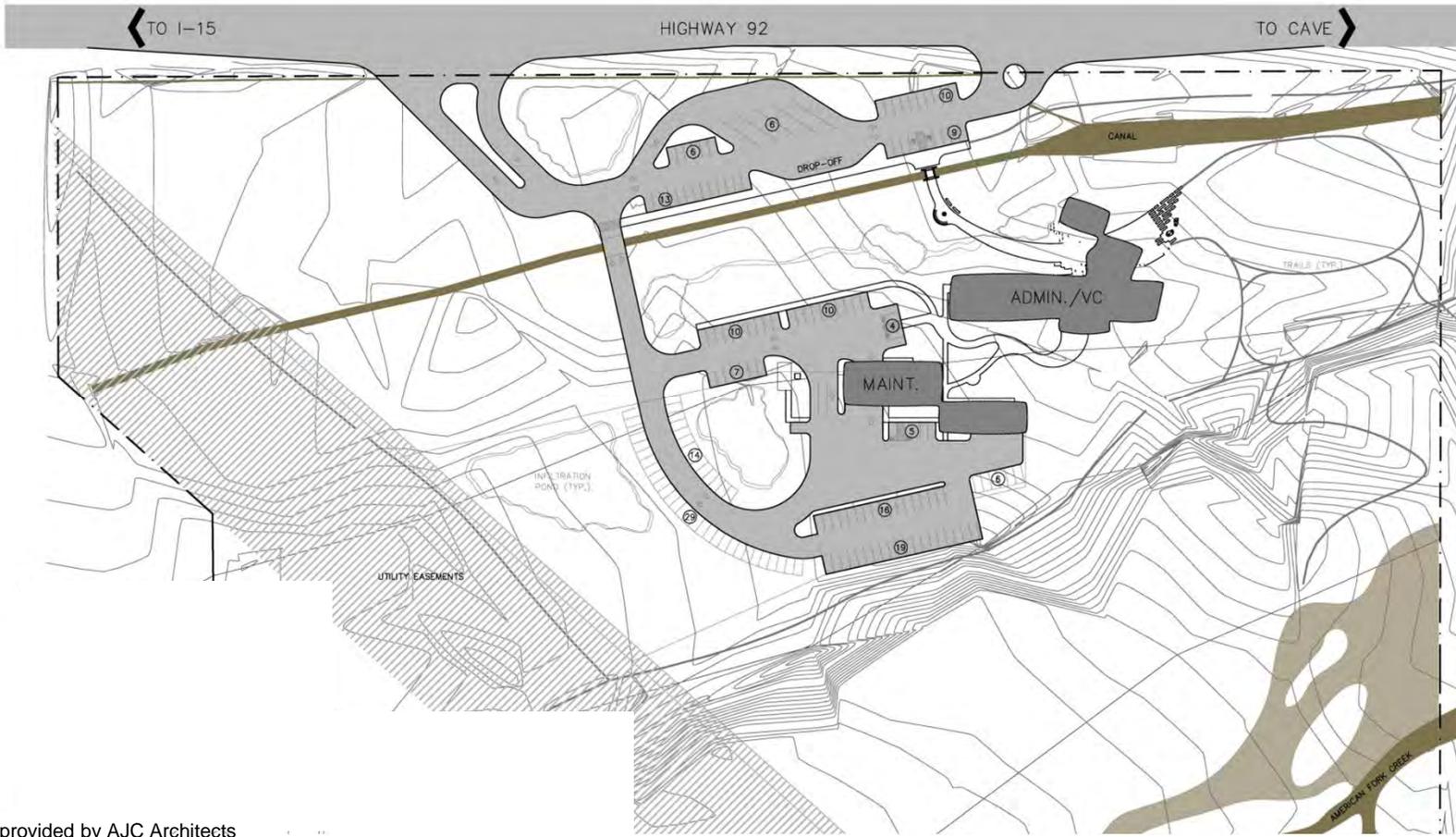
FIGURE 7a

ALTERNATIVE D - CANYON SITE SAFETY IMPROVEMENTS & REALIGNMENT OF SR-92 CANYON SITE

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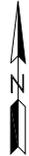
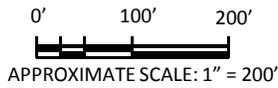


FIGURE 7b

**ALTERNATIVE D & ALTERNATIVE E
HIGHLAND SITE**

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1 **Alternative E – Canyon Site Capacity Improvements With Advanced Demand** 2 **Management**

3
4 Alternative E would maximize parking at the Canyon site cave trailhead. At the Canyon site
5 cave trailhead, the visitor contact station would be constructed to the east of the existing,
6 temporary visitor center out of the most hazardous rockfall area and out of the 100-year
7 floodplain. Parking would be redesigned and parking spaces would be located on both sides of
8 SR 92. The parking configuration would maximize the number of parking spots and require
9 more visitor demand management from the Monument staff to reduce traffic congestion at the
10 Monument. Plans at the Highland site are the same for both Alternative D and Alternative E.
11 Parking necessary for the interagency visitor orientation center operations would be
12 constructed. Figure 8a shows the Canyon site cave trailhead conceptual site studies for
13 Alternative E, and Figure 7b shows the Highland site conceptual site studies for Alternative E.
14 Final designs may vary slightly from these conceptual studies. The following text further
15 describes the components:
16

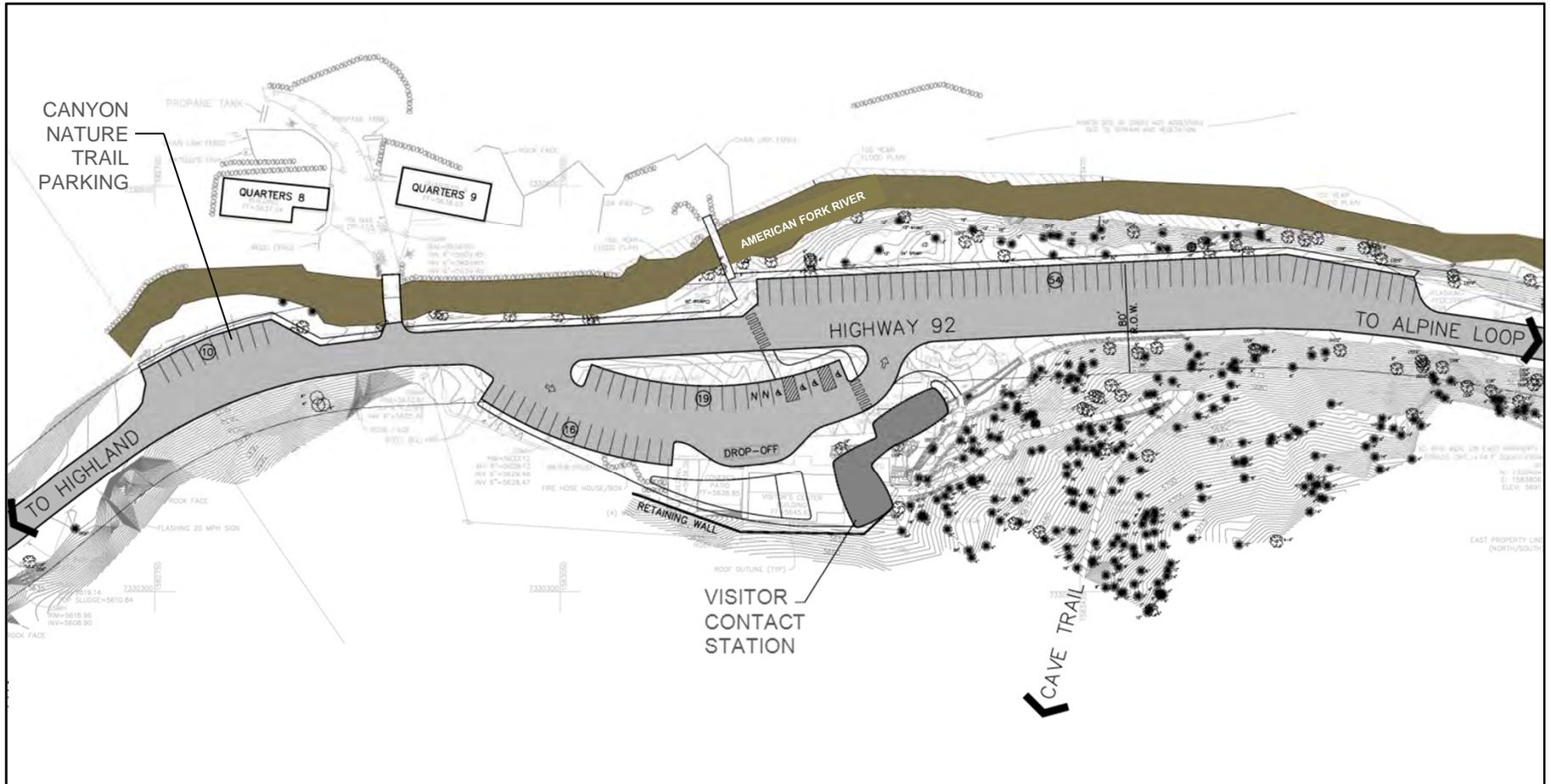
17 **Canyon Site**

- 18
19 • Visitor Contact Station — The visitor contact station at the Canyon site cave trailhead
20 would be built east of the existing, temporary visitor center. The building would remain
21 within the rockfall hazard zone, but would be located out of the 100-year floodplain.
- 22 • Concession operations at Swinging Bridge Picnic Area – Concession operations would
23 be provided at the Swinging Bridge Picnic Area. The concession operations structure
24 would be either a permanent or portable facility. Visitors that want to access the
25 concession operations would be encouraged to drive and park at the Swinging Bridge
26 Picnic Area so that the longer visitor duration associated with concession operations
27 would not impact the cave tour schedule and parking capacity at the Canyon site cave
28 trailhead.
- 29 • Parking – Visitor parking at the Canyon site cave trailhead parking area would be
30 redesigned and existing gravel, road-side parking would be paved into formal parking
31 spaces. Approximately 65 parking spaces would be available on the north side of SR 92
32 including the existing 10 parking spaces at Canyon Nature Trail lot. At the visitor contact
33 station parking lot, approximately 40 spaces would be created including ADA parking
34 spaces and 2 parking spaces for Monument staff. The new layout would accommodate
35 parking on both sides of SR 92 and create approximately 105 parking spaces at the
36 Canyon site cave trailhead.
- 37 • Visitor management strategies – All cave tour tickets would be available in advance. The
38 Monument would use the cave management plan and the parking capacity to set the
39 number of cave tours. The visitor demand management strategy would maximize
40 average tour group size and encourage visitor use of the early morning and late
41 afternoon tour openings.
- 42 • Visitor Information – Wayfinding and informational signage would be provided en-route
43 to the Monument to inform visitors about limited and legal parking opportunities and
44 advanced ticket sales. Additional information would need to be published to tourists and
45 possible visitors identifying the mandatory reservation system and the limited parking at
46 the Canyon site cave trailhead parking area.
47
48

1 **Highland Site**

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- Interagency Visitor Orientation Center Parking – Sufficient visitor parking to meet the demand for visitors accessing the interagency orientation center would be provided. Oversize tour group vehicles would be required to drop-off their passengers at the Canyon site cave trailhead and return to the Highland site to park while passengers were on the cave tour. Approximately 50 parking spaces including large vehicle parking spaces would be provided for visitors riding the shuttle and for visitors using the visitor center but not taking the cave tour. NPS staff parking would also be provided at the Highland site. Employees would be encouraged or required to carpool or ride shuttle buses to their work locations.



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QUADRANGLE LOCATION



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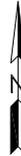
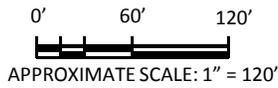


FIGURE 8a

ALTERNATIVE E - CANYON SITE CAPACITY IMPROVEMENTS WITH ADVANCED DEMAND MANAGEMENT - CANYON SITE

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Mitigation Measures

The following mitigation measures were developed to minimize the degree and/or severity of adverse effects and would be implemented during and after construction of the Action Alternatives, as needed:

- To minimize the amount of ground disturbance, staging and stockpiling areas would be in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction.
- Construction zones would be identified and fenced with construction tape, snow fencing, or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.
- Revegetation and re-contouring of disturbed areas would take place following construction and would be designed to minimize the visual intrusion of the structure. Revegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plant species using native species. All disturbed areas would be restored as nearly as possible to pre-construction conditions shortly after construction activities are completed. Weed control methods would be implemented to minimize the introduction of noxious weeds. Some trees may be removed, but other existing vegetation at the site would not be disturbed to the extent possible.
- Because disturbed soils are susceptible to erosion until revegetation takes place, standard erosion control measures such as silt fences and/or sand bags would be used to minimize any potential soil erosion.
- Fugitive dust generated by construction would be controlled by spraying water on the construction site, if necessary.
- To reduce noise and the construction carbon footprint, construction equipment would not be permitted to idle for long periods of time and would be in good working condition.
- To minimize possible petrochemical leaks from construction equipment, the contractor would regularly monitor and check construction equipment to identify and repair any leaks.
- Should construction unearth previously undiscovered cultural resources, work would be stopped in the area of any discovery and the Monument would consult with the SHPO and the Advisory Council on Historic Preservation, as necessary, according to §36 CFR 800.13, *Post Review Discoveries*. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed.
- The NPS would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties. Contractors and subcontractors would also be instructed on procedures to follow in case previously unknown paleontological or archeological resources are uncovered during construction.

-
- 1 • To minimize the potential for impacts to park visitors, variations on construction timing
2 may be considered. One option includes conducting the majority of the work in the off-
3 season (winter). Another option includes implementing daily construction activity
4 curfews such as operating construction equipment between the hours of 6 PM to 7 AM in
5 summer (May – September), and 6 PM to 8 AM in the winter (October – April). The NPS
6 would determine this in consultation with the contractor.
 - 7 • Construction workers and supervisors would be informed about the special sensitivity of
8 the Monument’s values, regulations, and appropriate housekeeping.

9

10 **Alternatives Considered and Dismissed**

11
12 During public scoping, four new alternatives were presented to NPS. NPS considered their
13 feasibility and probable impacts, but ultimately dismissed the alternatives from further analysis.
14 Additionally, one alternative initially proposed by NPS was dismissed. Reasons for their
15 dismissal are provided in the following alternatives discussion.

16 Although these alternatives were dismissed, some ideas that were received during scoping
17 were considered and included in the four action alternatives that were ultimately retained for
18 further analysis.

19

20 **Visitor Center at Teepee Flats and Administrative Staff Move to Highland Site**

21
22 During public scoping, a member of the public proposed building the visitor center at Teepee
23 Flats and building a pedestrian crosswalk across the highway. In considering this alternative,
24 NPS determined that minimal administrative functions would still be needed at the Highland site.
25 This alternative would provide all visitor services that are currently available at the Canyon site,
26 including concessions, and would enhance exhibits. It would be less confusing to visitors than
27 shuttle systems and would remove the visitor center out of the rockfall zone and 100-year
28 floodplain, thereby reducing hazards for visitors and staff. The pedestrian overpass, if approved
29 by the Utah Department of Transportation, would reduce pedestrian/vehicular conflicts.
30 However, to meet ABA accessibility requirements, ramps for the pedestrian bridge would need
31 to parallel SR 92 and take up many of the existing parking spaces, pushing parking into the
32 rockfall zone or increasing the likelihood that people would park in informal areas along the
33 road. Since visit lengths would likely increase in this alternative, the parking situation would be
34 worse than under current conditions. Additionally, the overpass would be a highly visible object
35 in the canyon and would disrupt views along the scenic drive.

36
37 In this alternative, one hundred percent of visitors would need to cross SR 92, most multiple
38 times, to access visitor services and then the cave trail. NPS looked at other ways to have
39 visitors cross the highway safely. An underpass was rejected because the flood hazard would
40 make an underpass extremely dangerous. A traffic light was rejected because cars approach
41 the crossing area from around a curve and may not be able to stop safely at a red light. Thus,
42 NPS would either need to reduce the number of cave visits to conform with reduced parking or
43 expose one hundred percent of visitors to traffic hazards if this alternative were implemented.

44
45 NPS would either need to reduce the number of cave visits to conform with reduced safe
46 parking constraints or expose one hundred percent of visitors to traffic hazards if this alternative
47 were implemented. Other alternatives were able to meet visitor service needs, and reduce
48 hazards to staff and employees while serving more visitors, therefore, this alternative was
49 dismissed.

1
2 **Reuse Residences 8 or 9 for Visitor Center and Administrative Staff Move to**
3 **Highland Site**

4
5 Several members of the public proposed reusing existing buildings as a cost cutting measure
6 that could be quickly implemented and would keep the current level of visitor services at the
7 Canyon site. Since all buildings are currently being used to full capacity, NPS would need to
8 move administrative staff to the Highland site to reuse Residence #8 and Residence #9
9 (Headquarters building) for visitor services.

10
11 In considering this alternative, NPS found that it had the same safety concerns that were
12 outlined for the Teepee Flats alternative. One hundred percent of visitors would need to cross
13 the SR 92, but because of the closeness of the buildings to SR 92, construction of an ABAs
14 compliant overpass would be even more difficult. Additionally, the two buildings could not
15 support a full visitor center program, since together they compose approximately 2,500 square
16 feet, not the approximately 4,000 square feet needed for a full upgrade in services. Additionally,
17 the seasonal staff would not have an operational headquarters because Residence #9 would be
18 used for visitor services. The residences would need to be reconfigured and upgraded for ABAs
19 compliance. Finally, although it was suggested that by reusing these buildings, NPS could
20 move more quickly to ameliorate problems at the current site, the reliance on this site for all park
21 administrative functions, would mean that park personnel would need to be relocated first, into
22 the Highland site or elsewhere. As a result, the timeline may not be as rapid as expected and
23 could be delayed.

24
25 NPS would either need to reduce the number of cave visits to conform with reduced safe
26 parking constraints or expose one hundred percent of visitors to traffic hazards if this alternative
27 were implemented. Additionally, administrative operations would need to be relocated during
28 construction, possibly delaying the implementation of the project unless other temporary
29 facilities in Highland could be found prior to the construction of the interagency visitor orientation
30 center. Other alternatives were able to meet visitor service needs, and reduce hazards to staff
31 and employees while serving more visitors and providing greater amenities with less disruption
32 to overall park operations therefore, this alternative was dismissed from further analysis.

33
34 **Construct New Visitor Center Near the Existing Visitor Center and No Visitor**
35 **Center at Highland Site**

36
37 This alternative was considered to provide visitor services at the Canyon site cave trailhead and
38 reduce project costs. Under this alternative, the existing, temporary visitor center would be
39 demolished and a new visitor center would be constructed in the existing footprint. The new
40 visitor center would provide all existing visitor services at the Monument in the same capacity.
41 The Monument would not participate in the construction of an interagency visitor orientation
42 center at the Highland site, thus all administrative staff would remain in their current locations at
43 the monument. During public scoping, a few members of the public proposed that an alternative
44 should examine the project without the addition of the Highland site to reduce project costs. This
45 alternative would provide a convenient, one-stop location for visitors that included concessions,
46 however, under this alternative the visitor center would remain within the rockfall zone and
47 require additional rockfall mitigation. Additionally, the footprint of a visitor center with enough
48 space for all existing visitor services would encroach on the existing parking spaces

1 A visitor center with enough space for ticket sales and snack bar and gift shop concession
2 operations would require at least 8,000 square feet. A building of this size cannot be
3 constructed on the south side of SR 92 without remaining within the rockfall zone, reducing the
4 available parking spaces, and requiring a substantial amount of rock excavation. This type of
5 construction was previously examined and the costs were too high for the scope of this project.
6 Additionally, increasing visitor services at the Canyon site cave trailhead would increase the
7 amount of time visitors spend not only at the Canyon site cave trailhead, but in the rockfall zone.
8 Both reduced available parking and increased visitor turnover time would reduce the number of
9 cave tours available each day at the Monument.

10
11 By not building the interagency visitor orientation center at the Highland site, administrative staff
12 would remain in their current locations with inadequate facilities for their operations.

13
14 Therefore, this alternative was dismissed because the construction of a new visitor center on
15 the south side of SR 92 would continue to expose visitors and staff to the rockfall hazard and
16 would reduce the number of visitors that would be able to experience the cave tour.

17 18 **Construct the Visitor Center Underground with Parking Structure**

19
20 Members of the public asked NPS to consider constructing a visitor and administrative center at
21 the Canyon site cave trailhead and constructing a covered parking structure over the roof of the
22 visitor center. This would increase the amount of building space that NPS would have and
23 protect visitors and staff from rockfall and vehicle/pedestrian conflicts. It would also consolidate
24 all NPS functions at the Canyon site. Under this alternative, the American Fork River would be
25 channelized to contain flood waters and SR 92 would be realigned along the American Fork
26 River. The Monument would not participate in the construction of an interagency visitor
27 orientation center at the Highland site. This alternative would provide a convenient, one-stop
28 location for visitors that included concessions, ticket sales, and interpretation and would mitigate
29 rockfall, flood, and SR 92 hazards. However, under this alternative, the flood hazard would only
30 be mitigated if the American Fork River can be channelized, the construction costs would be
31 increased due to extensive blasting and rock excavation, and a noticeable change to the natural
32 environment and visual resource would occur. Additionally, based on the ramps for the parking
33 structure, parking capacity could be less than existing conditions.

34
35 The extensive cost and impacts to the natural environment, Monument character, and visual
36 resources and the extremely high costs associated with the blasting and stream channelization
37 would likely constitute major impacts to the environment. Since this alternative would not be
38 feasible without the extreme flood hazard mitigations and other alternatives met the purpose
39 and need for the project without potential for major impacts, this alternative was dismissed from
40 further analysis.

41 42 **Interagency Visitor Orientation Center and Trailhead Visitor Center**

43
44 The NPS originally considered an alternative where a new Canyon site cave trailhead visitor
45 center would be constructed directly to the east into the slope of the cliffs behind the existing
46 visitor center. This would increase the amount of building space that NPS would have and move
47 the visitor center away from the concentrated rockfall area and out of the 100- and 500-year
48 floodplains. SR 92 would be realigned, as discussed in Alternative D, and a majority of the
49 parking at the Canyon site cave trailhead would be shifted to the south of the highway. At the
50 Highland site, the Monument administrative operations would move to the interagency visitor
51 orientation center and year-round education and interpretative materials would be included in

1 the interagency visitor orientation center. This alternative would provide a convenient, one-stop
2 location for visitors that included concessions, ticket sales, and interpretation and would mitigate
3 rockfall, flood, and SR 92 hazards. However, under this alternative, the rockfall and flood
4 hazards would only be mitigated by building the visitor center into the side of the canyon, the
5 construction costs would be increased due to extensive blasting and rock excavation, and a
6 noticeable change to the natural environment and visual resource would occur. Additionally,
7 despite moving the visitor center out of the rockfall and flood hazard areas, visitors would still be
8 encouraged to spend more time at the Canyon site cave trailhead. Increased visitor duration
9 would adversely impact visitor capacity and visitor safety at the Canyon site cave trailhead.

10
11 The extensive cost and impacts to the natural environment, visual resources, visitor experience,
12 and visitor safety, and the extremely high costs associated with the blasting and rock excavation
13 would likely constitute major impacts to the environment. Since this alternative would not be
14 feasible without large construction costs and other alternatives met the purpose and need for
15 the project without potential for major impacts, this alternative was dismissed from further
16 analysis.

17 **Alternative Summaries**

18
19
20 Table 2 summarizes the major components of Alternatives A, B, C, D (the Preferred
21 Alternative), and E, and compares the ability of these Alternatives to meet the project objectives
22 (the objectives for this project are identified in the *Purpose and Need* chapter). As shown in the
23 following table, Alternatives B, C, the Preferred Alternative, and E meet each of the objectives
24 identified for this project, while the No Action Alternative does not address the objectives.

25
26 Table 3 summarizes the anticipated environmental impacts for Alternatives A, B, C, D (the
27 Preferred Alternative), and E. Only those impact topics that have been carried forward for
28 further analysis are included in this table. The *Environmental Consequences* chapter provides a
29 more detailed explanation of these impacts.
30

Table 2 – Alternatives Summary and Project Objectives

Objective	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
Canyon Site	Park operations would continue as they are currently conducted. The Monument facilities and visitor services at the cave trailhead would remain unchanged from current conditions.	Provide a mandatory shuttle system between the interagency center and the Canyon site cave trailhead during the entire visitor use season. A visitor contact station with vending machines and a shuttle stop structure would be located at the Canyon site cave trailhead. Visitor parking at the Canyon site cave trailhead parking area would be greatly reduced including elimination of informal shoulder parking along SR 92.	Provide an optional shuttle system between the interagency center and the Canyon site cave trailhead during peak times of visitor use (weekends and holidays). A visitor contact station with vending machines and a shuttle stop structure would be located at the Canyon site cave trailhead. Visitor parking at the Canyon site cave trailhead parking area would continue to be available to visitors. The Canyon site cave trailhead parking area would be reconfigured on both sides of SR 92.	There would be no shuttle system and visitors would continue to park at the Canyon site cave trailhead. A visitor contact station with vending machines would be located at the Canyon site cave trailhead. SR 92 at the Canyon site cave trailhead would be realigned to allow construction of a new visitor contact station outside of the primary rock fall area, to consolidate parking, and to reduce of pedestrian highway crossings. The Canyon site cave trailhead parking area would be reconfigured on the south side of SR 92.	There would be no shuttle system and visitors would continue to park at the Canyon site cave trailhead. A visitor contact station with vending machines would be located at the Canyon site cave trailhead and concession operations would be located at Swinging Bridge Picnic Area. Visitor parking at the Canyon site cave trailhead parking area would continue to be available to visitors. The Canyon site cave trailhead parking area would be reconfigured on both sides of SR 92.
Highland Site	An interagency visitor orientation center would not be constructed.	An interagency visitor orientation center would be constructed and would include enough parking to support the mandatory shuttle system.	An interagency visitor orientation center would be constructed and would include enough parking to support the peak-season shuttle system.	An interagency visitor orientation center would be constructed.	An interagency visitor orientation center would be constructed.
Project Objectives	Meets Project Objectives?	Meets Project Objectives?	Meets Project Objectives?	Meets Project Objectives?	Meets Project Objectives?
Provide for visitor enjoyment and education with quality	No. •The Monument would continue to utilize a 20+ year old temporary modular structure, with	Yes. •At the Canyon site cave trailhead, a visitor contact station would be built in an area with substantially less	Yes. •At the Canyon site cave trailhead, a visitor contact station would be built in an area with substantially less	Yes. •At the Canyon site cave trailhead, a visitor contact station would be built in an area with substantially less	Yes. •At the Canyon site cave trailhead, a visitor contact station would be built in an area with substantially

Objective	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
<p>visitor services and facilities in the optimal locations for their purposes.</p>	<p>structural deficiencies and rodent infestation, for visitor services and administrative offices.</p> <ul style="list-style-type: none"> Educational and interpretative resources would be limited to the existing, temporary visitor center. PGRD would continue to provide visitor services from an inconvenient location and to operate from inadequate facilities. 	<p>rockfall and would include basic visitor information, restrooms, and vending machines with visitor convenience items.</p> <ul style="list-style-type: none"> At the Highland site, an interagency visitor orientation center would be built and would include enhanced education and interpretative materials and programs for visitors which would be available year-round. A mandatory shuttle system would transport visitors to the Canyon site cave trailhead. Improved visitor management would reduce visitor crowding and congestion at the Canyon site cave trailhead would be reduced. Improved information about advanced ticket purchase would be provided for visitors. 	<p>rockfall and would include basic visitor information, restrooms, and vending machines with visitor convenience items.</p> <ul style="list-style-type: none"> At the Highland site, an interagency visitor orientation center would be built and would include enhanced education and interpretative materials and programs for visitors which would be available year-round. On weekends and holiday, an optional shuttle system would transport visitors to the Canyon site cave trailhead. Visitor parking would be available at the Canyon site cave trailhead parking area. Improved visitor management would reduce visitor crowding and congestion at the Canyon site cave trailhead would be reduced. Recreational hikers would be able to access the Canyon site cave trailhead without the shuttle. Improved information about advanced ticket purchase and informative traffic signage would be provided for visitors. 	<p>rockfall and would include basic visitor information, restrooms, and vending machines with visitor convenience items.</p> <ul style="list-style-type: none"> At the Highland site, an interagency visitor orientation center would be built and would include enhanced education and interpretative materials and programs for visitors which would be available year-round. Visitor parking would be available at the Canyon site cave trailhead parking area. Improved visitor management would reduce visitor crowding and congestion at the Canyon site cave trailhead would be reduced. Recreational hikers would be able to access the Canyon site cave trailhead without the shuttle. Improved information about advanced ticket purchase and informative traffic signage would be provided for visitors. 	<p>less rockfall and would include basic visitor information, restrooms, and vending machines with visitor convenience items.</p> <ul style="list-style-type: none"> At the Highland site, an interagency visitor orientation center would be built and would include enhanced education and interpretative materials and programs for visitors which would be available year-round. Visitor parking would be available at the Canyon site cave trailhead parking area. Improved visitor management would reduce visitor crowding and congestion at the Canyon site cave trailhead would be reduced. Recreational hikers would be able to access the Canyon site cave trailhead without the shuttle. Improved information about advanced ticket purchase and informative traffic signage would be provided for visitors. Concession operations would be provided at the Swinging Bridge Picnic

Objective	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
					Area.
<p>Improve visitor and employee safety from hazards including rockfall, flood, and highway hazards.</p>	<p>No. At the Canyon site:</p> <ul style="list-style-type: none"> • The Monument would continue to utilize a 20+ year old temporary modular structure, with structural deficiencies and rodent infestation, for visitor services and administrative offices. • The existing, temporary visitor center at the Canyon site cave trailhead would remain in a rockfall zone without safety precautions for visitors and employees. • The Monument would continue to operate without flash flood mitigation. • Parking would remain on both sides of SR 92 and pedestrians would continue to cross the highway and fast flowing traffic to access the visitor center. 	<p>Yes. At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station and the shuttle stop would be built in an area with substantially less rockfall. • The visitor contact station would be built out of the 100-year floodplain. • Mitigation measures for flood danger would be implemented. • Visitor exposure to hazards would be reduced by the reduction in visitor duration at the Canyon site cave trailhead. • Better designed pedestrian crosswalks would be installed along SR 92 near the Monument. • The shuttle system would take people to the Canyon site cave trailhead and reduce the number of pedestrians crossing SR 92. • The reduction of parking along SR 92 would reduce the number of vehicles backing and maneuvering into oncoming traffic on SR 92. 	<p>Yes. At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station and the shuttle stop would be built in an area with substantially less rockfall. • The visitor contact station would be built out of the 100-year floodplain. • Mitigation measures for flood danger would be implemented. • Visitor exposure to hazards would be reduced by the reduction in visitor duration at the Canyon site cave trailhead. • Better designed pedestrian crosswalks would be installed along SR 92 near the Monument. • On weekends and holidays, the shuttle system would take people to the Canyon site cave trailhead and reduce the number of pedestrians crossing SR 92. 	<p>Yes. At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station and the shuttle stop would be built in an area with substantially less rockfall. • The visitor contact station would be built out of the 100- and 500-year floodplains. • Mitigation measures for flood danger would be implemented. • Visitor exposure to hazards would be reduced by the reduction in visitor duration at the Canyon site cave trailhead. • Better designed pedestrian crosswalks would be installed along SR 92 near the Monument. • The parking layout of the Canyon site cave trailhead parking area would be shifted to the south side of SR 92 and pedestrians crossing SR 92 and the number of vehicles backing and maneuvering into oncoming traffic on SR 92 would be reduced. 	<p>Yes. At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station and the shuttle stop would be built in an area with substantially less rockfall. • The visitor contact station would be built out of the 100-year floodplain. • Mitigation measures for flood danger would be implemented. • Visitor exposure to hazards would be reduced by the reduction in visitor duration at the Canyon site cave trailhead. • Better designed pedestrian crosswalks would be installed along SR 92 near the Monument.

Objective	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
<p>Provide facilities for the Monument and PGRD that consolidate and facilitate the Monument's and forest district's operations.</p>	<p>No.</p> <ul style="list-style-type: none"> •The Monument would continue to utilize a 20+ year old temporary modular structure, with structural deficiencies and rodent infestation, for visitor services and administrative offices. • The Monument administrative staff would continue to utilize Residence #9 as the administrative headquarters. •Seasonal operations would be limited to current space. •An interagency visitor orientation center would not be constructed and PGRD would continue to operate from inadequate and inefficient facilities. 	<p>Yes.</p> <ul style="list-style-type: none"> •Administrative staff offices would be consolidated to the interagency visitor orientation center. •The current administrative head-quarters building (Residence #9) would be converted to a Seasonal Operations Center to provide work and storage space for interpretive functions. •The interagency visitor orientation center would provide adequate sized administrative functions for both the Monument and the PGRD. PGRD would construct a maintenance facility and a fire operations facility. 	<p>Yes.</p> <ul style="list-style-type: none"> •Administrative staff offices would be consolidated to the interagency visitor orientation center. •The current administrative head-quarters building (Residence #9) would be converted to a Seasonal Operations Center to provide work and storage space for interpretive functions. •The interagency visitor orientation center would provide adequate sized administrative functions for both the Monument and the PGRD. PGRD would construct a maintenance facility and a fire operations facility. 	<p>Yes.</p> <ul style="list-style-type: none"> •Administrative staff offices would be consolidated to the interagency visitor orientation center. •The current administrative head-quarters building (Residence #9) would be converted to a Seasonal Operations Center to provide work and storage space for interpretive functions. •The interagency visitor orientation center would provide adequate sized administrative functions for both the Monument and the PGRD. PGRD would construct a maintenance facility and a fire operations facility. 	<p>Yes.</p> <ul style="list-style-type: none"> • Administrative staff offices would be consolidated to the interagency visitor orientation center. •The current administrative head-quarters building (Residence #9) would be converted to a Seasonal Operations Center to provide work and storage space for interpretive functions. •The interagency visitor orientation center would provide adequate sized administrative functions for both the Monument and the PGRD. PGRD would construct a maintenance facility and a fire operations facility.
<p>Minimize impacts to natural and cultural resources of the Monument.</p>	<p>Yes.</p> <p>At the Canyon site:</p> <ul style="list-style-type: none"> • The current facilities would be retained and no resources would be impacted. <p>At the Highland site:</p> <ul style="list-style-type: none"> • An interagency visitor orientation center would not be constructed and the property, previously used for livestock activities, 	<p>Yes.</p> <p>At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station would be constructed east of the existing, temporary visitor center in a previously disturbed area with negligible impacts to vegetation. • Some areas along SR 92 would be re-vegetated and rehabilitated as a 	<p>Yes.</p> <p>At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station would be constructed east of the existing, temporary visitor center in a previously disturbed area with negligible impacts to vegetation. <p>At the Highland site:</p> <ul style="list-style-type: none"> • The interagency visitor orientation center would be 	<p>Yes.</p> <p>At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station would be constructed east of the existing, temporary visitor center in a currently undisturbed, but effects to vegetation within the project area would be minor. • The updated parking layout of the Canyon site cave trailhead parking area 	<p>Yes.</p> <p>At the Canyon site:</p> <ul style="list-style-type: none"> • The visitor contact station would be constructed east of the existing, temporary visitor center in a previously disturbed area with negligible impacts to vegetation. <p>At the Highland site:</p> <ul style="list-style-type: none"> • The interagency visitor

Objective	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
	would remain vacant and undisturbed.	<p>result of reduced visitor parking.</p> <p>At the Highland site:</p> <ul style="list-style-type: none"> • The interagency visitor orientation center would be constructed on land which was previously used as pastureland. 	constructed on land which was previously used as pastureland.	<p>would reduce the impacts to vegetation and soils from social trailing.</p> <p>At the Highland site:</p> <ul style="list-style-type: none"> • The interagency visitor orientation center would be constructed on land which was previously used as pastureland. 	orientation center would be constructed on land which was previously used as pastureland.

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Table 3 – Environmental Impact Summary by Alternative

Impact Topic	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
Topography, Geology, and Soils	Effects would be long-term, minor and adverse as a result of small, existing areas of social trailing and soil compaction. Cumulative impacts on soils would be long-term, minor, and adverse.	Effects to soils would be long-term, minor, and beneficial as a result of an expected reduction in the amount of social trailing and the restoration of existing disturbed areas along SR 92 at the Canyon cave trail-head. Overall, construction activities would result in short- and long-term, minor, adverse impacts on soils. No adverse effects to topography or geology. Cumulative impacts on soils would be long-term, minor, and adverse.	Effects to soils would be short- and long-term, minor, and adverse as a result of construction activities, the permanent loss of soils within the footprint of development, and the negligible change in the amount of social trailing near the Canyon site cave trailhead. No adverse effects to topography or geology. Cumulative impacts on soils would be long-term, minor, and adverse.	Effects to soils would be short- and long-term, minor, and adverse as a result of construction activities and the permanent loss of soils and topography within the footprint of development at the Canyon site cave trailhead. Negligible beneficial impacts would occur as a result of the reduction in social trailing at the Canyon cave trailhead. No adverse effects to geology. Cumulative impacts on soils would be long-term, minor, and adverse.	Effects to soils would be short- and long-term, minor, and adverse as a result of construction activities, the permanent loss of soils within the footprint of development, and the negligible change in the amount of social trailing near the Canyon site cave trailhead. No adverse effects to topography or geology. Cumulative impacts on soils would be long-term, minor, and adverse.
Vegetation	Effects to vegetation would be long-term, minor, and adverse due to the continued localized disturbance at the Canyon site. Cumulative impacts on vegetation would be long-term, negligible, and adverse.	Effects to vegetation would be long-term, minor, and beneficial as a result the restoration of vegetation in existing disturbed areas along SR 92 at the Canyon cave trail-head and a potential reduction in social trailing. Temporary, negligible, adverse impacts would occur as a result of construction activities. Overall, construction activities would result in short- and long-term, minor, adverse impacts on soils. Cumulative impacts to vegetation would be long-term, minor, and adverse.	Effects to vegetation would be short- and long-term, minor, and adverse as a result of construction activities, the permanent loss of vegetation within the footprint of development, and the negligible change in the amount of social trailing near the Canyon site cave trailhead. Cumulative impacts to vegetation would be long-term, minor, and adverse.	Effects to vegetation would be short- and long-term, minor, and adverse as a result of construction activities and the permanent loss of vegetation within the footprint of development. Negligible beneficial impacts could occur as a result of the potential reduction in social trailing at the Canyon site cave trailhead. Cumulative impacts to vegetation would be long-term, minor, and adverse.	Effects to vegetation would be short- and long-term, minor, and adverse as a result of construction activities, the permanent loss of vegetation within the footprint of development, and the potential for social trailing near the Canyon site cave trailhead. Cumulative impacts to vegetation would be long-term, minor, and adverse.

Impact Topic	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
Wildlife	Effects to wildlife and wildlife habitat would be long-term, negligible, and adverse due to the existing disturbed areas near Canyon site developments. Cumulative impacts on wildlife would be long-term, moderate, and adverse.	Effects to wildlife and wildlife habitat would be short- and long-term, minor, and adverse as a result of construction activities and the permanent loss of wildlife habitat within the footprint of development at the Highland site. Negligible beneficial impacts would occur as a result of restoration of previously disturbed areas at the Canyon site cave trailhead. Cumulative impacts to wildlife would be long-term, moderate, and adverse.	Effects to wildlife and wildlife habitat would be short- and long-term, minor, and adverse as a result of construction activities and the permanent loss of wildlife habitat within the footprint of development at the Highland site. Cumulative impacts to wildlife would be long-term, moderate, and adverse.	Effects to wildlife and wildlife habitat would be short- and long-term, minor, and adverse as a result of construction activities and the permanent loss of wildlife habitat within the footprint of development at the Highland site. Cumulative impacts to wildlife would be long-term, moderate, and adverse.	Effects to wildlife and wildlife habitat would be short- and long-term, minor, and adverse as a result of construction activities and the permanent loss of wildlife habitat within the footprint of development at the Highland site. Cumulative impacts to wildlife would be long-term, moderate, and adverse.
Floodplain	Effects to floodplains would be long-term, minor, and adverse as a result of existing disturbances to the floodplains and natural floodplain values. Cumulative impacts on floodplains would be long-term, minor, and adverse.	Effects to floodplains would be long-term, negligible, and beneficial as a result of new facilities at the Canyon site cave trailhead being located out of the 100-year floodplain and the reclamation of some riparian areas. However, all facilities would remain within the 500-year and PMF flood plains and SR 92 and cave trailhead parking would remain with the 100-year floodplain which would have long-term, minor, adverse effects on floodplains. Cumulative impacts on floodplains would be long-term, minor, and adverse.	Effects to floodplains would be long-term, negligible, and beneficial as a result of new facilities at the Canyon site cave trailhead being located out of the 100-year floodplain. However, all facilities would remain within the 500-year and PMF flood plains and SR 92 and cave trailhead parking would remain with the 100-year floodplain which would have long-term, minor, adverse effects on floodplains. Cumulative impacts on floodplains would be long-term, minor, and adverse.	Effects to floodplains would be long-term, negligible, and beneficial as a result of the new visitor contact station at the Canyon site cave trailhead being located out of the 100- and 500-year floodplains. However, all other facilities would remain within the 500-year and PMF flood plains and SR 92 and cave trailhead parking would remain with the 100-year floodplain which would have long-term, minor, adverse effects on floodplains. Cumulative impacts on floodplains would be long-term, minor, and adverse.	Effects to floodplains would be long-term, negligible, and beneficial as a result of the new visitor contact station at the Canyon site cave trailhead being located out of the 100-year floodplain. However, all facilities would remain within the 500-year and PMF flood plains and SR 92 and cave trailhead parking would remain with the 100-year floodplain which would have long-term, minor, adverse effects on floodplains. Cumulative impacts on floodplains would be long-term, minor, and adverse.

Impact Topic	Alternative A – No Action	Alternative B – Mandatory Shuttle Service	Alternative C – Peak-Period Optional Shuttle Service	Alternative D – (Preferred Alternative) Canyon Site Safety Improvements with Realignment of SR 92 and Demand Management	Alternative E – Canyon Site Capacity Improvements with Advanced Demand Management
Visitor Use and Experience	Effects on visitor use and experience would be long-term, minor to moderate, and adverse primarily due to the limited available educational and interpretive experiences and the congestion and crowding that would continue at the Canyon site cave trailhead site. Cumulative impacts on visitor use and experience would be long-term, minor to moderate, and adverse.	Effects on visitor use and experience would be long-term, minor to moderate, beneficial due to the improved education and interpretive resources at the Highland site. Long term, minor adverse effects to early morning hikers, concessions users, and those driving from the east would occur. Cumulative impacts on visitor use and experience would be long-term, minor to moderate, and beneficial.	Effects on visitor use and experience would be long-term, minor to moderate, beneficial due to the improved education and interpretive resources at the Highland site. Long term, minor adverse effects to early morning hikers, concessions users, and those driving from the east would occur. Cumulative impacts on visitor use and experience would be long-term, minor to moderate, and beneficial.	Effects on visitor use and experience would be long-term, minor to moderate, beneficial due to the improved education and interpretive resources at the Highland site and better parking management at the Canyon site cave trailhead. Long term, negligible, adverse effects to concessions users would occur. Cumulative impacts on visitor use and experience would be long-term, minor to moderate, and beneficial.	Effects on visitor use and experience would be long-term, minor to moderate, beneficial due to the improved education and interpretive resources at the Highland site and better parking management at the Canyon site cave trailhead. Cumulative impacts on visitor use and experience would be long-term, minor to moderate, and beneficial.
Human Health and Safety	Effects to human health and safety would be long-term, minor to moderate, and adverse due to number of visitors and employees exposed to existing hazards. Cumulative impacts on human health and safety would be long-term, minor to moderate, and adverse.	Effects to human health and safety would be long-term, minor to moderate, and beneficial due to the reduced exposure to existing hazards and installation of mitigation measures. Cumulative impacts on human health and safety would be long-term, minor to moderate, and beneficial.	Effects to human health and safety would be long-term, minor to moderate, and beneficial due to the reduced exposure to existing hazards and installation of mitigation measures. Cumulative impacts on human health and safety would be long-term, minor to moderate, and beneficial.	Effects to human health and safety would be long-term, moderate, and beneficial due to the substantially reduced exposure to existing hazards and installation of mitigation measures. Cumulative impacts on human health and safety would be long-term, moderate, and beneficial.	Effects to human health and safety would be long-term, minor to moderate, and beneficial due to the reduced exposure to existing hazards and installation of mitigation measures. Cumulative impacts on human health and safety would be long-term, minor to moderate, and beneficial.
Park Operations	Effects on park operations would be long-term, minor, and adverse due to the limited, available facilities and the inadequate resources for managing visitor demand. Cumulative impacts on park operations would be long-term, minor, and adverse.	Effects to park operations would be long-term, moderate, and beneficial due to improved facilities for operations and improved visitor management tools. Cumulative impacts on park operations would be long-term, moderate, and beneficial.	Effects to park operations would be long-term, moderate, and beneficial due to improved facilities for operations and improved visitor management tools. Cumulative impacts on park operations would be long-term, moderate, and beneficial.	Effects to park operations would be long-term, moderate, and beneficial due to improved facilities for operations and improved visitor management tools. Cumulative impacts on park operations would be long-term, moderate, and beneficial.	Effects to park operations would be long-term, moderate, and beneficial due to improved facilities for operations and improved visitor management tools. Cumulative impacts on park operations would be long-term, moderate, and beneficial.

1 **Environmentally Preferable Alternative**

2
3 According to the CEQ regulations implementing NEPA (43 CFR 46.30), the environmentally
4 preferable alternative is the alternative “that causes the least damage to the biological and
5 physical environment and best protects, preserves, and enhances historical, cultural, and
6 natural resources. The environmentally preferable alternative is identified upon consideration
7 and weighing by the Responsible Official of long-term environmental impacts against short-term
8 impacts in evaluating what is the best protection of these resources. In some situations, such as
9 when different alternatives impact different resources to different degrees, there may be more
10 than one environmentally preferable alternative.”

11
12 Alternative B (Mandatory Shuttle System) is the environmentally preferable alternative for
13 several reasons: 1) The visitor contact station at the Canyon site would be constructed on
14 previously disturbed land; 2) The mandatory shuttle system would substantially reduce visitor
15 parking at the Monument except at the Swinging Bridge Picnic Area. By reducing visitor parking,
16 existing shoulder parking along SR 92 would be re-vegetated and social trailing through
17 vegetated areas would be greatly reduced; 3) The interagency visitor orientation center at the
18 Highland site would be constructed on previously disturbed land; and 4) New facilities at both
19 the Canyon and Highland sites would be more energy efficient (sustainable) in the long term.
20 Energy saving material used in the design of the new building are more sustainable in terms of
21 electric and water consumption than the current temporary modular structures used by both the
22 Monument and PGRD. For these reasons, Alternative B causes the least damage to the
23 biological and physical environment and best protects, preserves, and enhances natural
24 resources, thereby making it the environmentally preferable alternative.

25
26 Alternative C (Peak-Period Optional Shuttle Service) and Alternative E (Canyon Site Capacity
27 Improvements with Advanced Demand Management) are not the environmentally preferable
28 alternative because although the facilities at the Canyon and Highland sites would be built in the
29 same previously disturbed locations and constructed with the same energy saving materials as
30 Alternative B, 1) the parking layout at the Canyon site would formalize 99 parking spaces on
31 both sides of SR 92. With more parking spaces located in several locations, visitors are more
32 likely to participate in social trailing through undisturbed, vegetated areas of the Monument.

33
34 Alternative D (Canyon Site Safety Improvements with Realignment of SR 92 and Demand
35 Management) is not the environmentally preferable alternative. Similarities between Alternative
36 B and Alternative D include the facilities at the Canyon and Highland sites would be built with
37 the same energy saving materials and the Highland facilities would be built in the same location.
38 Additionally, the parking layout greatly reduces the available parking spaces on the north side of
39 SR 92, thus reducing social trailing by visitors; however, the visitor contact station would be
40 constructed in an area of significantly lower rock fall hazard. During construction, some trees
41 would have to be removed and some minor impacts to soil and geology would also occur.

42
43 Alternative A (No Action) is not the environmentally preferable alternative because although
44 there would be no construction or ground disturbing activities that would damage previously
45 undisturbed elements of the biological and physical environment 1) the existing, temporary
46 visitor center at the Canyon site is not energy efficient (sustainable) in the long term; 2) the
47 existing PGRD facilities are not energy efficient (sustainable) in the long term; 3) the existing
48 gravel parking spaces along the north side of SR 92 do not formalize parking boundaries to
49 visitors allowing for additional areas to become disturbed; and 4) the existing parking layout

1 currently encourages social trailing among visitors in undisturbed and vegetated areas of the
2 Monument.
3

AFFECTED ENVIRONMENT

This chapter describes the affected environment (existing setting or baseline conditions). This information is used to analyze impacts against the current conditions of the project area in the *Environmental Consequences* chapter.

Topography, Geology, and Soils

According to *NPS Management Policies* (NPS 2006) the NPS will preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue. These policies also state that the NPS will strive to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

American Fork Canyon is a dramatic, deeply-incised limestone gorge with spectacular cliffs and steep side canyons. The total canyon depth in the vicinity of the Canyon site is over 2000 feet. The existing, temporary visitor center lies at the base of near-vertical cliffs that rise over 600 feet above the floor of the American Fork Canyon. The cliffs above the existing, temporary visitor center are composed of quartzite, as is the talus apron behind the visitor center and the talus slope along the east side of the cliff (USGS 2009). The talus consists of angular gravel- to boulder-size clasts. The cliffs above the visitor center are truncated along a north-draining side canyon about 500 feet east of the visitor center and a talus slope extends along the east-facing part of the cliffs (Kleinfelder 2010a). The Timpanogos Cave trail crosses the lower part of the east talus slope.

The side canyon east of the visitor center is heavily forested, except for a narrow, active debris-channel down the middle. The well-defined debris-channel flattens as it reaches the mouth of the side canyon and disperses to feed an alluvial debris fan which extends to the American Fork River on the north and to the existing, temporary visitor center parking lot on the west. The toe of this debris fan has been cut away to accommodate SR 92 and enlarge the visitor center parking lot, exposing the debris-flow deposits that comprise the steep-sided fan. The flat-lying area of the visitor center parking lot at the edge of the debris fan is underlain by stream terrace deposits of the American Fork River (Kleinfelder 2010a).

The rocks exposed in the debris fan are predominantly limestone, derived from the higher cliffs on the south side of the American Fork Canyon and funneled down the debris channel to be deposited on the debris fan. These debris flow deposits comprise mostly sub-angular, gravel- to cobble-sized clasts in a silty sand matrix where exposed in cuts along SR 92 and the Timpanogos Cave trail. Although rarely exposed in the cuts, sub-angular boulders of limestone dot the surface of the debris fan, including a few as large as 1 to 2 cubic yards (Kleinfelder 2010b). The locations of the various geomorphic elements in vicinity of the existing, temporary visitor center are illustrated in the Monument Visitor Center Rockfall Figure in Appendix B.

Based on the presence of high cliffs of fractured quartzite above the visitor center, all areas in the general vicinity are exposed to hazards from falling rocks. In general, the rockfall risk is highest near the base of the cliffs and lowest in the center of the canyon floor. In addition, the debris fan east of the existing, temporary visitor center and the mature trees growing atop the debris fan provide a partial screen against rocks falling from the east-facing cliffs. There is an approximately 3-foot-high retaining wall along the Timpanogos Cave trail just west of the debris fan that acts to trap smaller rocks rolling down slope as shown by existence of soil and grasses

1 on the talus below the trail but not above. The transition between the debris fan and east-side
2 talus slope is marked by a shallow swale which directs rolling boulders northwestward toward
3 the existing, temporary visitor center (Kleinfelder 2010b).

4
5 East of the existing, temporary visitor center is a debris fan that has built up over time by
6 recurring debris flows. The debris-channel above the debris fan lacks vegetation and
7 accumulated organic material, indicating the channel remains active. Where the active channel
8 meets the apex of the debris fan, the channel is no longer incised and the debris fan is covered
9 in mature forest, with moderately heavy undergrowth and a ground cover of pine needles and
10 other organic material. The surface of the fan slope at this junction is hummocky, although
11 relatively flat, indicating that debris flows begin spreading out over the surface of the fan at this
12 point. The mature forest cover at the site indicates that large debris flows have not impacted this
13 location in several decades, and the overall risk of future flows capable of causing damage to
14 the building is probably low (Kleinfelder 2010b).

15
16 The Monument is located approximately 2.5 miles east of the Provo segment of the Wasatch
17 fault zone. The Wasatch fault zone is considered active and capable of generating earthquakes
18 as large as magnitude 7.3 (Arabasz, and others, 1992). Schwartz and Coppersmith (1984)
19 defined the Provo segment as that part of the Wasatch fault zone that borders the eastern
20 margin of the Utah Valley extending from the Traverse Mountains on the north to Payson
21 Canyon in the Wasatch Mountains on the south. The Provo segment is 43 miles long as
22 measured along its surface trace and 37 miles long from end-to-end (Machette and others,
23 1991).

24
25 Soils are poorly developed over most of the Monument due to the extreme steep and rugged
26 nature of the canyon, the slide slopes are primarily solid rock formations with large colluvium
27 deposits randomly located along the canyon walls especially near the toes of slopes. Soils
28 within the canyon bottom are alluvial in nature and relatively shallow. The deepest and most
29 developed soils occur on toes slopes near the visitor center.

30
31 The Canyon site and the Highland site are within the Basin and Range Physiographic Province,
32 which is characterized by approximately north-trending valleys and mountain ranges that have
33 been formed by extensional tectonics and displacement along normal faults (Hunt 1967). This
34 valley where the Highland site is located is flanked by the Wasatch Range on the east and Utah
35 Lake on the west. The Wasatch Range is the easternmost expression of pronounced Basin and
36 Range extension in north-central Utah.

37
38 The site geology as mapped by Machette (1992) is stream alluvium related to the Provo phase
39 of the Bonneville lake cycle (upper Pleistocene). The stream alluvium deposits consist of a
40 pebble and cobble gravel in a matrix of sand, silt, and minor clay. The clasts are subangular to
41 rounded and are thin to medium bedded.

42
43 The Highland site is vacant and consists of a large gently sloping area to the north and
44 floodplain/drainage of American Fork River to the south, with a steep bank dividing the two.
45 Two canals and one historic ditch run east west through the northern portion of the site. The two
46 canals will remain active as part of the land exchange stipulations. Overall the site gently slopes
47 to the southwest.

48
49 The Highland site is located near the Provo segment of the Wasatch Fault. Schwartz and
50 Coppersmith (1984) defined the Provo segment as that part of the Wasatch fault zone that
51 borders the eastern margin of the Utah Valley extending from the Traverse Mountains on the

north to Payson Canyon in the Wasatch on the south. The Highland site is located approximately 1.5 miles west of the Provo Segment of the Wasatch fault zone.

Vegetation

According to the NPS's *Management Policies* (NPS 2006), the NPS strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants. Plants commonly found at the Monument are listed in the table below:

Table 4 - Common Vegetation Species of Timpanogos Cave National Monument

Firecracker Penstemon	<i>Penstemon eatonii</i>
Red Alumroot	<i>Heuchera rubescens</i>
Rabbit Brush	<i>Chrysothamnus nauseosus</i>
Basin Jamesia	<i>Jamesia tetrapetala</i>
Oregon Grape	<i>Mahonia repens</i>
Miners Lettuce	<i>Montia perfoliata</i>
Dalmation Toadflax (non-native, invasive)	<i>Linaria dalmatica</i>
False Solomon Seal	<i>Smilacina racemosa</i>
Douglas Fir	<i>Pseudotsuga menziesii</i>
Bigtooth Maple	<i>Acer grandidentatum</i>
Boxelder Maple	<i>Acer negundo</i>
White Fir	<i>Abies concolor</i>
Gamble Oak	<i>Quercus gambelii</i>
Choke Cherry	<i>Prunus virginiana</i>
Blue Spruce	<i>Picea pungens</i>
Utah Juniper	<i>Juniperus osteosperma var. utahensis</i>
Rocky Mountain maple	<i>Acer glabrum</i>
Saskatoon serviceberry	<i>Amelanchier alnifolia</i>
Rocky Mountain Juniper	<i>Juniperus scopulorum</i>
Mallow ninebark	<i>Physocarpus malvaceus</i>
Mountain snowberry	<i>Symphoricarpos oreophilus var. utahensis</i>
Mountain lover	<i>Paxistima myrsinites</i>
Common juniper**	<i>Juniperus commuinis</i>
Bluebunch wheatgrass	<i>Elymus spicatus</i>
Muttongrass	<i>Poa fendleriana</i>
Spike fescue	<i>Leucopoa kingii</i>
American vetch	<i>Vicia americana</i>
Starry false Solomon's-seal	<i>Maianthenyn stekkatyn</i>
Red-osier dogwood	<i>Cornus sericea</i>
Blue elderberry	<i>Sambucus caerulea</i>
Louisiana Wormwood	<i>Artemisia ludoviciana</i>
Curlleaf mountain mahogany	<i>Cercocarpus ledifolius</i>
Rock goldenrod**	<i>Petradoria pumila</i>
Big Sage	<i>Artemisia tridentata</i>
Littleleaf mountain mahogany	<i>Cercocarpus intricatus</i>
Narrow leaf cottonwood	<i>Populus angustifolia</i>
Orchard grass	<i>Dactylis glomerata</i>
River birch	<i>Betula occidentalis</i>
<i>Notes:</i>	
** - Denotes vegetation found at high elevations.	

1 The American Fork River runs through the Monument and creates a small area of riparian
2 vegetation as described below:

3
4 *“The banks of the American Fork Creek [sic] have been heavily modified to protect the*
5 *highway and other developments in Monument. The narrow, undeveloped corridor that*
6 *exists between the river and the highway supports a diverse montane riparian forest*
7 *characterized by narrow leaf cottonwood (*Populus angustifolia*), boxelder (*Acer**
8 *negundo), white fir, and Douglas-fir with an understory of water birch (*Betula**
9 *occidentalis), chokecherry, red-osier dogwood, orchard grass (*Dactylis glomerata*), and*
10 *smooth brome (*Bromus inermis*).” (NPS 2009a)*

11
12 Currently there are 63 species of non-native flora documented at the Monument. Three of these
13 species have been documented at visitor center grounds, the residence area, or the Swinging
14 Bridge Picnic Area (NPS 2009b). Most of the non-native species were accidentally imported by
15 livestock, wildlife, maintenance and construction activities, and visitors while other species were
16 introduced for specific purposes. In 2001 and 2002, the Monument staff focused eradication and
17 restoration efforts on the most invasive species and initiated a native plant propagation program
18 (NPS 2009a).

19
20 Vegetation at the Highland site is primarily composed of both native and non-native grasses
21 along with some deciduous brush and trees along the irrigation canals on the property. The site
22 was previously used for livestock grazing so the native vegetation of the area was significantly
23 altered.

24 **Wildlife**

25
26
27 According to NPS *Management Policies* (NPS 2006), the NPS strives to maintain all
28 components and processes of naturally evolving park unit ecosystems, including the natural
29 abundance, diversity, and ecological integrity of animals. Wildlife commonly found at the
30 Monument is listed in the table below:

1

Table 5 - Common Wildlife Species of Timpanogos Cave National Monument

Reptiles	
Sagebrush Lizard	<i>Sceloporus graciosus</i>
Gopher Snake	<i>Pituophis catenifer</i>
Great Basin Rattlesnake	<i>Crotalus viridis lutosus</i>
Rubber Boa	<i>Charina bottae</i>
Birds	
Violet-green Swallow	<i>Tachycineta thalassina</i>
Peregrine Falcon	<i>Falco peregrinus</i>
Stellar Jay	<i>Cyanocitta stelleri</i>
Townsend's Solitaire	<i>Myadestes townsendi</i>
Western Tanager	<i>Piranga ludoviciana</i>
Mountain Chickadee	<i>Poecile gambeli</i>
Black-chinned Hummingbird	<i>Archilochus alexandri</i>
Canyon Wren	<i>Catherpes mexicanus</i>
Mammals	
Golden Mantled Ground Squirrel	<i>Citellus lateralis</i>
Cliff Chipmunk	<i>Eutamias dorsalis</i>
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>
Rock Squirrel	<i>Spermophilus variegatus</i>
Mountain Goat (nonnative species)	<i>Oreamnos americanus</i>
Mule Deer	<i>Odocoileus hemionus</i>
Elk	<i>Cervus canadensis</i>
Moose	<i>Alces americana</i>
Bighorn Sheep	<i>Ovis canadensis</i>
Mountain Lion	<i>Felis concolor</i>
Bobcat	<i>Lynx rufus</i>
Red Fox	<i>Vulpes vulpes</i>
Coyote	<i>Canis latrans</i>
Cottontail rabbit	<i>Sylvilagus nuttallii</i>
Ringtail Cat	<i>Bassariscus astutus</i>
Long-tailed Weasel	<i>Mustela frenata</i>
Mink	<i>Mustela vison</i>
North American Porcupine	<i>Erethizon dorsatum</i>
Raccoon	<i>Procyon lotor</i>
Striped Skunk	<i>Mephitis mephitis</i>

2

3 Common wildlife at the Canyon site includes chipmunks, ground squirrels, lizards, snakes,
4 insects, cottontail rabbits, mice, and perching birds. Larger wildlife animals have been observed,
5 but smaller animals are more common. The Highland site was previously used for livestock;
6 hence, native wildlife was displaced by the farming activities. The Highland site is currently
7 vacant and common wildlife at the site is limited to smaller animals that utilize the grasses for
8 habitat and small deer herds.

9

1 At the both the Canyon and Highland sites, the project area is mostly located in previously
2 disturbed areas that contain minimal vegetation to support wildlife. The presence of humans,
3 human-related activities, and structures have removed or displaced much of the native wildlife
4 habitat in the project areas, which has limited the number and variety of wildlife occurrences in
5 the area.
6

7 **Floodplains**

8
9 Executive Order 11988 *Floodplain Management* requires all federal agencies to avoid
10 construction within the 100-year floodplain unless no other practicable alternative exists. NPS
11 under *NPS Management Policies* (NPS 2006) and *DO 77-2 Floodplain Management* will strive
12 to preserve floodplain values and minimize hazardous floodplain conditions. According to *DO*
13 *77-2 Floodplain Management*, certain construction within a 100-year floodplain requires
14 preparation of a statement of findings for floodplains.
15

16 The Monument is located within the American Fork Canyon. The canyon is steep and deeply
17 incised with American Fork River running along the length of the canyon. A very narrow area
18 along the floor of the canyon can accommodate building construction. The structures within the
19 Monument were constructed before EO 11988 was approved on May 24, 1977. Over half the
20 length of SR 92 in the Monument and almost the entire canyon bottom Monument facilities,
21 including the Monument's Historic District, are located within the 100- or 500-year floodplain.
22 Facilities specifically associated with this project include the existing, temporary visitor center
23 with associated parking and the Swinging Bridge Picnic Area and restroom area are located
24 within the 100-year floodplain. Therefore, a statement of findings (SOF) for floodplains has
25 been prepared due to the location of over half the length of SR 92 in the Monument and almost
26 the entire canyon bottom Monument facilities being located with the 100- or 500-year floodplain.
27 A copy of the SOF is located in Appendix C.
28

29 Additionally, Tibble Fork Dam and Silver Lake Flat Dam are upstream from the Monument. If
30 either of these two retention structures were to fail, flood waters would flow through the
31 Monument. According to the SOF, the flooded area would cover a larger area than the 500-
32 year flood area.
33

34 **Visitor Use and Experience**

35
36 According to *NPS Management Policies* (NPS 2006), the enjoyment of park resources and
37 values by people is part of the fundamental purpose of all park units. The NPS is committed to
38 providing appropriate, high quality opportunities for visitors to enjoy the parks, and will maintain
39 within the parks an atmosphere that is open, inviting, and accessible to every segment of
40 society. Further, the NPS will provide opportunities for forms of enjoyment that are uniquely
41 suited and appropriate to the superlative natural and cultural resources found in the parks. The
42 *NPS Management Policies* (NPS 2006) also state that scenic views and visual resources are
43 considered highly valued associated characteristics that the NPS should strive to protect (NPS
44 2006).
45

46 The Monument receives approximately 120,000 visitors each year. Visitors access the
47 Monument via SR 92 using personal vehicles as no public transit options are available.
48 Approximately 70 percent of visitors approach the Monument from the west and the remaining
49 30 percent approach the Monument from the east (CS 2012).
50

1 The primary visitor activity is hiking the cave trail and taking a tour of the caves, but some
2 visitors also utilize the picnic areas or hike the interpretive nature trail. Approximately 65 percent
3 of the Monument's annual visitors participate in cave tours. Currently, cave tour tickets are
4 available for purchase at the existing, temporary visitor center or by phone. Up to 70% percent
5 of the daily cave tour tickets are made available for advanced purchase by phone. The
6 Monument staff estimate that approximately 40% of available tickets are currently sold in
7 advance, while about 60% are same day sales.

8
9 The lack of advanced ticket purchase by visitors creates peak visitor demand during mid-day
10 hours with underutilized tour capacity during the morning and evening hours. Currently, a
11 majority of visitors arrive at the Monument to purchase "same day" cave tour tickets. On peak
12 days, cave tour capacity is exceeded in the mid-morning and the earliest available cave tours
13 sell out. As more visitors arrive to purchase "same day" cave tour tickets, the cave tours later in
14 the day are reserved and also sell out. For this reason, wait times for a cave tour increase
15 throughout the day to as much as four hours. Most visitors with later cave tour times remain at
16 the cave trailhead within the rockfall zone, while more visitors continue to arrive at the Canyon
17 site cave trailhead planning to purchase cave tour tickets. As a result, the Canyon site cave
18 trailhead exceeds capacity and visitor crowding and congestion occur at the Canyon site cave
19 trailhead as well as traffic congestion on SR 92.

20
21 The current visitor patterns were examined and compared in the Timpanogos Cave National
22 Monument Alternative Transportation Feasibility Study. Data from a 2005 visitor survey found
23 that over 75 percent of people stayed at the cave trailhead more than 3 hours. Data collected
24 during the 2011 Labor Day weekend indicated that approximately 50 percent of visitors that
25 parked in the North lot and the Canyon Nature Trail lot were parked for 3 hours or more, but
26 most visitors parked for less time in the other paved lots. In the North lot, several Monument
27 staff vehicles were documented which may have increased the parking duration average and
28 which would decrease the available visitor parking on peak days when more staff are at the
29 Canyon site cave trailhead. Average parking duration at the South lot was approximately 2.7
30 hours with approximately 30 percent of visitors parking in the lot for 1 to 2 hours. Since this lot is
31 closest to the visitor center, many of the short duration parking times most likely account for
32 visitors utilizing other visitor services (ticket purchases, concessions, restrooms, etc.) and not
33 taking a cave tour. The South lot parking duration average also includes local visitors that hike
34 the trail for exercise, but do not take a cave tour. The Monument has observed up to 100
35 parking spaces utilized by morning hikers that hike and leave the Canyon site cave trailhead
36 before 9 AM (CS 2012).

37
38 Additionally, the Monument is located within the section of Uinta-Wasatch-Cache National
39 Forest referred to as PGRD. The PGRD includes the Alpine Loop Scenic Byway (shown on
40 Figure 1) which begins with SR 92 at the mouth of American Fork Canyon, runs through the
41 canyon and past the Monument, and connects visitors with Provo Canyon. Approximately 1.2
42 million visitors drive the Alpine Loop Scenic Byway every year. PGRD also fosters a wide
43 variety of recreational pursuits for visitors, including backpacking in wilderness, peak climbing,
44 camping, picnicking, mountain biking, hiking, off-highway vehicle use, and driving for pleasure.

45 46 **Human Health and Safety**

47
48 According to NPS *Management Policies* (NPS 2006), the saving of human life will take
49 precedence over all other management actions. The NPS will seek to provide a safe and
50 healthful environment for visitors and employees. The NPS will strive to identify recognizable

1 threats to the safety and health of persons and to the protection of property. Where practicable
2 and not detrimental to preserve park resources, known hazards will be reduced or removed.
3 Where it would be inconsistent with congressionally designated purposes and mandates or
4 where otherwise not practicable to make physical changes, efforts will be made to provide for
5 personal safety and health through other controls, including closures, guarding, signing, or other
6 forms of education. The NPS recognizes that the environment being preserved is a visitor
7 attraction but that it also may be potentially hazardous (NPS 2006).

8
9 Employees in the existing, temporary visitor center complain of rodent sightings and droppings
10 in and around the existing visitor and office work spaces. Rodents have the potential to carry
11 hanta virus or other diseases. Hanta viruses in particular can be contracted by humans in the
12 form of hanta virus pulmonary syndrome. Hanta virus pulmonary syndrome is a deadly disease
13 transmitted by infected rodents through urine, droppings, or saliva. Humans can contract the
14 disease when they breathe in aerosolized virus. Hanta virus pulmonary syndrome was first
15 recognized in 1993 and has since been identified throughout the United States (CDC 2011).
16 Although rare, hanta virus pulmonary syndrome is potentially fatal.

17
18 Additionally, visitors and employees at the Canyon site cave trailhead are exposed to three
19 existing safety hazards: rockfall, flood, and vehicle and pedestrian safety associated with SR 92.

20
21 The visitor center and all areas in the general vicinity are exposed to the potential of falling rock
22 from the high cliffs of fractured quartzite directly south of the visitor center. The rockfall risk is
23 highest near the base of the cliffs where most of the visitor services are located. Injuries from
24 rockfall have been documented within the canyon and rocks have damaged and penetrated the
25 existing, temporary visitor center.

26
27 As discussed in Floodplains, the flood potential of the American Fork River affects visitors and
28 employees at the Canyon site cave trailhead. Many of the existing Monument buildings,
29 including the existing, temporary visitor center are located in the 100- and 500-year floodplain of
30 the American Fork River as well as the PMF floodplain. Currently, no evacuation plan,
31 informational signage, or flood warning system is in place for the Monument.

32
33 Approximately 1.2 million visitors drive SR 92 through the Monument annually. SR 92 divides
34 the Monument with administrative facilities, some visitor services, and parking located on the
35 north side, and parking, visitor center, and cave trail located on the south side. Pedestrian
36 crossing of SR 92 and use along the road shoulders is necessary to access parking, facilities,
37 and services on both sides of SR 92 and vehicles often do not slow down despite warning signs
38 and existing traffic signage. Additionally, motorists that park along SR 92 must back-up into
39 oncoming highway traffic.

40 41 **Park Operations**

42
43 Park operations utilize several different facilities at the Monument. The existing, temporary
44 visitor center building is a temporary, modular structure that requires frequent repair and
45 maintenance and provides inadequate space for educational interpretation. The administrative
46 headquarters building hosts most of the Monument administrative functions and offices, but the
47 building was converted to offices from a residence building and lacks a conference room or
48 reception space. Additional administrative offices are located in various buildings throughout the
49 Monument and employees must travel between several buildings in order to meet and work

1 together. Operating space is currently not available for seasonal operations and the staff are
2 unable to coordinate operations from a central location.

3
4 Additionally, Monument staff have no mechanism to manage the cave resources and parking
5 congestion in relation to visitor demand. Currently, visitors arrive at the Canyon site cave
6 trailhead at any time in the day to take a cave tour. This creates parking overflow into
7 undesignated areas and visitor crowding at the Canyon site cave trailhead. In some instances,
8 Monument employees are needed to safely manage the parking congestion. Monument staff
9 have no method to communicate parking conditions and cave tour ticket availability with visitors
10 before they reach the Canyon site cave trailhead, thus congested conditions are common on
11 days with peak visitor demand.

12
13 The PGRD offices are functionally too small. Additional temporary buildings have been added to
14 the property, but the structures are in poor condition and do not adequately serve the
15 maintenance or fire operations. The PGRD office is located in a residential neighborhood away
16 from access to American Fork Canyon, and the location limits the ability of PGRD to provide the
17 appropriate visitor services and information to its visitors.

ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the proposed project. Topics analyzed in this chapter include topography, geology, and soil, vegetation, wildlife, floodplain, visitor use and experience, human health and safety, and park operations. Direct, indirect, and cumulative effects are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource at the beginning of each resource section.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
 - *Beneficial*: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
 - *Adverse*: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
 - *Direct*: An effect that is caused by an action and occurs in the same time and place.
 - *Indirect*: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
- Context describes the area or location in which the impact will occur. Are the effects site-specific, local, regional, or even broader?
- Duration describes the length of time an effect will occur, either short-term or long-term:
 - *Short-term impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.*
 - *Long-term impacts last beyond the construction period, and the resources may not resume their pre-construction conditions for a longer period of time following construction.*
- Intensity describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this environmental assessment.

Cumulative Impact Scenario

The CEQ regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for the No Action Alternative, Alternatives B, C, and E, and the Preferred Alternative.

Cumulative impacts were determined by combining the impacts of the Preferred Alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Timpanogos Cave National Monument, Pleasant Grove Ranger District, and if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the Monument's boundaries,

1 while the temporal scope includes projects within a range of approximately ten years. Given
2 this, the following projects were identified for the purpose of conducting the cumulative effects
3 analysis, listed from past to future:
4

- 5 • **Residential Development in Surrounding Communities, Ongoing:** The Monument is
6 located near the towns of Highland, Alpine, Cedar Hills, and American Fork. The
7 Highland site where the interagency facilities are being proposed is located on the
8 eastern end of the town of Highland. These communities are experiencing residential
9 growth less than three miles from the Monument and possibly adjacent to the Highland
10 site. With development comes increased traffic and localized construction.
- 11 • **Historic Power House Trail, Future:** The Forest Service has proposed a trail that
12 would run from the Monument's Historic District to the historic power house located west
13 of the Monument along SR 92. This trail would follow an old road grade with the need
14 for the addition of one foot bridge. Minimal tree clearing would be necessary for the
15 construction of this trail.
16

17 **Topography, Geology, and Soils**

18 **Intensity Level Definitions**

19
20
21 Topography, geology and soils are resources that are considered necessary and appropriate to
22 fulfill the purposes of the Monument. The Monument is located in American Fork Canyon,
23 which is a dramatic, deeply-incised limestone gouge with spectacular cliffs and steep side
24 canyons. Because of the presence of high cliffs of fractured quartzite and limestone, all areas
25 below the cliffs are exposed to rockfall and debris flow hazards. Additionally, the 1.5 mile paved
26 cave trail provides an excellent exposed ascent from Precambrian through late Mississippi-aged
27 rocks. The thresholds for this impact assessment are as follows:
28

29 **Negligible:** Topography, geology, and soils features would not be affected or effects would
30 not be measurable. Any effects on soil productivity or fertility would be slight and
31 would occur in a relatively small area.
32

33 **Minor:** Effects on topography, geology, and soils would be detectable, but would
34 degrade or improve a small area.
35

36 **Moderate:** Effects on topography, geology, and soils would be readily apparent, and would
37 degrade or improve a relatively large area.
38

39 **Major:** Effects on topography, geology, and soils would be readily apparent, and would
40 substantially degrade or improve the natural topography, geology, and soil
41 characteristics over a large area.
42

43 The project area evaluated for impacts on topography, geology, and soils includes a maximum
44 of approximately 5 acres at the Canyon site and a maximum of approximately 17 acres at the
45 Highland site depending on the Alternative.
46
47
48
49

1 **Impacts of Alternative A – No Action Alternative**

2 3 **Analysis**

4
5 The No Action Alternative would continue current patterns of soil disturbance around the visitor
6 center and other facilities at the Canyon site cave trailhead. Disturbance in these areas
7 includes compacting soils along social trails and around facilities. Effects would be limited to
8 small areas. At the Highland site, the property would remain vacant, thus, soil would not be
9 disturbed. Effects of the No Action Alternative would be considered long-term, minor, and
10 adverse.

11 12 **Cumulative Effects**

13
14 The Historic Power House Trail is proposed to be constructed along a previously disturbed,
15 existing road grade. Formalizing the trail along the existing road grade would disturb soil during
16 trail construction and subsequent trail use through compaction, disruption of the soil structure,
17 and potential exposure of the soil to erosion. Mitigation such as erosion control measures would
18 be implemented as part of the project. Trail design (e.g., check dams) and informational/
19 educational signs to direct visitors would be used as needed to minimize potential social trail
20 formulation along the trail corridor. Adverse impacts to soils would be localized long-term, and
21 minor. Development in nearby communities could result in more local visitation at the Monument
22 which could result in more social trailing in currently undisturbed, vegetated areas. Additional
23 user created trails would likely be limited to the immediate area of existing facilities and trails
24 and long-term impacts such as compaction and erosion of soils are expected to be highly
25 localized and negligible. No effects to geology and topography are expected from these
26 cumulative actions. Impacts from these actions when combined with the localized, long-term
27 minor adverse impacts associated with the No Action Alternative would result in localized, long-
28 term, minor, adverse cumulative impacts to soils.

29 30 **Conclusion**

31
32 The No Action Alternative would continue current use patterns and involve no new construction
33 at the Canyon or Highland sites. This Alternative would have long-term, minor, adverse effect to
34 soils due to ongoing soil disturbance at the Canyon site cave trailhead and no effects to
35 topography or geology. There would be no effects to topography, geology, and soils at the
36 Highland site. Cumulative impacts on soils would be long-term, minor, and adverse.

37 38 **Impacts of Alternative B – Mandatory Shuttle System**

39 40 **Analysis**

41
42 Construction of the Canyon site cave trailhead visitor contact station, shuttle stop structure, and
43 smaller parking lot would impact approximately 2 acres. The footprint of the new structures
44 would be located within previously disturbed areas. These structures would be located away
45 from the base of the talus slope and construction would not alter these slopes or the cave trail.
46 The existing 3-foot retaining wall along the bottom of the cave trail, which traps smaller rocks
47 from rolling down slope, would remain in place. A new rock fence would also be installed above
48 the retaining wall to provide additional protection to people and facilities. Installation of this
49 fence would result in only limited ground disturbance and new impacts to soils such as soil
50 removal, compaction, and possible erosion. Construction of administrative and visitor facilities
51 at the Highland site would result in the permanent loss and temporary disturbance of

1 approximately 17 acres of soils in this area, although this acreage has all been previously
2 disturbed as pastureland. Soils within the development footprints would be lost and the addition
3 of impervious constructed surfaces would increase runoff and potential erosion. Construction
4 activities would temporarily compact and expose soils adjacent to the facilities, increasing the
5 potential for erosion. At both the Canyon and Highland sites, mitigation measures to confine the
6 extent of the construction zones, restore disturbed areas, and employ standard erosion control
7 measures would minimize construction related impacts. Overall, construction activities are
8 expected to result in short- and long-term, minor, adverse impacts to soils.
9

10 At the Canyon site cave trailhead, beneficial effects to soils would be expected from the
11 restoration of areas currently impacted by parking and pedestrian use along SR 92. Reduction
12 in the extent of impervious paved surface at the Canyon site cave trailhead would also
13 incrementally decrease water runoff and erosion potential from the Canyon site cave trailhead
14 parking area. By substantially reducing visitor parking at the Canyon site cave trailhead, social
15 trailing through undisturbed areas along SR 92 would also be reduced. The existing social trails
16 would be re-vegetated and due to the reduced visitor parking and the layout of the Canyon site
17 cave trailhead, less social trailing would likely occur in the future. The reduction in these
18 localized areas of soil compaction would reduce water runoff and erosion potential. Overall, the
19 impact of these beneficial effects would be long-term and minor.
20

21 **Cumulative Effects**

22
23 The same projects discussed in the No Action Alternative would affect topography, geology, and
24 soils in a similar manner. Under Alternative B, some areas at the Canyon site cave trailhead
25 would be re-vegetated, but approximately 17 acres of soil would be disturbed at the Highland
26 site with the construction of new facilities. As a result, long-term minor adverse impacts on soils
27 from the cumulative actions when combined with short- and long-term, minor, beneficial and
28 adverse impacts associated with Alternative B would result in an overall, long-term, minor,
29 adverse cumulative impact to soils.
30

31 **Conclusion**

32
33 Alternative B would result in the disturbance of approximately 19 acres. Long-term, minor,
34 adverse impacts would result from the permanent loss of soils within the footprint of new
35 development. Short-term, minor, adverse impacts to soils would result from construction
36 activities that temporarily disturb areas within the construction limits. No adverse effects to
37 topography or geology would occur under this alternative. Although restoration of existing
38 disturbed areas along SR 92 at the Canyon site cave trailhead and an expected reduction in the
39 amount of social trailing would result in long-term, minor, beneficial impacts on soils, overall
40 Alternative B would result in short- and long-term, minor, adverse impacts on soils. Cumulative
41 impacts on soils would be long-term, minor, and adverse.
42

43 **Impacts of Alternative C – Peak-Period Optional Shuttle System**

44 **Analysis**

45
46
47 Construction of the Canyon site cave trailhead visitor contact station, shuttle stop structure, and
48 updated parking lot configuration would impact approximately 4 acres. The footprint of the new
49 structures would primarily be located within previously disturbed areas. These structures would
50 be located away from the base of the talus slope and construction would not alter these slopes

1 or the fractured quartzite cliffs above the existing cave trail, which are the source rockfall at the
2 Canyon site cave trailhead. A new rock fence would be installed above the existing retaining
3 wall which would result in limited new ground disturbance the same as described in Alternative
4 B. Construction of administrative and visitor facilities at the Highland site would impact
5 approximately 16 acres of soils in this area, although this acreage has all been previously
6 disturbed as pastureland. Construction of new facilities would temporarily compact and expose
7 soils within the construction limits near buildings and parking lots, and increase the potential for
8 localized erosion. Soils within the development footprints would be lost and the addition of
9 impervious constructed surfaces would increase runoff and potential erosion. At both the
10 Canyon and Highland sites, mitigation measures to confine the extent of the construction zones,
11 restore disturbed areas, and employ standard erosion control measures would minimize
12 construction related impacts. Overall, construction is expected to result in localized short- and
13 long-term, minor adverse impacts to soils.

14
15 At the Canyon site cave trailhead, social trailing would have negligible impacts to soils
16 compared to the current conditions. By providing visitor parking on both sides of SR 92, some
17 social trailing through undisturbed areas along SR 92 could occur. However, improved signage
18 and pedestrian walkways would be installed to minimize social trailing that results in localized
19 erosion and compaction of soils. Overall, the impact of these changes would be long-term,
20 negligible, and adverse.

21 22 **Cumulative Effects**

23
24 The same projects discussed in the No Action Alternative would affect topography, geology, and
25 soils in a similar manner. Construction activities in Alternative C would disturb some small
26 localized areas at the Canyon site cave trailhead with the development of additional parking,
27 and would disturb approximately 16 acres of soil at the Highland site with the construction of
28 new facilities. As a result, long-term minor adverse impacts on soils from the cumulative actions
29 when combined with short- and long-term, minor, adverse impacts associated with Alternative C
30 would result in an overall, long-term, minor, adverse cumulative impact to soils.

31 32 **Conclusion**

33
34 Overall, implementation of Alternative C would result in short- and long-term, minor, adverse
35 impacts on approximately 20 acres as a result of temporary ground disturbance during
36 construction, a potential increase in social trails, and the permanent loss of soils within the
37 footprint of new development. No adverse effects to topography or geology would occur under
38 this alternative. Cumulative impacts on soils would be long-term, minor, and adverse.

39 40 **Impacts of Alternative D – (Preferred Alternative) – Canyon Site Safety** 41 **Improvements with Realignment of SR 92 and Demand Management**

42 43 **Analysis**

44
45 Construction of the Canyon site cave trailhead visitor contact station, an updated parking lot
46 configuration, and the realignment of SR 92 would impact approximately 5 acres. The visitor
47 contact station would be constructed in an undisturbed area directly east of the existing,
48 temporary visitor center and construction could require excavation of some soil and rock in the
49 alluvial debris. Construction would not alter the fractured quartzite cliffs above the Canyon site
50 cave trailhead area. A new rock fence would be installed above the existing retaining wall which
51 would result in limited new ground disturbance the same as described in Alternative B. The

1 footprint of the updated parking areas and a majority of the SR 92 realignment would be located
2 within previously disturbed areas. However, some new permanent loss of soils would likely
3 result from the road realignment. Construction of administrative and visitor facilities at the
4 Highland site would result in the permanent loss and temporary disturbance of approximately 10
5 acres of soils in this area, although this acreage has all been previously disturbed as
6 pastureland. Construction of new facilities would temporarily compact and expose soils within
7 the construction limits near buildings, SR 92, and parking lots, and increase the potential for
8 localized erosion. Soils within the development footprints would be lost and the addition of
9 impervious constructed surfaces would increase runoff and potential erosion. At both the
10 Canyon and Highland sites, mitigation measures to confine the extent of the construction zones,
11 restore disturbed areas, and employ standard erosion control measures would minimize
12 construction related impacts. Overall, construction activities are expected to result in short- and
13 long-term, minor, adverse impacts to soils and topography.

14
15 At the Canyon site cave trailhead, negligible beneficial effects to soils would be expected from a
16 decrease in social trails. As a result of relocating visitor parking south of SR 92, social trailing
17 through undisturbed areas along SR 92 would be slightly reduced. The existing social trails
18 would be re-vegetated and due to the updated parking layout, fewer areas with social trailing
19 would likely occur in the future. The reduction in these localized areas of soil compaction would
20 reduce water runoff and erosion potential. Overall, the impact of these beneficial effects would
21 be long-term and negligible.

22 23 **Cumulative Effects**

24
25 The same projects discussed in the No Action Alternative would affect topography, geology, and
26 soils in a similar manner. In Alternative D, the new construction footprints of the visitor contact
27 station and the realignment of SR 92 would disturb some soils and topography, and at the
28 Highland site, approximately 10 acres of soil would be disturbed by the construction of new
29 facilities. As a result, long-term minor adverse impacts on soils from the cumulative actions
30 when combined with the short- and long-term minor adverse and negligible beneficial impacts
31 associated with Alternative D would result in an overall, long-term, minor, adverse cumulative
32 impact to soils and topography.

33 34 **Conclusion**

35
36 Implementation of Alternative D would result in short- and long-term, minor, adverse impacts on
37 approximately 15 acres as a result of temporary ground disturbance during construction,
38 localized excavation of the talus slope, and the permanent loss of soils within the footprint of
39 new development. No adverse effects to geology would occur under this alternative. A negligible
40 change in the amount of social trailing would result in long-term, negligible, beneficial impacts
41 on soils. Cumulative impacts on soils and topography would be long-term, minor, and adverse.

42 43 **Impacts of Alternative E – Canyon Site Capacity Improvements with Advanced** 44 **Demand Management**

45 46 **Analysis**

47
48 Under Alternative E, construction at the Canyon site cave trailhead would impact approximately
49 4 acres. Soil disturbances from the construction of visitor contact station and the updated
50 parking layout would be the same as described in Alternative C and impacts would be short-
51 and long-term, minor, and adverse. Construction at the Highland site would disturb

1 approximately 10 acres of abandoned pastureland. Soil disturbance from the construction of the
2 interagency visitor orientation center would be the same as described Alternative D and impacts
3 would be short- and long-term, minor, and adverse. The mitigation measures to minimize
4 construction related impacts would be similar as those described in Alternatives C. Overall,
5 construction activities are expected to result in short- and long-term, minor adverse impacts to
6 soils.

7
8 At the Canyon site cave trailhead, the soil disturbances from social trailing along SR 92 would
9 be the same as described in Alternative C and impacts would be long-term, negligible, and
10 adverse.

11
12 At the Swinging Bridge Picnic Area, the concessions services structure would be located to
13 avoid soil disturbances, but the additional visitors that would use the area could result in
14 additional areas with localized, soil compaction from social trailing activity. Overall, the impact of
15 these changes would be long-term, negligible, and adverse.

16 **Cumulative Effects**

17
18
19 The same projects discussed in the No Action Alternative would affect topography, geology, and
20 soils in a similar manner. Construction activities in Alternative E would disturb some, small
21 localized areas at the Canyon site cave trailhead with the development of additional parking,
22 and would disturb approximately 10 acres of soil at the Highland site with the construction of
23 new facilities. As a result, long-term minor adverse impacts on soils from the cumulative actions
24 when combined with short- and long-term, minor, adverse impacts associated with Alternative E
25 would result in an overall, long-term, minor, adverse cumulative impact to soils.

26 **Conclusion**

27
28
29 Implementation of Alternative E would result in short- and long-term, minor, adverse impacts on
30 soils as a result of temporary ground disturbance during construction and permanent loss of
31 soils within the footprint of new development. No adverse effects to topography or geology
32 would occur under this alternative. A negligible change in the amount of social trailing would
33 result in long-term, negligible, adverse impacts on soils. Cumulative impacts on soils would be
34 long-term, minor, and adverse.

35 **Vegetation**

36 **Intensity Level Definitions**

37
38
39 A variety of vegetation communities are found at the Canyon and Highland sites. At the Canyon
40 site, the project areas contain mixed conifer forest woodland and narrowleaf cottonwood/conifer
41 riparian woodland. The project area at the Highland site is composed of native and non-native
42 grasses along with some deciduous brush and trees. The thresholds for this impact assessment
43 are as follows:
44

45
46 **Negligible:** Effects on native plants would not be measureable. No effects on plant
47 community size, integrity, or continuity would occur.

48
49 **Minor:** Effects on native plants would occur in a small area, and measurable or
50 perceptible changes in plant community size, integrity, or continuity might occur.

1
2 **Moderate:** Effects on native plants would occur over a relatively large area, and measurable
3 or perceptible changes in plant community size, integrity, or continuity would
4 occur.

5
6 **Major:** Effects on native plant communities would be readily apparent, and measurable
7 or perceptible changes in plant community size, integrity, or continuity would
8 substantially change vegetation community types over a large area in and out of
9 the Monument.

10
11 The project area evaluated for impacts on vegetation includes a maximum of approximately 5
12 acres at the Canyon site and a maximum of approximately 17 acres at the Highland site
13 depending on the Alternative.

14 **Impacts of Alternative A – No Action Alternative**

15 **Analysis**

16
17
18
19 Riparian vegetation located adjacent to the North Lot along the American Fork River would
20 continue to be trampled or destroyed by parked vehicles that use the area for additional footage
21 within the parking space or by visitor use of social trails that access the Canyon site cave
22 trailhead. Under the No Action Alternative, no construction would occur. The existing vegetation
23 disturbances would remain in localized areas, but no new disturbances would occur. At the
24 Highland site, the property would remain vacant, thus, vegetation would not be disturbed.
25 Overall, the impacts to vegetation are expected to be long-term, minor, and adverse.

26 **Cumulative Effects**

27
28
29 The Historic Power House Trail is proposed to be constructed along a previously disturbed,
30 existing road grade. Formalizing the trail along the existing road grade would disturb vegetation
31 during trail construction and permanently remove vegetation within the localized area of trail
32 footprint. Trail design (e.g., check dams) and informational/educational sign to direct visitors
33 would be used as needed to minimize potential social trail formulation along the trail corridor.
34 Following construction, temporarily disturbed areas outside the footprint of the trail would be re-
35 vegetated and rehabilitated. Adverse impacts to vegetation would be long-term, localized, and
36 minor. Development in nearby communities could result in more local visitation at the Monument
37 which could result in more social trailing in currently undisturbed, vegetated areas. Additional
38 user created trails would likely be limited to the immediate area of existing facilities and trails
39 and long-term impacts, such as compaction, are expected to be highly localized and negligible.
40 Impacts from these actions when combined with the localized long-term, minor, adverse impacts
41 associated with the No Action Alternative would result in localized long-term, minor, adverse
42 cumulative impacts to vegetation.

43 **Conclusion**

44
45
46 The No Action Alternative would continue current use patterns and involve no new construction
47 at the Canyon or Highland sites. This Alternative would have long-term, minor, adverse effects
48 to vegetation due to the continued localized disturbance at the Canyon site. There would be no
49 effects to vegetation at the Highland site. Cumulative impacts on vegetation would be long-
50 term, minor, and adverse.

1 **Impacts of Alternative B – Mandatory Shuttle System**

3 **Analysis**

5 Construction of the Canyon site cave trailhead visitor contact station, shuttle stop structure, and
6 smaller parking lot would be focused within previously disturbed, unvegetated areas. During
7 construction, disturbance or loss of vegetation adjacent to these facilities and along the new
8 rock fence, such as smaller plants which could include Oregon grape, miners lettuce, false
9 Solomon seal, mallow ninebark, and starry false Solomon's-seal, would occur from localized
10 clearing and grading. Construction of administrative and visitor facilities at the Highland site
11 would result in the permanent loss and temporary disturbance of approximately 17 acres of
12 vegetation. The area of disturbance at the Highland site is comprised of native and non-native
13 grasses, shrubs, and small trees. A majority of the construction would permanently remove
14 grasses and shrubs, but some small trees would also need to be permanently removed to
15 create roadways over the onsite canals. Construction activities would also temporarily disturb
16 localized areas of vegetation near the footprints of the buildings and parking areas. At the
17 Canyon and Highland sites, clearing of vegetation, soil disturbance, and soil compaction could
18 increase the potential spread of exotic species. Minimizing ground disturbance, planting
19 disturbed areas with native vegetation, and implementing weed control methods such as
20 washing of construction equipment, would minimize the extent of vegetation impacts and the
21 introduction or spread of noxious weeds. Overall, construction activities are expected to result in
22 short- and long-term, minor, adverse impacts to vegetation.

24 At the Canyon site cave trailhead, beneficial effects to vegetation would be expected from the
25 restoration of areas currently impacted by parking and pedestrian use along SR 92 near the
26 Canyon site cave trailhead. The area of riparian vegetation along the north side of the North Lot
27 would be enlarged by re-vegetating existing parking spaces. By substantially reducing visitor
28 parking at the Canyon site cave trailhead, social trailing through undisturbed, vegetated areas
29 along SR 92 would likely be reduced and the existing social trails would be re-vegetated.
30 Overall, the impact of these beneficial effects would be long-term and minor.

32 **Cumulative Effects**

34 The same projects discussed in the No Action Alternative would affect vegetation in a similar
35 manner. Under Alternative B, some temporary disturbances to vegetation would occur at the
36 Canyon site cave trailhead during construction, but some existing disturbed areas would be re-
37 vegetated. Approximately 17 acres of vegetation, including some small trees, would be
38 permanently or temporarily disturbed and removed at the Highland site with the construction of
39 new facilities. As a result, long-term, minor, adverse impacts on vegetation from the cumulative
40 actions when combined with short- and long-term, minor, adverse and beneficial impacts
41 associated with Alternative B would result in an overall, long-term, minor, adverse cumulative
42 impact to vegetation.

44 **Conclusion**

46 Implementation of Alternative B would result in short-term, minor, adverse impacts on
47 vegetation as a result of construction activities and temporary ground disturbances. In addition,
48 the proposed actions would have long-term, minor, adverse impacts from the permanent loss of
49 vegetation within the footprint of new development at the Highland site. An expected reduction
50 in the amount of social trailing and the restoration of existing disturbed areas along SR 92 at the

1 Canyon site cave trailhead would result in long-term, minor, beneficial impacts on vegetation.
2 Cumulative impacts on vegetation would be long-term, minor, and adverse.

4 **Impacts of Alternative C – Peak-Period Optional Shuttle System**

6 **Analysis**

8 Construction of the Canyon site cave trailhead visitor contact station, shuttle stop structure, and
9 updated parking lot would be primarily conducted within previously disturbed, unvegetated
10 areas. The footprint of the visitor contact station and shuttle stop structure would be located
11 within previously disturbed areas. A new rock fence would be installed above the existing
12 retaining wall which would result in limited vegetation removal the same as in Alternative B. A
13 majority of the footprint of the updated parking areas would be located in a previously disturbed
14 area, but the updated parking area would permanently disturb some riparian vegetation along
15 the north side of the existing North Lot footprint. Construction of new facilities would temporarily
16 disturb some small, localized areas of vegetation within the construction limits near the visitor
17 contact station and around the parking lot. Construction of administrative and visitor facilities at
18 the Highland site would result in the permanent loss and temporary disturbance of
19 approximately 16 acres of vegetation. The type of impacts and mitigation would be similar to
20 Alternative B. Construction would result in the permanent removal of grasses and shrubs, and
21 some small trees. Construction activities would also temporarily disturb localized areas of
22 vegetation near the footprints of the buildings and parking areas. At the Canyon and Highland
23 sites, clearing of vegetation, soil disturbance, and soil compaction could increase the potential
24 spread of exotic species. Minimizing ground disturbance, planting disturbed areas with native
25 vegetation, and implementing weed control methods such as washing of construction
26 equipment, would minimize the extent of vegetation impacts and the introduction or spread of
27 noxious weeds. Overall, construction activities are expected to result in short- and long-term,
28 minor, adverse impacts to vegetation.

29
30 At the Canyon site cave trailhead, social trailing would have negligible impacts to vegetation
31 compared with the current conditions. By providing visitor parking at the Canyon site cave
32 trailhead on both sides of SR 92, some social trailing through undisturbed areas along SR 92
33 could occur. However, improved signage and pedestrian walkways would be installed to
34 minimize social trailing and the localized compaction of vegetation. Existing social trails would
35 be re-vegetated to deter visitors from walking through undisturbed areas. Overall, the impact of
36 these changes would be long-term, negligible, and adverse.

38 **Cumulative Effects**

39
40 The same projects discussed in the No Action Alternative would affect vegetation in a similar
41 manner. Construction activities in Alternative C would permanently disturb some small localized
42 areas of vegetation at the Canyon site cave trailhead with the development of additional
43 parking, and would permanently or temporarily disturb approximately 16 acres of vegetation,
44 including some small trees, at the Highland site with the construction of new facilities. As a
45 result, long-term, minor, adverse impacts on vegetation from the cumulative actions when
46 combined with short- and long-term, minor, adverse impacts associated with Alternative C
47 would result in an overall, long-term, minor, adverse cumulative impact to vegetation.

1 **Conclusion**

2
3 Implementation of Alternative C would result in short-term, minor, adverse impacts on
4 vegetation as a result of construction activities and temporary ground disturbances. In addition,
5 the proposed actions would have long-term, minor, adverse impacts from the permanent loss of
6 vegetation within the footprint of the updated parking at the Canyon site cave trailhead and the
7 new facilities at the Highland site. There could be additional long-term, negligible, adverse
8 impacts to vegetation if social trailing continues with the updated parking layout at the Canyon
9 site cave trailhead. Cumulative impacts on vegetation would be long-term, minor, and adverse.

10
11 **Impacts of Alternative D – (Preferred Alternative) – Canyon Site Safety**
12 **Improvements with Realignment of SR 92 and Demand Management**

13
14 **Analysis**

15
16 Construction of the Canyon site cave trailhead visitor contact station, updated parking lot, and
17 realignment of SR 92 would be primarily conducted within previously disturbed, unvegetated
18 areas. The footprint of the updated parking lot would be located within previously disturbed
19 areas. The footprint of SR 92 would permanently remove a small, localized area of riparian
20 vegetation directly north of the existing North Lot. The footprint of the visitor contact station
21 would permanently remove another small area (less than ½ acre) of undisturbed vegetation
22 which could include the removal of Douglas fir, bigtooth maple, white fir, gambel oak, bigtooth
23 maple, Oregon grape, miners lettuce, false Solomon seal, mallow ninebark, and starry false
24 Solomon’s-seal (NPS 2009A). Installation of the new rock fall fence above the existing retaining
25 wall would result in limited vegetation removal the same as in Alternative B. Construction of new
26 facilities would temporarily disturb some small, localized areas of vegetation within the
27 construction limits near the visitor contact station, parking lot, and SR 92. Construction of
28 administrative and visitor facilities at the Highland site would result in the permanent loss and
29 temporary disturbance of approximately 10 acres of vegetation. The type of impacts and
30 mitigation would be similar to Alternative B. Construction would result in the permanent removal
31 of grasses and shrubs, and some small trees. Construction activities would also temporarily
32 disturb localized areas of vegetation near the footprints of the buildings and parking areas. At
33 the Canyon and Highland sites, clearing of vegetation, soil disturbance, and soil compaction
34 could increase the potential spread of exotic species. Minimizing ground disturbance, planting
35 disturbed areas with native vegetation, and implementing weed control methods such as
36 washing of construction equipment, would minimize the extent of vegetation impacts and the
37 introduction or spread of noxious weeds. Overall, construction activities are expected to result in
38 short- and long-term, minor, adverse impacts to vegetation.

39
40 At the Canyon site cave trailhead, beneficial effects to vegetation would be expected from the
41 decrease in social trails. Due to the updated parking layout that would consolidate parking on
42 the south side of SR 92 at the Canyon site cave trailhead, social trailing could be reduced.
43 Existing social trails would also be re-vegetated to deter visitors from walking through
44 undisturbed areas. Overall, the impact of these changes would be long-term, negligible, and
45 beneficial.

46
47 **Cumulative Effects**

48
49 The same projects discussed in the No Action Alternative would affect vegetation in a similar
50 manner. In Alternative D, the new construction footprints of the visitor contact station and the
51 realignment of SR 92 would permanently remove vegetation including some trees, and at the

1 Highland site, approximately 10 acres of vegetation, including some small trees, would be
2 permanently or temporarily disturbed by the construction of new facilities. As a result, long-term,
3 minor, adverse impacts on vegetation from the cumulative actions when combined with short-
4 and long-term, minor, adverse impacts associated with Alternative D would result in an overall,
5 long-term, minor, adverse cumulative impact to vegetation.

6 7 **Conclusion**

8
9 Implementation of Alternative D would result in short-term, minor, adverse impacts on
10 vegetation as a result of construction activities and temporary ground disturbances. In addition,
11 the proposed actions would have long-term, minor, adverse impacts from the permanent loss of
12 vegetation within the footprint of new development at the Canyon site cave trailhead and
13 Highland site. An expected reduction in the amount of social trailing along SR 92 at the Canyon
14 site would result in long-term, negligible, beneficial impacts on vegetation. Cumulative impacts
15 on vegetation would be long-term, minor, and adverse.

16 17 **Impacts of Alternative E – Canyon Site Capacity Improvements with Advanced** 18 **Demand Management**

19 20 **Analysis**

21
22 Under Alternative E, construction of the Canyon site cave trailhead visitor contact station and
23 updated parking lot would be primarily conducted within previously disturbed areas.
24 Disturbances to vegetation from the construction of visitor contact station and the updated
25 parking layout would be the same as described in Alternative C and impacts would be short-
26 and long-term, minor, and adverse. Construction of administrative and visitor facilities at the
27 Highland site would result in the permanent loss and temporary disturbance of approximately 10
28 acres of vegetation as described Alternative D and impacts would be short- and long-term,
29 minor, and adverse. The mitigation measures to minimize construction related impacts would be
30 similar as those described in Alternative D. Overall, construction activities are expected to result
31 in short- and long-term, minor adverse impacts to vegetation.

32
33 At the Canyon site cave trailhead, the disturbances to vegetation from social trailing along SR
34 92 would be the same as described in Alternative C and impacts would be long-term, negligible,
35 and adverse.

36
37 At Swinging Bridge Picnic Area, the concessions services structure would be located to avoid
38 new disturbances to vegetation, but the additional visitors that would use the area could result in
39 additional areas with localized, social trailing activity which would disturb vegetation. Overall, the
40 impact of these changes would be long-term, negligible, and adverse.

41 42 **Cumulative Effects**

43
44 The same projects discussed in the No Action Alternative would affect vegetation in a similar
45 manner. Construction activities in Alternative E would permanently disturb some small localized
46 areas of vegetation at the Canyon site cave trailhead with the development of additional
47 parking, and would permanently or temporarily disturb approximately 10 acres of vegetation,
48 including some small trees, at the Highland site with the construction of new facilities. As a
49 result, long-term, minor, adverse impacts on vegetation from the cumulative actions when
50 combined with short- and long-term, minor, adverse impacts associated with Alternative E would
51 result in an overall, long-term, minor, adverse cumulative impact to vegetation.

1 **Conclusion**

2
3 Implementation of Alternative E would result in short-term, minor, adverse impacts on
4 vegetation as a result of construction activities and temporary ground disturbances. In addition,
5 the proposed actions would have long-term, minor, adverse impacts from the permanent loss of
6 vegetation within the footprint of the updated parking at the Canyon site cave trailhead and the
7 new facilities at the Highland site. There could be long-term, negligible, adverse impacts to
8 vegetation if social trailing continues at the Canyon site cave trailhead or if social trailing
9 increases at the Swinging Bridge Picnic Area. Cumulative impacts on vegetation would be long-
10 term, minor, and adverse.

11
12 **Wildlife**

13
14 **Intensity Level Definitions**

15
16 Wildlife commonly found at the Canyon site includes but is not limited to mule deer, elk, moose,
17 mountain goats, bighorn sheep, mountain lions, coyotes, porcupines, weasels, chipmunks,
18 ground squirrels, cottontail rabbits, and mice in addition to numerous bird and reptile species. At
19 the Highland site, the Highland City development limits the wildlife observed at the site to
20 smaller species. The thresholds for this impact assessment are as follows:

21
22 **Negligible:** There would be no observable or measurable effects to wildlife species and their
23 habitats. Effects would be within natural fluctuations.

24
25 **Minor:** Effects on wildlife species and their habitats would be detectable, but would not
26 exceed the natural range of variability.

27
28 **Moderate:** Effects on wildlife species and their habitats would be measurable. Changes
29 would exceed the natural range of variability of the wildlife species and habitats,
30 but would be limited within the Monument.

31
32 **Major:** Effects on wildlife species and their habitats would be measurable and would
33 substantially change the wildlife species population and/or habitats in and out of
34 the Monument.

35
36 The project area evaluated for impacts on wildlife includes approximately 5 acres at the Canyon
37 site along with approximately 0.25 miles of road realignment, depending on the Alternative, and
38 a maximum of approximately 17 acres at the Highland site depending on the Alternative.

39
40 **Impacts of Alternative A – No Action Alternative**

41
42 **Analysis**

43
44 At the Canyon site, the presence of humans, human-related activities, and structures have
45 removed or displaced much of the native wildlife habitat. These disturbances to wildlife and
46 wildlife habitat due to the existing development and use in and adjacent to the Canyon site
47 would continue. At the Highland site, the property would remain vacant, thus, impacts to wildlife
48 and wildlife habitat on the site would remain unchanged. Overall, the impacts to wildlife are
49 expected to be long-term, negligible, and adverse.

1 **Cumulative Effects**

2
3 The Historic Power House Trail is proposed to be constructed along a previously disturbed,
4 existing road grade. Formalizing the trail along the existing road grade would disturb wildlife
5 during trail construction and permanently remove some potential wildlife habitat within the
6 localized area of trail footprint. Trail design (e.g., check dams) and informational/educational
7 sign to direct visitors would be used as needed to minimize potential social trail formulation
8 along the trail corridor. Disturbed areas would be re-vegetated and rehabilitated following
9 construction. Adverse impacts to wildlife would be short- and long-term, localized, and
10 negligible. Development in nearby communities has increased the area of disturbance to wildlife
11 and permanently removed wildlife habitat, resulting in long-term, moderate, adverse impacts.
12 Impacts from these actions when combined with the long-term, negligible, adverse impacts
13 associated with the No Action Alternative would result in long-term, moderate, adverse
14 cumulative impacts to wildlife.

15 **Conclusion**

16
17
18 Under the No Action Alternative, impact to wildlife would be long-term, negligible, and adverse
19 due to previous development at the Canyon site cave trailhead. Cumulative impacts on wildlife
20 and wildlife habitat would be long-term, moderate, and adverse.

21 **Impacts of Alternative B – Mandatory Shuttle System**

22 **Analysis**

23
24
25
26 Construction at the Canyon site cave trailhead would occur in previously disturbed areas where
27 human-related activities have removed or displaced much of the native wildlife habitat. Thus
28 new, permanent disturbances to wildlife habitat could be avoided. However, some smaller
29 wildlife such as rodents and reptiles and their habitat could be displaced or eliminated during
30 construction activities in areas near the footprint of the visitor contact station and along the area
31 of riparian vegetation north of the existing North Lot. Construction of administrative and visitor
32 facilities at the Highland site would result in the permanent loss and temporary disturbance of
33 approximately 17 acres of vegetation. Though this area was previously disturbed as pastureland
34 and vegetation is composed of both native and non-native species, the permanent loss of these
35 areas would displace smaller wildlife that are present at the Highland site. However, similar
36 habitat exists in other areas on and around the Highland site. Mitigation measures to confine the
37 extent of the construction zone and to rehabilitate temporarily disturbed areas outside of the
38 permanent construction footprint would minimize construction related impacts. Overall,
39 construction activities are expected to result in short- and long-term, minor, adverse impacts to
40 wildlife.

41
42 During construction, noise would also increase, which may disturb wildlife in the general areas
43 at the Canyon site cave trailhead and the Highland site. Construction-related noise would be
44 temporary. Existing sound conditions at the Canyon site cave trailhead would resume following
45 construction activities. At the Highland site, daytime noise would increase as a result of human-
46 related activities associated with the new operations and buildings, but human-related noise in
47 areas around the Highland site is common. The temporary and permanent noise would have
48 negligible or minor adverse effects on wildlife.

49
50 At the Canyon site cave trailhead, beneficial effects to small wildlife species would be expected
51 from the restoration of areas currently impacted by parking and pedestrian use along SR 92

1 near the Canyon site cave trailhead. The area of riparian vegetation along the north side of the
2 North Lot would be enlarged by re-vegetating the existing parking spaces. Overall, the impact of
3 these beneficial effects would be long-term and negligible.

4 5 **Cumulative Effects**

6
7 The same projects discussed in the No Action Alternative would affect wildlife in a similar
8 manner. Under Alternative B, some temporary disturbances to wildlife would occur at the
9 Canyon site cave trailhead during construction, but some existing disturbed areas would be re-
10 vegetated. At the Highland site, the construction of new facilities would permanently disturb
11 approximately 17 acres of vegetation and would displace smaller wildlife species to surrounding
12 areas. Compared with the wildlife displacement as a result of the residential development in the
13 surrounding areas, the impact to wildlife as a result of construction at the Highland site would be
14 minor. As a result, long-term, moderate, adverse impacts on wildlife from the cumulative actions
15 when combined with the short- and long-term, minor, adverse and beneficial impacts associated
16 with Alternative B would result in an overall, long-term, moderate, adverse cumulative impact to
17 wildlife.

18 19 **Conclusion**

20
21 Implementation of Alternative B would result in short-term, minor, adverse impacts on wildlife
22 habitat as a result of construction activities and temporary ground disturbances. In addition, the
23 proposed actions would have long-term, minor, adverse impacts from the permanent loss of
24 wildlife habitat within the footprint of new development at the Highland site. Impacts from
25 construction noise and noise from human-related activities would be long-term, negligible, and
26 adverse to wildlife. The restoration of existing disturbed areas along SR 92 at the Canyon site
27 cave trailhead would result in long-term, negligible, beneficial impacts on wildlife. Cumulative
28 impacts on wildlife and wildlife habitat would be long-term, moderate, and adverse.

29 30 **Impacts of Alternative C – Peak-Period Optional Shuttle System**

31 32 **Analysis**

33
34 Construction at the Canyon site cave trailhead would occur primarily in previously disturbed
35 areas where human-related activities have removed or displaced much of the native wildlife
36 habitat. However, some smaller wildlife and their habitat would be displaced or eliminated
37 during construction activities in areas near the footprint of the visitor contact station or the
38 updated cave trailhead parking areas. Construction of administrative and visitor facilities at the
39 Highland site would result in the permanent loss and temporary disturbance of approximately 16
40 acres of vegetation. Though this area was previously disturbed as pastureland and vegetation
41 includes both native and non-native species, the permanent loss of these areas would displace
42 smaller wildlife that are present at the Highland site. However, similar habitat exists in other
43 areas on and around the Highland site. Mitigation measures to confine the extent of the
44 construction zone and to rehabilitate temporarily, disturbed areas outside the permanent
45 construction footprint would minimize construction related impacts. Overall, construction
46 activities are expected to result in short- and long-term, minor, adverse impacts to wildlife.

47
48 During construction, noise would also increase, which may disturb wildlife in the general areas
49 at the Canyon site cave trailhead and Highland site. Construction-related noise would be
50 temporary. Existing sound conditions at the Canyon site cave trailhead would resume following
51 construction activities. At the Highland site, daytime noise would increase as a result of human-

1 related activities associated with the new operations and buildings, but human-related noise in
2 areas around the Highland site is common. The temporary and permanent noise would have
3 negligible or minor adverse effects on wildlife.

4 5 **Cumulative Effects**

6
7 The same projects discussed in the No Action Alternative would affect wildlife in a similar
8 manner. Under Alternative C, the development of additional parking at the Canyon site cave
9 trailhead would permanently disturb some, small localized areas of vegetation which could
10 displace some small wildlife. At the Highland site, the construction of new facilities would disturb
11 approximately 16 acres of vegetation and permanently displace some smaller wildlife. The
12 displaced wildlife at the Highland site would have a negligible contribution to the wildlife
13 displacement as a result of the additional development in the nearby communities. As a result,
14 long-term, moderate, adverse impacts on wildlife from the cumulative actions when combined
15 with short- and long-term, minor, adverse impacts associated with Alternative C would result in
16 an overall, long-term, moderate, adverse cumulative impact to wildlife.

17 18 **Conclusion**

19
20 Implementation of Alternative C would result in short-term, minor, adverse impacts on wildlife
21 habitat as a result of construction activities and temporary ground disturbances. In addition, the
22 proposed actions would have long-term, minor, adverse impacts from the permanent loss of
23 wildlife habitat within the footprint of new development at the cave trailhead and the Highland
24 site. Impacts from construction noise and noise from human-related activities would be long-
25 term, negligible, and adverse to wildlife. Cumulative impacts on wildlife and wildlife habitat
26 would be long-term, moderate, and adverse.

27 28 **Impacts of Alternative D – (Preferred Alternative) – Canyon Site Safety** 29 **Improvements with Realignment of SR 92 and Demand Management**

30 31 **Analysis**

32
33 Construction at the Canyon site cave trailhead would occur primarily in previously disturbed
34 areas where human-related activities have removed or displaced much of the native wildlife
35 habitat. However, the footprint of the SR 92 realignment and the footprint of the visitor contact
36 station would permanently remove some vegetation and could displace some smaller wildlife.
37 Additionally, during construction activities smaller wildlife and their habitat could be displaced or
38 eliminated in areas near the footprint the updated cave trailhead parking area. Construction of
39 administrative and visitor facilities at the Highland site would result in the permanent loss and
40 temporary disturbance of approximately 10 acres of vegetation. Though this area was
41 previously disturbed as pastureland and vegetation includes both native and non-native species,
42 the permanent loss of these areas would displace smaller wildlife that are present at the
43 Highland site. However, similar habitat exists in other areas on and around the Highland site.
44 Mitigation measures to confine the extent of the construction zone and to rehabilitate
45 temporarily, disturbed areas outside the permanent construction footprint would minimize
46 construction related impacts. Overall, construction activities are expected to result in short- and
47 long-term, minor, adverse impacts to wildlife.

48
49 During construction, noise would also increase, which may disturb wildlife in the general areas
50 at the Canyon site cave trailhead and Highland site. Construction-related noise would be
51 temporary. Existing sound conditions at the Canyon site cave trailhead would resume following

1 construction activities. At the Highland site, daytime noise would increase as a result of human-
2 related activities associated with the new operations and buildings, but human-related noise in
3 areas around the Highland site is common. The temporary and permanent noise would have
4 negligible or minor adverse effects on wildlife.

5 6 **Cumulative Effects**

7
8 The same projects discussed in the No Action Alternative would affect wildlife in a similar
9 manner. Under Alternative D, the realignment of SR 92 and the construction of the visitor
10 contact station at the Canyon site cave trailhead would permanently disturb some localized
11 areas of vegetation which would eliminate some small wildlife habitat. At the Highland site, the
12 construction of new facilities would disturb approximately 10 acres of vegetation and
13 permanently displace some smaller wildlife. The displaced wildlife at the Highland site would
14 have a negligible contribution to the total wildlife displacement as a result of the additional
15 development in the nearby communities. As a result, long-term, moderate, adverse impacts on
16 wildlife from the cumulative actions when combined with short- and long-term, minor, adverse
17 impacts associated with Alternative D would result in an overall, long-term, moderate, adverse
18 cumulative impact to wildlife.

19 20 **Conclusion**

21
22 Implementation of Alternative D would result in short-term, minor, adverse impacts on wildlife
23 habitat as a result of construction activities and temporary ground disturbances. In addition, the
24 proposed actions would have long-term, minor, adverse impacts from the permanent loss of
25 wildlife habitat within the footprint of new development at the Canyon site cave trailhead and the
26 Highland site. Impacts from construction noise and noise from human-related activities would be
27 long-term, negligible, and adverse to wildlife. Cumulative impacts on wildlife and wildlife habitat
28 would be long-term, moderate, and adverse.

29 30 **Impacts of Alternative E – Canyon Site Capacity Improvements with Advanced** 31 **Demand Management**

32 33 **Analysis**

34
35 Under Alternative E, construction of the Canyon site cave trailhead visitor contact station and
36 the updated cave trailhead parking area would be primarily conducted within previously
37 disturbed areas. Disturbances to wildlife from the construction of the visitor contact station and
38 the updated parking layout would be the same as described in Alternative C and impacts would
39 be short- and long-term, minor, and adverse. Construction of administrative and visitor facilities
40 at the Highland site would result in the permanent loss and temporary disturbance of
41 approximately 10 acres of wildlife habitat and wildlife displacement as described Alternative D
42 and impacts would be short- and long-term, minor, and adverse. The mitigation measures to
43 minimize construction related impacts would be similar as those described in Alternative D.
44 Overall, construction activities are expected to result in short- and long-term, minor adverse
45 impacts to wildlife.

46
47 During construction, noise would also increase, which may disturb wildlife in the general areas
48 at the Canyon site cave trailhead and Highland site. Construction-related noise would be
49 temporary. Existing sound conditions at the Canyon site cave trailhead would resume following
50 construction activities. At the Highland site, daytime noise would increase as a result of human-
51 related activities associated with the new operations and buildings, but human-related noise in

1 areas around the Highland site is common. The temporary and permanent noise would have
2 negligible or minor adverse effects on wildlife.

3
4 Under Alternative E, the concessions services structure would be located at the Swinging
5 Bridge Picnic Area. The installation of concessions services in this area would most likely
6 increase the number of visitors that utilize the picnic area which would increase human-related
7 noise in this area. However, human-related activities are already common in this area. Overall,
8 impacts to wildlife as a result of increased human-related noise are expected to be long-term,
9 negligible, and adverse.

10 **Cumulative Effects**

11
12
13 The same projects discussed in the No Action Alternative would affect wildlife in a similar
14 manner. Under Alternative E, the development of additional parking at the Canyon site cave
15 trailhead would permanently disturb some, small localized areas of vegetation which could
16 displace some small wildlife. At the Highland site, the construction of new facilities would disturb
17 approximately 10 acres of vegetation and permanently displace some smaller wildlife. The
18 displaced wildlife at the Highland site would have a negligible contribution to the wildlife
19 displacement as a result of the additional development in the nearby communities. As a result,
20 long-term, moderate, adverse impacts on wildlife from the cumulative actions when combined
21 with short- and long-term, minor, adverse impacts associated with Alternative E would result in
22 an overall, long-term, moderate, adverse cumulative impact to wildlife.

23 **Conclusion**

24
25
26 Implementation of Alternative E would result in short-term, minor, adverse impacts on wildlife
27 habitat as a result of construction activities and temporary ground disturbances. In addition, the
28 proposed actions would have long-term, minor, adverse impacts from the permanent loss of
29 wildlife habitat within the footprint of new development at the Canyon site cave trailhead and the
30 Highland site. Impacts from construction noise and noise from human-related activities would be
31 long-term, negligible, and adverse to wildlife. Cumulative impacts on wildlife and wildlife habitat
32 would be long-term, moderate, and adverse.

33 **Floodplains**

34 **Intensity Level Definitions**

35
36
37
38 The Monument is located in American Fork Canyon with very limited, non-flood prone,
39 developable land within the Monument. American Fork River flows east to west through the
40 Monument, which varies from a small brook during the winter months to an extremely swift and
41 dangerous river caused by snow melt during early summer months. Additionally, two water
42 retention structures, Tibble Fork Dam and Sliver Lake Flat Dam are located upstream from the
43 Monument. SR 92 and almost the entire canyon bottom Monument facilities are located within
44 or adjacent to the 100- or 500-year floodplain. The thresholds for this impact assessment are
45 as follows:

46
47 **Negligible:** Changes in the ability of a floodplain to convey floodwaters, or its values and
48 functions would be slight and not of any measurable or detectable consequence.

49
50 **Minor:** Changes in the ability of a floodplain to convey floodwaters, or its values and

1 functions, would be measurable and local. If changes were adverse, the project
2 would not contribute to flooding and no mitigation would be needed. If changes
3 were beneficial, small, currently disturbed areas would be reclaimed and
4 designated for the floodplain resource.

5
6 **Moderate:** Changes in the ability of a floodplain to convey floodwaters, or its values and
7 functions, would be measurable and local. If changes were adverse, the project
8 could contribute to flooding and the impacts could be mitigated by modification of
9 proposed facilities in floodplain. If changes were beneficial, large, currently
10 disturbed areas would be reclaimed and designated for the floodplain resource.

11
12 **Major:** Changes in the ability of a floodplain to convey floodwaters, or its values and
13 functions, would be measurable and widespread. If changes were adverse, the
14 project would contribute to flooding, and the impacts could not be mitigated by
15 modification of proposed facilities in floodplain. If changes were beneficial, areas
16 existing structures and human-related activities would be removed and large
17 areas would be reclaimed and designated for the floodplain resource.

18
19 The project area evaluated for impacts on floodplain includes approximately 3,500 feet along
20 the American Fork River from the East Entrance Sign to the maintenance building. The
21 Highland site is not within the 100-year floodplain.

22
23 **Impacts of Alternative A – No Action Alternative**

24
25 **Analysis**

26
27 Under the No Action Alternative, the existing, temporary visitor center, the visitor center parking,
28 and of the portion of SR 92 at the Canyon site cave trailhead would remain within the 100- and
29 500-year floodplains. The entire Canyon site project area would remain within the dam failure
30 PMF. The existing structures do displace water within the floodplain, however these facilities do
31 not impact the ability of the floodplain to convey floodwaters nor do they increase or enhance
32 flooding potential. The natural floodplain values, such as forested riparian vegetation, have been
33 locally altered by the existing development in the canyon. However, these impacts would not
34 change under the No Action Alternative. Overall, the impacts to floodplains are expected to be
35 long-term, minor, and adverse.

36
37 **Cumulative Effects**

38
39 The Historic Power House Trail is proposed to be constructed within the 100-year, 500-year,
40 and PMF floodplains. The design or construction of the trail would not impact the flow or
41 capacity of the existing floodplains. Temporarily disturbed areas outside the footprint of the trail
42 would be re-vegetated to the appropriate forested riparian vegetation. Adverse impacts to the
43 floodplains would be short- and long-term, localized, and negligible. The existing floodplains and
44 floodplain resources have been previously altered by existing structures, not located within the
45 project area, including the Monument's Historic District structures, the Swinging Bridge Picnic
46 Area restroom, and Residence #9. Impacts from these structures would be long-term, minor,
47 and adverse. Impacts from these actions when combined with the long-term, minor, adverse
48 impacts associated with the No Action Alternative would result in long-term, minor, adverse
49 cumulative impacts to floodplains.

1 **Conclusion**

2
3 The No Action Alternative would continue to have facilities within the project area located in the
4 100-year, 500-year, and PMF floodplains. Due to the existing disturbances to the floodplains
5 and natural floodplain values, impacts would have long-term, minor, adverse effects to the local
6 floodplains. Cumulative impacts on floodplains would be long-term, minor, and adverse.

7
8 **Impacts of Alternative B – Mandatory Shuttle Service**

9
10 **Analysis**

11
12 The new structures at the Canyon site cave trailhead would be located within previously
13 disturbed areas and the overall development footprint at the Canyon site cave trailhead would
14 be reduced. The riparian areas currently impacted by parking and pedestrian use along the
15 north side of SR 92 would be restored. Similar to existing conditions, all the facilities would
16 remain within the PMF and 500-year floodplains and the parking and SR 92 would also remain
17 within the 100-year floodplain. However, the visitor contact station and shuttle stop structure
18 would be located outside of the 100-year floodplain. Removing existing structures from the 100-
19 year floodplain would minimally improve the ability of the floodplain to convey 100-year flood
20 flows, but is not expected to measurably alter upstream or downstream flooding. Although
21 reducing development and restoring limited areas in the 100-year floodplain would be beneficial,
22 overall, development within the Canyon site cave trailhead would continue to have a localized,
23 minor, adverse impact on natural floodplain values.

24
25 **Cumulative Effects**

26
27 The same projects discussed in the No Action Alternative would affect floodplains in a similar
28 manner. Under Alternative B, existing structures are removed from the 100-year floodplain, but
29 SR 92 and updates to the Canyon site cave trailhead parking area remain within the 100-year
30 floodplain. As a result, impacts from these actions when combined with the long-term, minor,
31 adverse impacts associated with Alternative B would result in long-term, minor, adverse
32 cumulative impacts to floodplains.

33
34 **Conclusion**

35
36 The implementation of Alternative B would result in long-term, minor, adverse impacts to
37 floodplains and natural floodplain resources because all the facilities would remain within the
38 PMF and 500-year floodplains and the Canyon site cave trailhead parking area and SR 92
39 would also remaining within the 100-year floodplain. The visitor contact station and shuttle stop
40 structure would be located outside of the 100-year floodplain and some riparian vegetation
41 would be reclaimed resulting in long-term, negligible, beneficial impacts. Cumulative impacts on
42 floodplains would be long-term, minor, and adverse.

43
44 **Impacts of Alternative C – Peak-Period Optional Shuttle Service**

45
46 The new structures at the Canyon site cave trailhead would be located within previously
47 disturbed areas and the overall development footprint at the Canyon site cave trailhead would
48 increase and some riparian areas would be permanently removed due to the development of
49 the north parking area. Similar to existing conditions, all the facilities would remain within the
50 PMF and 500-year floodplains and the parking and SR 92 would also remain within the 100-
51 year floodplain. However, the visitor contact station and shuttle stop structure would be located

1 outside of the 100-year floodplain. Removing existing structures from the 100-year floodplain
2 would minimally improve the ability of the floodplain to convey 100-year flood flows, but is not
3 expected to measurably alter upstream or downstream flooding. Although reducing
4 development in the 100-year floodplain would be beneficial, overall, development within the
5 Canyon site cave trailhead would continue to have a localized, minor, adverse impact on natural
6 floodplain values.

7 **Cumulative Effects**

8
9
10 The same projects discussed in the No Action Alternative would affect floodplains in a similar
11 manner. Under Alternative C, existing structures are removed from the 100-year floodplain, but
12 SR 92 and updates to the Canyon site cave trailhead parking areas remain within the 100-year
13 floodplain. As a result, impacts from these actions when combined with the long-term, minor,
14 adverse impacts associated with Alternative C would result in long-term, minor, adverse
15 cumulative impacts to floodplains.

16 **Conclusion**

17
18
19 The implementation of Alternative C would result in long-term, minor, adverse impacts to
20 floodplains and natural floodplain resources because all the facilities would remain within the
21 PMF and 500-year floodplains and the Canyon site cave trailhead parking area and SR 92
22 would also remaining within the 100-year floodplain. Additionally, some riparian areas would be
23 permanently disturbed with the updates to the Canyon site cave trailhead parking area. The
24 visitor contact station and shuttle stop structure would be located outside of the 100-year
25 floodplain resulting in long-term, negligible, beneficial impacts. Cumulative impacts on
26 floodplains would be long-term, minor, and adverse.

27 **Impacts of Alternative D – (Preferred Alternative) – Canyon Site Safety 28 Improvements with Realignment of SR 92 and Demand Management**

29 **Analysis**

30
31
32
33 The new structures at the Canyon site cave trailhead would be located primarily within
34 previously disturbed areas, although, the overall development footprint at the Canyon site cave
35 trailhead would increase and some riparian areas would be permanently removed due to the
36 realignment of SR 92. All the facilities, except the visitor contact station, would remain within the
37 PMF and 500-year floodplains and the parking and realignment of SR 92 would also remain
38 within the 100-year floodplain. The visitor contact station would be located outside of the 100-
39 and 500-year floodplains, but remain within the PMF floodplain. Removing the existing
40 structures from the 100- and 500-year floodplains would minimally improve the ability of the
41 floodplains to convey 100- and 500-year flood flows, but is not expected to measurably alter
42 upstream or downstream flooding. Although reducing development in the 100- and 500-year
43 floodplains would be beneficial, overall, development within the Canyon site cave trailhead
44 would continue to have a localized, minor, adverse impact on natural floodplain values.

45 **Cumulative Effects**

46
47
48 The same projects discussed in the No Action Alternative would affect floodplains in a similar
49 manner. Under Alternative D, existing structures are removed from the 100- and 500-year
50 floodplains, but the realignment of SR 92 and updates to the Canyon site cave trailhead parking
51 areas remain within the 100-year floodplain. As a result, impacts from these actions when

1 combined with the long-term, minor, adverse impacts associated with Alternative D would result
2 in long-term, minor, adverse cumulative impacts to floodplains.

3
4 **Conclusion**

5
6 The implementation of Alternative D would result in long-term, minor, adverse impacts to
7 floodplains and natural floodplain resources because all the facilities, except the visitor contact
8 station, would remain within the PMF and 500-year floodplains and the Canyon site cave
9 trailhead parking area and SR 92 would also remaining within the 100-year floodplain.
10 Additionally, some riparian areas would be permanently disturbed with the updates to the
11 Canyon site cave trailhead parking area. The visitor contact station would be located outside of
12 the 100- and 500-year floodplains. Cumulative impacts on floodplains would be long-term,
13 minor, and adverse.

14
15 **Impacts of Alternative E – Canyon Site Capacity Improvements with Advanced**
16 **Demand Management**

17
18 The construction footprint at the Canyon site cave trailhead would be the same as described in
19 Alternative C and impacts would be long-term, minor and adverse. Similar to existing
20 conditions, all the facilities would remain within the PMF and 500-year floodplains and the
21 parking and SR 92 would also remain within the 100-year floodplain. However, the visitor
22 contact station would be located outside of the 100-year floodplain. Removing existing
23 structures from the 100-year floodplain would minimally improve the ability of the floodplain to
24 convey 100-year flood flows, but is not expected to measurably alter upstream or downstream
25 flooding. Although reducing development in the 100-year floodplain would be beneficial, overall,
26 development within the Canyon site cave trailhead would continue to have a localized, minor,
27 adverse impact on natural floodplain values.

28
29 **Cumulative Effects**

30
31 The same projects discussed in the No Action Alternative would affect floodplains in a similar
32 manner. Under Alternative E, existing structures are removed from the 100-year floodplain, but
33 SR 92 and updates to the Canyon site cave trailhead parking areas remain within the 100-year
34 floodplain. As a result, impacts from these actions when combined with the long-term, minor,
35 adverse impacts associated with Alternative E would result in long-term, minor, adverse
36 cumulative impacts to floodplains

37
38 **Conclusion**

39
40 The implementation of Alternative E would result in long-term, minor, adverse impacts to
41 floodplains and natural floodplain resources because all the facilities would remain within the
42 PMF and 500-year floodplains and the Canyon site cave trailhead parking area and SR 92
43 would also remaining within the 100-year floodplain. Additionally, some riparian areas would be
44 permanently disturbed with the updates to the Canyon site cave trailhead parking area. The
45 visitor contact station would be located outside of the 100-year floodplain resulting in long-term,
46 negligible, beneficial impacts. Cumulative impacts on floodplains would be long-term, minor, and
47 adverse.

1 Visitor Use and Experience

3 Intensity Level Definitions

5 The Monument was established to preserve and protect the cave resources for the benefit and
6 enjoyment of the visitors. NPS *Management Policies* (NPS 2006) states that enjoyment of park
7 resources and values by the people of the United States is part of the fundamental purpose of
8 all parks and that the NPS is committed to provide safe, appropriate, high-quality opportunities
9 for visitor to enjoy parks. The thresholds for this impact assessment are as follows:

11 **Negligible:** Changes in visitor experience or use would not limit or enhance the primary
12 visitor experience of touring the cave. Visitors would not be affected or would not
13 be aware of any effects.

15 **Minor:** Changes in visitor experience or use would not appreciably limit or enhance the
16 primary visitor experience of touring the cave. Changes would be slight and
17 detectable and would affect few visitors.

19 **Moderate:** Changes in visitor experience or use would somewhat limit or enhance the
20 primary visitor experience of touring the cave. Changes would be noticeable and
21 could affect many visitors.

23 **Major:** Changes in visitor experience or use would appreciably limit or enhance the
24 primary visitor experience. Changes would be noticeable and would affect most
25 visitors.

27 Impacts of Alternative A – No Action Alternative

29 Analysis

31 The Canyon site cave trailhead site visitor center is the principal point of contact where visitors
32 view educational exhibits, obtain information and tour tickets, and begin cave tours. The visitor
33 center would remain in a small, cramped, temporary, modular structure with limited space for
34 educational and interpretive materials and programs. The facilities do not adequately provide
35 visitors the opportunity to fully understand and appreciate the unique cave resources that they
36 will view on their tour. Additionally, limited knowledge about delicate cave formations and cave
37 ethics increases the potential for visitor impacts that in turn negatively affect the visitor
38 enjoyment of the cave.

40 Tickets for cave tours would continue to be sold at the Canyon site cave trailhead site. Thus
41 access and visitation patterns at the Canyon site cave trailhead site are not expected to change.
42 Cave tours often sell out, especially on holidays and weekends. Advance tickets may be
43 purchased prior to visitors' arrival at the Monument but a percentage of tickets are withheld for
44 sale on site. Visitors arriving on weekends or holidays without advance tickets sometimes wait
45 two to three hours before beginning their tour or are turned away because all tours for that day
46 are sold. Congregation of visitors near the trailhead results in crowding and congestion. In
47 particular, the availability of parking and the likelihood of visitors being able to find convenient
48 parking decreases as the number and length of time that vehicles are parked increases. Visitors
49 waiting for later tours occupy limited parking space for extended periods of time. During high
50 visitation days and times, the parking capacity of the Canyon site cave trailhead parking area

1 and the informal parking areas along SR 92 would continue to be exceeded. More visitors
2 waiting at the Monument for a cave tour and the lack of communication with visitors about the
3 current parking conditions would increase traffic and parking congestion and visitor frustration.
4

5 The only access to the cave system is by walking a strenuous 1 1/2-mile-paved trail. The round-
6 trip hike and tour of the cave system takes about three hours. Mid-summer temperatures on the
7 trail can reach 100 degrees F. However, temperatures in the caves average 45 degrees. The
8 concession operation near the trailhead would continue to provide items such as water, snacks,
9 and sweatshirts that support a safe and enjoyable visit.

10
11 It is not unusual for upwards of 100 hikers to use the trails in the Monument during the early
12 morning hours. Access and parking for these hikers would not change under this alternative.
13

14 Overall, the impacts on the visitor use and experience are expected to be long-term, minor to
15 moderate, and adverse primarily due to the limited educational and interpretive experience that
16 would continue to be offered and the congestion and crowding that would continue to occur at
17 the Canyon site cave trailhead site.
18

19 **Cumulative Effects**

20
21 The construction of Historic Power House Trail would have temporary, localized, disruption to
22 visitors, but the completed trail would provide an additional recreational option for visitors.
23 Beneficial impacts to visitor use and experience would be permanent, negligible and long-term.
24 Development in nearby communities could result in more local visitation at the Monument and in
25 the PRGD recreational areas which could contribute to visitor and traffic congestion at the
26 Monument. The increased visitation would not create noticeable impacts on days with peak
27 visitor demand when visitor and traffic congestion are currently observed, however increased
28 visitation could have long-term, minor, adverse impacts on off-peak days when visitor and traffic
29 congestion are uncommon. Impacts from these actions when combined with the long-term,
30 minor to moderate, adverse impacts associated with the No Action Alternative would result in
31 long-term, minor to moderate, adverse cumulative impacts to visitor use and experience.
32

33 **Conclusion**

34
35 The No Action Alternative would result in long-term, minor to moderate, adverse impacts as a
36 result of the limited education and interpretive experiences and the congestion and crowding
37 conditions on weekends and holidays. Although snack bar and gift shop concession operations,
38 parking availability for early morning hikers, and same day ticket sales at the Canyon site cave
39 trailhead site would result in long-term, negligible, beneficial impacts on visitor use and
40 experience, the overall impact to the primary visitor experience of visiting the cave and learning
41 about cave resources would be long-term, minor to moderate and adverse. Cumulative impacts
42 on visitor use and experience would be long-term, minor to moderate, and adverse.
43

44 **Impacts of Alternative B – Mandatory Shuttle System**

45 **Analysis**

46
47
48 Under Alternative B, the Highland site interagency visitor orientation center would be the
49 principal point of contact where visitors view educational exhibits, obtain information and tour
50 tickets, and begin cave tours by utilizing the mandatory shuttle system. The interagency visitor
51 orientation center would provide a larger space for expanded educational, informational and

1 interpretive materials and programs that would enhance visitors' understanding and
2 appreciation of the unique cave resources that they would view on their tour. Knowledge about
3 delicate cave formations and appropriate minimal impact behavior decreases the potential for
4 visitor impacts. That, in turn, positively affects the visitor enjoyment of the cave. Educational
5 and interpretive materials at the Highland site would be available to visitors year-round including
6 the months when the Canyon site cave trailhead site is closed.

7
8 Visitors would access the Canyon site cave trailhead site with the mandatory shuttle system that
9 runs between the Highland and Canyon site cave trailhead sites. All cave tour visitors would be
10 required to park at the Highland site where parking capacity would be equipped to handle peak
11 day visitation. To access the shuttle system, the approximately 30 percent of visitors that arrive
12 from the east of the Monument would have to drive 6 additional miles past the Canyon site cave
13 trailhead site in order to board the shuttle.

14
15 Most daily cave tour tickets would be available for advanced reservation with an online
16 reservation system, but visitors would also be able to purchase "same-day" cave tour tickets.
17 More advanced information would be available to communicate cave tour availability at the
18 Monument to encourage the redistribution of use to non-peak times. On weekends and
19 holidays, visitors arriving without advance tickets would most likely still wait two to three hours
20 before beginning their tour or would be turned away because all tours for that day are sold.
21 However, visitors waiting for their tour would not take up space at the Canyon site cave
22 trailhead site and could spend their time viewing the Highland site exhibits or in Highland City.
23 Since cave tour visitors would only access the Monument via the shuttle system, traffic and
24 parking congestion at the Monument would be reduced. According to the Timpanogos Cave
25 National Monument Alternative Transportation Feasibility Study, ticket prices would likely
26 increase by approximately \$3 to \$11 under this alternative to offset the cost of the shuttle.

27
28 The cave tour capacity would not be limited by parking capacity since the Highland parking
29 would be designed to meet peak capacity number. The actual number of tours and visitors per
30 tour allowed in the cave would be determined by the Monument staff in the Cave Management
31 Plan. If future visitation patterns did change and visitation increased on weekdays, the
32 mandatory shuttle system would allow the full capacity of visitors to access the cave tour the
33 cave if they were spread out across the day.

34
35 The concession operation at the Canyon site cave trailhead site would be eliminated and
36 concession services would no longer be provided at the Canyon or Highland sites. Some
37 visitors would miss these services, especially if they forgot items that would make the cave tour
38 more comfortable, such as a sweater or water for the hike. However, the park would work to
39 communicate those needs to visitors in many ways before they reached the trailhead and
40 vending machines would be installed at the Canyon site cave trailhead site to provide items
41 such as water, snacks, and visitor convenience items. Since wait times for tours at the Canyon
42 site cave trailhead site would be much less, visitors would have less need to use full concession
43 services.

44
45 The early morning hikers at the Monument would not be able to park at the Canyon site cave
46 trailhead site, but limited parking would still be available at the Swinging Bridge Picnic Area and
47 the nature trail parking area in the canyon. Some hikers may also elect to take the shuttle to the
48 Canyon site cave trailhead site to begin their hike.

49
50 During construction at the Canyon site cave trailhead site, portions of the trailhead area and
51 trailhead parking would be off limits to visitor use. Visitors should be able to access the cave

1 tour, but the number of visitors may be limited. Noise and dust from construction activities would
2 also adversely affect the visitor experience, but all construction-related impacts would be
3 temporary and cease following construction activities. If possible, construction activities would
4 be scheduled near or during the off-seasons for the Monument so the impact to visitor use and
5 experience is minimized.

6
7 Alternative B would result in minor to moderate beneficial impacts to visitors who would
8 experience a better interpretive and educational experience with less traffic congestion or
9 parking difficulties. There would be minor adverse impacts to visitors who hike in the morning or
10 come to the Monument from the east and have to drive to the Highlands site because parking
11 would not be available at the Canyon site cave trailhead site. Additionally, there would be minor
12 adverse impacts to visitors who use the concessions, but this would be ameliorated by the fact
13 that essential items for the cave tour would be available for purchase. Overall, the impacts on
14 the primary visitor experience of visiting the cave and learning about cave resources would be
15 long-term, minor to moderate, and beneficial primarily due to the improved educational and
16 interpretive experience at the Highland site and the reduction of congestion and crowding.

17 18 **Cumulative Effects**

19
20 The same projects discussed in the No Action Alternative would affect visitor use and
21 experience in a similar manner. Alternative B reduces impacts to visitor use due to congestion
22 with the implementation of the mandatory shuttle system. As a result, impacts from these
23 actions when combined with the long-term, minor, beneficial impacts associated with Alternative
24 B would result in long-term, minor to moderate, beneficial cumulative impacts to visitor use and
25 experience.

26 27 **Conclusion**

28
29 The implementation of Alternative B would result in short-term, minor, adverse impacts to visitor
30 use and experience as a result of construction activities and long-term minor to moderate
31 beneficial impacts to visitors who want to visit and learn about the cave resources. There would
32 be long term minor adverse effects to early morning hikers, concessions users, and those
33 driving from the east, however, the overall primary visitor experience of visiting the cave and
34 learning about cave resources would be long-term, minor to moderate, beneficial due to the
35 improved education and interpretive resources at the Highland site. Cumulative impacts on
36 visitor use and experience would be long-term, minor to moderate, and beneficial.

37 38 **Impacts of Alternative C – Peak-Period Optional Shuttle System**

39 40 **Analysis**

41
42 Under Alternative C, the Highland site interagency visitor orientation center would be the
43 principal point of contact where visitors view educational exhibits, obtain information and same
44 day tour tickets, and begin cave tours when utilizing the peak-period optional shuttle system. As
45 discussed in Alternative B, the interagency visitor orientation center would provide a larger
46 space for expanded educational, informational and interpretive materials and programs that
47 would enhance visitors' understanding and appreciation of the unique cave resources that they
48 would view on their tour. Visitors would have access to these materials year-round. While not
49 everyone would have to go to the Highlands Site, it is anticipated that many of the visitors who
50 come from the east and may park at the Canyon site cave trailhead may visit the Highland
51 visitor center after their tour if they do the whole loop drive along SR 92.

1
2 Visitor access to the Canyon site cave trailhead would depend on the day of the week and
3 conditions at the trailhead site. On weekends and holidays, cave tour visitors would be able to
4 park at the Canyon site cave trailhead site or they could park at the Highland site and take the
5 shuttle. When Canyon site cave trailhead site parking is full, Monument staff would be able to
6 communicate parking conditions with visitors and visitors would be required to take the shuttle.
7 To access the shuttle system, the approximately 30 percent of visitors that arrive from the east
8 of the Monument would have to drive 6 additional miles past the Canyon site cave trailhead site
9 in order to board the shuttle. One week days, visitors would drive directly to the Canyon site
10 cave trailhead site to park. Convenient parking should be available for all visitors, but there
11 could be some confusion on peak days when visitors would need to heed signs about where to
12 park.

13
14 Most daily cave tour tickets would be available for advanced reservation with an online
15 reservation system, but visitors would also be able to purchase “same-day” cave tour tickets.
16 Visitors who did not reserve tickets in advance would have to go to the Highlands site for tickets.
17 A number of options are being considered for picking up reserved tickets and communicating
18 tour availability are being considered to allow flexibility in getting tickets and encourage the
19 redistribution of use to non-peak times. On weekends and holidays, visitors arriving without
20 advance tickets would most likely still wait two to three hours before beginning their tour or
21 would be turned away because all tours for that day are sold. However, visitors waiting for their
22 tour would not take up space at the Canyon site cave trailhead site and could spend their time
23 viewing the Highland site exhibits or in Highland City. Since cave tour visitors would only access
24 the Canyon site via the shuttle system, traffic and parking congestion at the Canyon site would
25 be reduced. According to the Timpanogos Cave National Monument Alternative Transportation
26 Feasibility Study, ticket prices would likely increase by approximately \$1 to \$4 under this
27 alternative to offset the cost of the shuttle.

28
29 Since advanced ticket reservation is not required for cave tours, visitation patterns for the
30 Monument are not expected to change. On weekends and holidays, visitors arriving without
31 advance tickets would most likely wait two to three hours before beginning their tour or would be
32 turned away because all tours for that day are sold. More advanced information would be
33 available to communicate cave tour availability at the Canyon site to prevent visitors from
34 arriving at the Monument when no cave tour tickets are available. However, since ticket sales
35 would be conducted at the Highland site, visitors that would wait for a cave tour could spend
36 their time at the Highland site or in Highland City. Visitors would be able to experience the
37 improved education and interpretative resources that would most likely improve their cave tour.
38 The optional shuttle system and informational signage to inform visitors of parking conditions
39 would slightly reduce traffic and parking congestion, especially on peak visitation days when
40 more people would opt to take the shuttle, although visitors from the east would likely be
41 inconvenienced.

42
43 The cave tour capacity should not be limited by parking capacity during peak times since the
44 Highland parking would be designed to meet peak capacity numbers and there would be two
45 lots and a shuttle to help visitors reach the Canyon site cave trailhead. The actual number of
46 tours and visitors per tour allowed in the cave would be determined by the Monument staff in the
47 Cave Management Plan. If there were no changes to current visitor management strategies,
48 then parking capacity could limit the numbers of visitors to the cave during off-peak times,
49 however the park would use adaptive management practices to prevent parking limits from
50 impacting the total number of visitors who experience the cave tour.

1 Concession services would be the same as described in Alternative B.

2
3 There would be no impact to early morning hikers at the Canyon site cave trailhead, who would
4 still be able to access convenient parking at the trailhead.

5
6 During construction at the Canyon site cave trailhead, portions of the trailhead area and
7 trailhead parking would be off limits to visitor use. Visitors should be able to access the cave
8 tour, but the number of visitors may be limited. Noise and dust from construction activities would
9 also adversely affect the visitor experience, but all construction-related impacts would be
10 temporary and cease following construction activities. If possible, construction activities would
11 be scheduled near or during the off-seasons for the Monument so the impact to visitor use and
12 experience is minimized.

13
14 Alternative C would result in minor to moderate beneficial impacts to visitors who would
15 experience a better interpretive and educational experience. There would be minor adverse
16 impacts to visitors who come to the Monument from the east during peak times and who would
17 have to determine if they could park at the Canyon site cave trailhead or would have to go to
18 Highland. Additionally, there would be minor adverse impacts to visitors who use the
19 concessions, but this would be ameliorated by the fact that essential items for the cave tour
20 would be available for purchase. Overall, the impacts on the primary visitor experience of
21 visiting the cave and learning about cave resources would be long-term, minor and beneficial
22 primarily due to the improved educational and interpretive experience at the Highland site, and
23 somewhat to less congestion at the Canyon site cave trailhead.

24 25 **Cumulative Effects**

26
27 The same projects discussed in the No Action Alternative would affect visitor use and
28 experience in a similar manner. As a result, impacts from these actions when combined with the
29 long-term, minor, beneficial impacts associated with Alternative C would result in long-term,
30 minor to moderate, beneficial cumulative impacts to visitor use and experience. .

31 32 **Conclusion**

33
34 The implementation of Alternative C would result in short-term, minor, adverse impacts to visitor
35 use and experience as a result of construction activities and long-term minor to moderate
36 beneficial impacts to visitors who want to visit and learn about the cave resources. There would
37 be long term minor adverse effects to concessions users, and those driving from the east,
38 however, the overall experience of the primary visitor resources would be long-term and minor
39 to moderate beneficial due to the improved education and interpretive resources at the Highland
40 site. Cumulative impacts on visitor use and experience would be long-term, minor to moderate,
41 and beneficial.

42 43 **Impacts of Alternative D – (Preferred Alternative) – Canyon Site Safety** 44 **Improvements with Realignment of SR 92 and Demand Management**

45 46 **Analysis**

47
48 Under Alternative D, the Highland site interagency visitor orientation center would be the
49 principal point of contact where visitors view educational exhibits, obtain information and same
50 day tour tickets. As discussed in Alternative C, the interagency visitor orientation center would
51 provide a larger space for expanded educational, informational and interpretive materials and

1 programs that would enhance visitors' understanding and appreciation of the unique cave
2 resources that they would view on their tour. Visitors would have access to these materials
3 year-round. While not everyone would have to go to the Highland site, it is anticipated that many
4 of the visitors would stop at the Highlands site on their way to the Canyon site cave trailhead or
5 after their tour if they came from the east.

6
7 All cave tour visitors would drive directly to the Canyon site cave trailhead to park, whether they
8 came from the east or the west.

9
10 All tickets for cave tours would be made available in advance with an online reservation system.
11 Visitors may be able to purchase "same-day" cave tour tickets, but only if they were not all
12 reserved in advance. Visitors who did not reserve tickets in advance would have to go to the
13 Highlands site for tickets. A number of options for picking up reserved tickets and
14 communicating tour availability are being considered to allow flexibility in getting tickets and
15 encourage the redistribution of use to non-peak times. Because most tickets would be reserved
16 in advance, visitors would know when their tours start and would be encouraged not to show up
17 at the Canyon site cave trailhead early in order to find parking and get tickets.

18
19 If there were no changes to current visitor management strategies, then parking capacity could
20 noticeably limit the numbers of visitors to the cave, however, the park would use adaptive
21 management practices to prevent parking limits from impacting the total number of visitors who
22 experience the cave tour. The cave tour capacity would be determined by the Cave
23 Management Plan. By making all tickets available in advance, the visitor entry times likely would
24 be spread out more evenly across the day and the week, filling less popular tour slots. Although
25 on popular days visitors without reserved tickets may not be able to visit the cave.

26
27 Concession services would be the same as described in Alternative B.

28
29 There would be no impact to early morning hikers at the Canyon site cave trailhead, who would
30 still be able to access convenient parking at the trailhead.

31
32 During construction at the Canyon site cave trailhead, portions of the trailhead area and
33 trailhead parking would be limited to visitor use. Visitors should be able to access the cave tour,
34 but the number of visitors at the Monument may be limited. Noise and dust from construction
35 activities would also adversely affect the visitor experience, but all construction-related impacts
36 would be temporary and cease following construction activities. During the realignment of SR
37 92, the road may be closed and visitors may not have access to the cave site. If possible,
38 construction activities would be scheduled near or during the off-seasons for the Monument so
39 the impact to visitor use and experience is minimized.

40
41 Alternative D would result in minor to moderate beneficial impacts to visitors who would have a
42 better interpretive and educational experience and less congestion in the parking area due to
43 the expansion of the advance reservation system. There would be minor adverse impacts to
44 visitors who use the concessions, but this would be ameliorated by the fact that essential items
45 for the cave tour would be available for purchase. Additionally, there would be a minor to
46 adverse impact to visitors who did not use the advance reservation system and who may not be
47 able to see the cave during peak visitation times, but they could schedule an off peak visit and
48 see the exhibits at the Highland site to learn about the cave resources. If visitor demand
49 management did not work, there could be fewer people visiting the cave. Overall, the impacts
50 on the primary visitor experience of visiting the cave and learning about cave resources would
51 be long-term, minor to moderate and beneficial primarily due to the improved educational and

1 interpretive experience at the Highland site, and less congestion at the Canyon site cave
2 trailhead.

3 4 **Cumulative Effects**

5
6 The same projects discussed in the No Action Alternative would affect visitor use and
7 experience in a similar manner. As a result, impacts from these actions when combined with the
8 long-term, minor, beneficial impacts associated with Alternative D would result in long-term,
9 minor to moderate, beneficial cumulative impacts to visitor use and experience.

10 11 **Conclusion**

12
13 The implementation of Alternative D would result in short-term, minor to moderate, adverse
14 impacts to visitor use and experience as a result of construction activities and long-term minor
15 to moderate beneficial impacts to visitors who want to visit and learn about the cave resources.
16 There would be long term minor adverse effects to concessions users. There could be short
17 and long term minor adverse impacts to visitors who did not use the advanced reservation
18 system during peak hours or if demand management systems could not cope with the numbers
19 of visitors who wished to view the cave, but these visitors would still be able to view the exhibits
20 at the Highlands center. The overall experience of the primary visitor resources would be long-
21 term and minor to moderate beneficial due to the improved education and interpretive resources
22 at the Highland site and better management of the parking situation. Cumulative impacts on
23 visitor use and experience would be long-term, minor to moderate, and beneficial.

24 25 **Impacts of Alternative E – Canyon Site Capacity Improvements with Advanced** 26 **Demand Management**

27 28 **Analysis**

29
30 Under Alternative E, the Highland site interagency visitor orientation center would be the
31 principal point of contact where visitors view educational exhibits, obtain information and same
32 day tour tickets. The visitor center would function in the same way as discussed in Alternative D.
33 All cave tour visitors would drive directly to the Canyon site cave trailhead to park, whether they
34 came from the east or the west.

35
36 All tickets for cave tours would be made available in advance with an online reservation system.
37 Visitors may be able to purchase “same-day” cave tour tickets, but only if they were not all
38 reserved in advance. Visitors who did not reserve tickets in advance would have to go to the
39 Highlands site for tickets. A number of options for picking up reserved tickets and
40 communicating tour availability are being considered to allow flexibility in getting tickets and
41 encourage the redistribution of use to non-peak times. Because most tickets would be reserved
42 in advance, visitors would know when their tours start and would be encouraged not show up at
43 the Canyon site cave trailhead site early in order to find parking and get tickets.

44
45 If there were no changes to current visitor management strategies, then parking capacity could
46 noticeably limit the numbers of visitors to the cave, however, the park would use adaptive
47 management practices to prevent parking limits from impacting the total number of visitors who
48 experience the cave tour. The cave tour capacity would be determined by the Cave
49 Management Plan. By making all tickets available in advance, the visitor entry times likely would
50 be spread out more evenly across the day and the week, filling less popular tour slots. Although
51 on popular days visitors without reserved tickets may not be able to visit the cave.

1
2 Concession services would be removed from the Canyon site cave trailhead and provided at the
3 Swinging Bridge Picnic Area. Vending machines would also be installed at the Canyon site cave
4 trailhead to provide items such as water, snacks, and visitor convenience items to meet the
5 immediate needs of people taking the cave tour. Visitors wanting to extend their stay, buy
6 souvenirs or enjoy a picnic would be encouraged to drive to the Swinging Bridge Picnic Area in
7 order to open up parking spaces at the Canyon site cave trailhead for cave visitors. The
8 concession service would be open on Sundays and holidays when other businesses in Highland
9 City are closed.

10
11 There would be no impact to early morning hikers at the Canyon site cave trailhead, who would
12 still be able to access convenient parking at the trailhead.

13
14 During construction at the Canyon site cave trailhead, portions of the trailhead area and
15 trailhead parking would be off limits to visitor use. Visitors should be able to access the cave
16 tour, but the number of visitors may be limited. Noise and dust from construction activities would
17 also adversely affect the visitor experience, but all construction-related impacts would be
18 temporary and cease following construction activities. If possible, construction activities would
19 be scheduled near or during the off-seasons for the Monument so the impact to visitor use and
20 experience is minimized.

21
22 Alternative E would result in minor to moderate beneficial impacts to visitors who would have a
23 better interpretive and educational experience and less congestion in the parking area due to
24 the expansion of the advance reservation system. There would be a minor to adverse impact to
25 visitors who did not use the advance reservation system and who may not be able to see the
26 cave during peak visitation times, but they could schedule an off peak visit and see the exhibits
27 at the Highland site to learn about the cave resources. If visitor demand management did not
28 work, there could be fewer people visiting the cave. Overall, the impacts on the primary visitor
29 experience of visiting the cave and learning about cave resources would be long-term, minor to
30 moderate and beneficial primarily due to the improved educational and interpretive experience
31 at the Highland site, and less congestion at the Canyon site cave trailhead.

32 33 **Cumulative Effects**

34
35 The same projects discussed in the No Action Alternative would affect visitor use and
36 experience in a similar manner. As a result, impacts from these actions when combined with the
37 long-term, minor, beneficial impacts associated with Alternative E would result in long-term,
38 minor to moderate, beneficial cumulative impacts to visitor use and experience.

39 40 **Conclusion**

41
42 The implementation of Alternative E would result in short-term, minor to moderate, adverse
43 impacts to visitor use and experience as a result of construction activities and long-term minor
44 to moderate beneficial impacts to visitors who want to visit and learn about the cave resources.
45 There could be short and long term minor adverse impacts to visitors who did not use the
46 advanced reservation system during peak hours or if demand management systems could not
47 cope with the numbers of visitors who wished to view the cave, but these visitors would still be
48 able to view the exhibits at the Highlands center. The overall experience of the primary visitor
49 resources would be long-term and minor to moderate beneficial due to the improved education
50 and interpretive resources at the Highland site and better management of the parking situation.

1 Cumulative impacts on visitor use and experience would be long-term, minor to moderate, and
2 beneficial.

3 4 **Human Health and Safety**

5 6 **Intensity Level Definitions**

7
8 Within the Canyon site, Monument personnel and visitors are exposed to a number of existing
9 safety hazards including rockfall, flood, and vehicle traffic on SR 92. Additionally, Monument
10 employees and visitors are exposed to rodent infestation in the existing, temporary visitor
11 center. The thresholds for this impact assessment are as follows:

12
13 **Negligible:** Effects to employees and visitor safety is not measurable or perceptible.

14
15 **Minor:** Effects to employees and visitor safety is detectable, but would not have an
16 appreciable effect on public safety. Visitors and employees would be exposed or
17 removed from hazards in a small localized area.

18
19 **Moderate:** Effects to employees and visitor safety would be readily apparent and they would
20 result in substantial, noticeable effects to public safety. A large number of visitors
21 and employees would be exposed or removed from hazards in a small localized
22 area.

23
24 **Major:** Effects to employees and visitor safety would be readily apparent and they would
25 result in substantial, noticeable effects to public safety. A large number of visitors
26 and employees would be exposed or removed from hazards at the Monument.

27 28 **Impacts of Alternative A – No Action Alternative**

29 30 **Analysis**

31
32 At the Canyon site cave trailhead, the existing, temporary visitor center, concession services,
33 and large area of visitor parking are located within a rockfall zone and local floodplains. Visitors
34 utilize the services provided in these areas as well as use these areas to wait for cave tours.
35 Visitors arriving on weekends or holidays without advance tickets sometimes wait two to three
36 hours before beginning their tour and due to the limited available parking, many of the visitors
37 wait at the facilities at the Canyon site cave trailhead. These visitor patterns would continue to
38 expose a majority of visitors to the rockfall and flood hazards for an extended period of time.
39 Due to the location of the existing visitor services, Monument staff would also continue to work
40 within the hazard areas. No current systems are in place at the Monument to limit the visitor
41 exposure to the rockfall and flood hazards. Additionally, in specific instances, the existing,
42 temporary visitor center structure has failed to provide protection from rockfall.

43
44 SR 92 transects the Monument and facilities are located on both sides of the highway.
45 Monument staff facilities and Canyon site cave trailhead parking in the North Lot are located on
46 the north side of SR 92 and the existing, temporary visitor center, cave trail access, the South
47 Lot, and concession services are located on the south side of SR 92. A majority of visitors at the
48 Monument take the cave tour and a majority of the Canyon site cave trailhead parking is located
49 on the north side of SR 92. Thus, many visitors must cross the SR 92 especially on weekends
50 and holidays. One pedestrian crossing is available directly north of the existing, temporary

1 visitor center, but visitors are frequently observed crossing at other locations along the highway.
2 Visitors are also observed walking along SR 92 to access the Monument from informal roadside
3 parking areas both east and west of the Canyon site cave trailhead.
4

5 Visitor parking in the North Lot at the Canyon site cave trailhead and at informal, gravel pullouts
6 along SR 92 are located directly adjacent to the SR 92 highway. In order to utilize these parking
7 spaces, visitors must back into or maneuver in oncoming SR 92 traffic.
8

9 The footprint of SR 92 is narrow and curves near the Monument reducing the line of sight for
10 drivers in both directions. The posted speed limit through the Monument is 20 miles per hour,
11 but vehicles are typically not reducing speeds. As a result, traffic on SR 92 is a hazard for
12 pedestrians and visitor vehicles at the Monument. Pedestrians crossing SR 92 and visitor
13 vehicles backing into SR 92 traffic from a parking space do not have protection from the
14 speeding traffic. Pedestrians that do not use the crosswalk and vehicles backing or
15 maneuvering into oncoming traffic cannot always be readily observed by vehicles with limited
16 line of sight. Additionally, pedestrians walking along the highway constrain traffic to an even
17 smaller area within the SR 92 footprint. Under these conditions, the Canyon site cave trailhead
18 would continue to be prone to accidents and both Monument visitors and motorists on SR 92
19 would continue to be at risk.
20

21 The current visitor center would remain outdated and infested with rodents potentially carrying
22 hanta virus.
23

24 Overall, the impacts on human health and safety are expected to be long-term, minor to
25 moderate, and adverse primarily due to number of visitors and employees exposed to existing
26 hazards.
27

28 **Cumulative Effects**

29
30 The construction of Historic Power House Trail is not expected to impact human health and
31 safety. Development in nearby communities could result in more local visitation at the
32 Monument and in the PRGD recreational areas which could increase the daily number of
33 visitors exposed to rockfall and flood hazards. Increased traffic on SR 92 could also increase
34 the pedestrian and motorist hazards on SR 92 at the Canyon site cave trailhead. The increased
35 local visitation could have long-term, minor, adverse impacts to human health and safety.
36 Impacts from these actions when combined with the long-term, minor to moderate, adverse
37 impacts associated with the No Action Alternative would result in long-term, minor to moderate,
38 adverse cumulative impacts to human health and safety.
39

40 **Conclusion**

41
42 The No Action Alternative would result in long-term, minor to moderate, adverse effects to
43 human health and safety as a result of existing hazards and limited existing mitigation. Visitors
44 would continue to be exposed to rockfall and flood hazards at the Canyon site cave trailhead
45 and motorists and pedestrians on SR 92 would continue to be exposed to hazardous conditions.
46 Cumulative impacts on human health and safety would be long-term, minor to moderate, and
47 adverse.
48
49
50

1 **Impacts of Alternative B – Mandatory Shuttle System**

3 **Analysis**

5 The visitor contact station and shuttle stop structure would be located in an area of significantly
6 lower rockfall hazard and outside of the 100-year floodplain. With the location of the new
7 facilities, all visitors using the shuttle stop and any visitors and employees utilizing the visitor
8 contact station would still be exposed to the rockfall hazard and remain within the 500-year
9 floodplain, but to a lesser degree than current conditions. Additional safety mitigation measures
10 for flood danger would be implemented at the Monument to raise awareness to visitors of the
11 existing flood risk and educating Monument staff on emergency response efforts in the event of
12 a flood. As a result, the location of facilities would have a long-term, minor, adverse effect on
13 human health and safety.

15 At the Canyon site cave trailhead, visitor services and visitor parking would be reduced. Visitors
16 would have less incentive to socialize and spend time within the hazard areas which would
17 reduce the visitor exposure to hazards. Additionally, visitors are taking the shuttle to the Canyon
18 site cave trailhead so they should be arrive at the cave trail in time to hike to their cave tour.
19 Visitors waiting for cave tours would remain at the Highland site until it was time to take the
20 shuttle to the Canyon site cave trailhead for the cave tour hike. Overall, the reduction in
21 exposure time for visitors would have a long-term, moderate, beneficial effect on human health
22 and safety.

24 The mandatory shuttle system would greatly reduce the number of pedestrians crossing SR 92.
25 The shuttle stop structure would be located on the south side of SR 92 near the cave trail so
26 visitors taking a cave tour would not need to cross SR 92 to access the cave trail. Some
27 pedestrian traffic would remain as visitors and Monument staff access trails and facilities on the
28 north side of the road, but pedestrians walking along SR 92 to access the Canyon site cave
29 trailhead would be greatly reduced. Since a majority of parking would be reduced and shifted to
30 the south side of the road, the number of vehicles maneuvering into SR 92 traffic would also be
31 reduced. Improved pedestrian cross-walks would also be installed to increase the visibility of
32 pedestrians for drivers. As a result, the hazards associated with pedestrians and vehicles on SR
33 92 would be reduced and have a long-term, moderate, beneficial effect on human health and
34 safety.

36 The new visitor contact station would eliminate the rodent nuisance currently observed at the
37 existing facility.

39 Overall, the impacts on human health and safety are expected to be long-term, minor to
40 moderate, and beneficial primarily due to the reduced exposure to existing hazards and
41 installation of mitigation measures.

43 **Cumulative Effects**

45 The same projects discussed in the No Action Alternative would affect human health and safety
46 in a similar manner. With the implementation of the mandatory shuttle, Alternative B reduces the
47 number of visitors that interactions between Monument visitors and traffic on SR 92. As a result,
48 impacts from these actions when combined with the long-term, minor to moderate, beneficial
49 impacts associated with Alternative B would result in long-term, minor to moderate, beneficial
50 cumulative impacts to human health and safety.

1 **Conclusion**

2
3 The implementation of Alternative B would result in long-term, minor, adverse impacts to human
4 health and safety as a result of the location of facilities at the Canyon site cave trailhead.
5 Visitors and employees would still be exposed to rockfall and flood hazards. However, the
6 duration of exposure to hazards at the Canyon site cave trailhead would be reduced and the
7 hazards associated with SR 92 pedestrians and motorists would also be reduced. These
8 beneficial impacts would be long-term and moderate. Under Alternative B, the impacts on
9 human health and safety are expected to be long-term, minor to moderate, and beneficial.
10 Cumulative impacts on human health and safety would be long-term, minor to moderate, and
11 beneficial.

12
13 **Impacts of Alternative C – Peak-Period Optional Shuttle System**

14
15 **Analysis**

16
17 The location of visitor facilities at the Canyon site cave trailhead and the mitigation measures
18 would be the same as described in Alternative B. The updated parking in the South Lot would
19 remain within the rockfall and flood hazard areas. As a result, the location of facilities would
20 have a long-term, minor, adverse effect on human health and safety.

21
22 At the Canyon site cave trailhead, visitor services would be reduced. Visitors would have less
23 incentive to socialize and spend time within the hazard areas which would reduce the visitor
24 exposure to hazards. Additionally, advanced ticket reservation and visitor management of
25 parking capacity would allow visitors to arrive at the Canyon site cave trailhead and start the
26 hike to the cave tour rather than current conditions where visitors pass time waiting for cave
27 tours in the Canyon site cave trailhead area. Overall, the reduction in exposure time for visitors
28 would have a long-term, moderate, beneficial effect on human health and safety.

29
30 On weekends and holidays, the shuttle system would reduce hazards associated with
31 pedestrians on SR 92 as described in Alternative B.

32
33 Parking the Canyon site cave trailhead would be provided on both the north and south sides of
34 SR 92 with a majority of parking spaces located in the North Lot adjacent to SR 92. Visitors that
35 park in the North Lot would still have to maneuver into oncoming traffic to utilize parking spaces
36 and would still have to cross SR 92 to access the cave trail. Improved pedestrian cross-walks
37 would also be installed to increase the visibility of pedestrians for drivers. As a result, the
38 hazards associated with pedestrians and vehicles on SR 92 would be reduced and have a long-
39 term, minor, beneficial effect on human health and safety.

40
41 The rodent nuisance would be eliminated as described in Alternative B.

42
43 Overall, the impacts on human health and safety are expected to be long-term, minor to
44 moderate, and beneficial primarily due to the reduced exposure to existing hazards and
45 installation of mitigation measures.

46
47 **Cumulative Effects**

48
49 The same projects discussed in the No Action Alternative would affect human health and safety
50 in a similar manner. As a result, impacts from these actions when combined with the long-term,

1 minor to moderate, beneficial impacts associated with Alternative C would result in long-term,
2 minor to moderate, beneficial cumulative impacts to human health and safety.

3
4 **Conclusion**

5
6 The implementation of Alternative C would result in long-term, minor, adverse impacts to human
7 health and safety as a result of the location of facilities at the Canyon site cave trailhead.
8 Visitors and employees would still be exposed to rockfall and flood hazards. However, the
9 duration of exposure to hazards at the Canyon site cave trailhead would be reduced which
10 would have a long-term, moderate, beneficial impact. On peak days, the shuttle would reduce
11 the number of pedestrians that cross SR 92. A majority of visitors that park at the Canyon site
12 would still cross SR 92 to access the cave trail, but improved pedestrian crosswalks would be
13 installed. These beneficial impacts would be long-term and minor. Under Alternative C, the
14 impacts on human health and safety are expected to be long-term, minor to moderate, and
15 beneficial. Cumulative impacts on human health and safety would be long-term, minor to
16 moderate, and beneficial.

17
18 **Impacts of Alternative D – (Preferred Alternative) – Canyon Site Safety**
19 **Improvements with Realignment of SR 92 and Demand Management**

20
21 **Analysis**

22
23 The visitor contact station would be located in an area of substantially lower rockfall hazard and
24 outside of the 100- and 500-year floodplains. With the location of the new facilities, visitors using
25 the facilities would only be exposed to the PMF flood hazard. The updated parking in the South
26 Lot would remain within the rockfall and flood hazard areas. The flood mitigation measures
27 would be the same as described in Alternative B. As a result, the location of facilities would
28 have a long-term, negligible, adverse effect on human health and safety.

29
30 Due to the reduced visitor services and the location of the visitor services, a majority of visitor
31 exposure to rockfall and flood hazards would occur when visitors are in the South Lot. Since
32 visitors are not expected to spend extended periods of time in the parking lot, visitor exposure to
33 hazards is further reduced. Additionally, advanced ticket reservation and visitor management of
34 parking capacity would allow visitors to arrive at the Canyon site cave trailhead and start the
35 hike to the cave tour. Overall, the reduction in exposure time for visitors would have a long-term,
36 moderate, beneficial effect on human health and safety.

37
38 A majority of parking the Canyon site cave trailhead would be provided on the south side of SR.
39 Thus, a majority of visitors be able to access the cave trail without crossing SR 92 and a
40 majority of visitors that park at the Canyon site cave trailhead parking area would not need to
41 maneuver vehicles into SR 92 traffic. Some pedestrian traffic would remain, but improved
42 pedestrian cross-walks would also be installed to increase the visibility of pedestrians for
43 drivers. As a result, the hazards associated with pedestrians and vehicles on SR 92 would be
44 reduced and have a long-term, moderate, beneficial effect on human health and safety.

45
46 The rodent nuisance would be eliminated as described in Alternative B.

47
48 Overall, the impacts on human health and safety are expected to be long-term, moderate, and
49 beneficial primarily due to the substantially reduced exposure to existing hazards and
50 installation of mitigation measures.

1 **Cumulative Effects**

2
3 The same projects discussed in the No Action Alternative would affect human health and safety
4 in a similar manner. As a result, impacts from these actions when combined with the long-term,
5 moderate, beneficial impacts associated with Alternative D would result in long-term, moderate,
6 beneficial cumulative impacts to human health and safety.

7
8 **Conclusion**

9
10 The implementation of Alternative D would result in long-term, moderate, beneficial impacts to
11 human health and experience as a result of reduces the exposure to hazards at the Canyon site
12 cave trailhead for visitors and employees. The visitor facilities would be located in an area of
13 substantially lower rockfall hazard and out of the 100- and 500-year floodplains. A majority of
14 visitor parking would be located on the south side of SR 92 provided access to the cave trail
15 without crossing SR 92. These beneficial impacts would be long-term and moderate. Under
16 Alternative C, the impacts on human health and safety are expected to be long-term, moderate,
17 and beneficial. Cumulative impacts on human health and safety would be long-term, moderate,
18 and beneficial.

19
20 **Impacts of Alternative E – Canyon Site Capacity Improvements with Advanced**
21 **Demand Management**

22
23 **Analysis**

24
25 The location of visitor facilities and parking at the Canyon site cave trailhead and the mitigation
26 measures would be the same as described in Alternative C.

27
28 The visitor duration at the Canyon site cave trailhead would be the same as described in
29 Alternative C.

30
31 Parking the Canyon site cave trailhead would be the same as described in Alternative C.

32
33 The rodent nuisance would be eliminated as described in Alternative B.

34
35 Overall, the impacts on human health and safety are expected to be long-term, minor to
36 moderate, and beneficial primarily due to the reduced exposure to existing hazards and
37 installation of mitigation measures.

38
39 **Cumulative Effects**

40
41 The same projects discussed in the No Action Alternative would affect human health and safety
42 in a similar manner. As a result, impacts from these actions when combined with the long-term,
43 moderate, beneficial impacts associated with Alternative E would result in long-term, minor to
44 moderate, beneficial cumulative impacts to human health and safety.

45
46 **Conclusion**

47
48 The implementation of Alternative E would result in long-term, minor, adverse impacts to human
49 health and safety as a result of the location of facilities at the Canyon site cave trailhead.
50 Visitors and employees would still be exposed to rockfall and flood hazards. However, the
51 duration of exposure to hazards at the Canyon site cave trailhead would be reduced which

1 would have a long-term, moderate, beneficial impact. A majority of visitors that park at the
2 Canyon site would still cross SR 92 to access the cave trail, but improved pedestrian crosswalks
3 would be installed. These beneficial impacts would be long-term and minor. Under Alternative
4 C, the impacts on human health and safety are expected to be long-term, minor to moderate,
5 and beneficial. Cumulative impacts on human health and safety would be long-term, minor to
6 moderate, and beneficial.

7 **Park Operations**

8 **Intensity Level Definitions**

9
10
11
12 Implementation of a project can affect the operations of a park such as the number of
13 employees needed; the type of duties that need to be conducted; when/who would conduct
14 these duties; how activities should be conducted; and administrative procedures. For the
15 purpose of this analysis, the human health and safety of park employees is also evaluated. The
16 methodology used to assess potential changes to park operations is defined as follows:

17
18 **Negligible:** Park operations would not be affected or the effect would be at or below the
19 lower levels of detection, and would not have an appreciable effect on park
20 operations.

21
22 **Minor:** The effect would be detectable, but would be of a magnitude that would not have
23 an appreciable adverse or beneficial effect on park operations.

24
25 **Moderate:** The effects would be readily apparent and would result in a substantial adverse
26 or beneficial change in park operations in a manner noticeable to staff and the
27 public.

28
29 **Major:** The effects would be readily apparent and would result in a substantial adverse
30 or beneficial change in park operations in a manner noticeable to staff and the
31 public, and be markedly different from existing operations.

32 **Impacts of Alternative A – No Action Alternative**

33 **Analysis**

34
35
36
37 Under the No Action Alternative, no new facilities would be constructed. At the Canyon site,
38 staffing needs would not change. The visitor center would continue to be operated from a
39 temporary, modular structure that requires constant repair from maintenance crews. The
40 Monument administrative staff would continue to operate from the modified residence building
41 without reception or meeting space and additional administrative staff offices would remain in
42 separate buildings posing minor inconvenience in terms of communication and employee
43 meetings. Seasonal operations would not be allocated office space for staff and storage. No
44 mechanisms would be put in place to manage the number of visitors at the Monument or
45 communicate with visitors about current parking conditions or additional safety information. At
46 the Highland site, an interagency orientation visitor center would not be constructed and PGRD
47 would continue to operate in the current facilities. The lack of facilities for the expanding
48 operations at both the Monument and PGRD creates a minor inconvenience for the staff of both
49 organizations. Over time, the Monument's seasonal and maintenance staff would continue to

1 grow which would only increase the need for additional work space. PGRD has already
2 exceeded their capacity and is working out of multiple structures.

3
4 These operational issues would have a long-term, minor, adverse effect on park operations.

5 6 **Cumulative Effects**

7
8 The construction of Historic Power House Trail could have temporary, localized, disruption to
9 park operations during construction, but most likely USFS personnel would supervise the
10 construction activities. Adverse impacts to park operations would be short-term and negligible.
11 Development in nearby communities could result in more local visitation at the Monument and in
12 the PRGD recreational areas. The increased visitation could further strain the existing staff with
13 the management of visitor congestion and crowding which could have long-term, minor, adverse
14 impacts. Impacts from these actions when combined with the long-term, minor, adverse impacts
15 associated with the No Action Alternative would result in long-term, minor, adverse cumulative
16 impacts to park operations.

17 18 **Conclusion**

19
20 The No Action Alternative would result in long-term, minor, adverse impacts as a result of the
21 limited facilities and inadequate resources for managing visitor demand. Cumulative impacts on
22 visitor use and experience would be long-term, minor, and adverse.

23 24 **Impacts of Alternative B – Mandatory Shuttle System**

25 26 **Analysis**

27
28 At the Canyon site cave trailhead, a new visitor contact station would replace the existing,
29 temporary visitor center. The visitor contact station would not require as many Monument staff
30 to operate because ticket services would be located at the Highland site. Monument
31 administrative staff would be moved to offices at the interagency visitor orientation center and
32 Seasonal operations would operate from the former administrative offices. Due to the reduction
33 of infrastructure and operations at the Canyon site cave trailhead, maintenance services from
34 Monument staff would also be slightly reduced.

35
36 Logistically, the Monument would be required to manage a contract or partnership agreement to
37 provide the mandatory shuttle system service. Some additional Monument staff could be
38 needed to facilitate the shuttle system for visitors. The overall management flexibility to manage
39 visitor use would be limited due to the dependency on the mandatory shuttle system. If issues
40 with the shuttle system occur, mechanical problems with shuttle buses, budget, or contracting
41 issues, visitor access to the Canyon site cave trailhead would have to be substantially limited or
42 eliminated until shuttle service issues are resolved. Implementation of the mandatory shuttle
43 system would also provide the flexibility to maximize the number of cave tours and the cave tour
44 visitor capacity, as specified in the cave management plan. Thus, a maximum number of
45 Monument cave tour staff would be required and the cave tour schedule would be updated to
46 coordinate with the shuttle schedule. Additionally, an online ticket reservation system would be
47 installed and 70 percent of tickets would be available in advance. This would improve
48 Monument's ability to plan cave tours and communicate ticket availability to visitors.

49
50 At the Highland site, the new interagency visitor orientation center would provide new
51 administrative offices for both the Monument and PGRD which would consolidate administrative

1 staff and provide appropriate work space. Monument staff that currently sell cave tour tickets
2 would be located at the Highland site to sell tickets and provide educational and safety
3 information. Since the interagency visitor orientation center would be open year-round some
4 additional scheduling and staffing would be required to support these services. Due to the
5 necessary parking capacity for all Monument visitors, more maintenance services from
6 Monument staff would be required to maintain the vegetated areas around the parking area.

7
8 Effects to park operations would be long-term, moderate, and beneficial due to improved
9 facilities for operations and improved visitor management tools.

10 11 **Cumulative Effects**

12
13 The same projects discussed in the No Action Alternative would affect park operations in a
14 similar manner. Alternative B improves visitor management tools which could support any
15 increased local. As a result, impacts from these actions when combined with the long-term,
16 moderate, beneficial impacts associated with Alternative B would result in long-term, moderate,
17 beneficial cumulative impacts to park operations.

18 19 **Conclusion**

20
21 The implementation of Alternative B would result in long-term, moderate, beneficial impacts to
22 park operations as a result of improved facilities. There would be long-term, minor, adverse
23 effects to operations in the event that the shuttle system is not able to provide access to the
24 Canyon site, however, the overall flexibility to provide cave tours and minimize visitor crowding
25 and congestion would be long-term, minor to moderate, and beneficial. Cumulative impacts on
26 park operations would be long-term, moderate, and beneficial.

27 28 **Impacts of Alternative C – Peak-Period Optional Shuttle Service**

29 30 **Analysis**

31
32 At the Canyon site cave trailhead, facilities would be updated and Monument operations would
33 be adjusted as described in Alternative B.

34
35 The logistics to operate the optional shuttle would be the same as described in Alternative B.
36 However, since parking would be available at the Canyon site cave trailhead, in the event the
37 shuttle system did not operate, visitors could access the Monument with personal vehicles. On
38 weekends and holidays, Monument staff would have the flexibility to provide as many tours as
39 appropriate, as specified in the cave management plan, and a maximum number of cave tour
40 staff would be needed. On weekdays, the cave tour capacity and schedule would be limited to
41 the available parking and Monument staff would monitor parking availability and use electronic
42 signs to update visitors before they drove to the Monument. Additionally, an online ticket
43 reservation system would be installed and 70 percent of tickets would be available in advance.
44 This would improve Monument's ability to plan cave tours and communicate ticket availability to
45 visitors.

46
47 Park operations at the Highland site would be the same as described in Alternative B.

48
49 Effects to park operations would be long-term, moderate, and beneficial due to the new facilities
50 and improved management tools.

1 **Cumulative Effects**

2
3 The same projects discussed in the No Action Alternative would affect park operations in a
4 similar manner. As a result, impacts from these actions when combined with the long-term,
5 moderate, beneficial impacts associated with Alternative C would result in long-term, moderate,
6 beneficial cumulative impacts to park operations.

7
8 **Conclusion**

9
10 The implementation of Alternative C would result in long-term, moderate, beneficial impacts to
11 park operations as a result of improved facilities. The overall flexibility to provide cave tours
12 with the optional shuttle and with formalized parking capacity, and the improved visitor
13 management tools would be long-term, moderate, and beneficial. Cumulative impacts on park
14 operations would be long-term, moderate, and beneficial.

15
16 **Impacts of Alternative D – (Preferred Alternative) – Canyon Site Safety**
17 **Improvements with Realignment of SR 92 and Demand Management**

18
19 **Analysis**

20
21 At the Canyon site cave trailhead, facilities would be updated and Monument operations would
22 be adjusted as described in Alternative B.

23
24 The number of cave tours and the cave tour visitor capacity would be limited by the parking
25 layout. Thus, the number of cave tour Monument staff would be reduced and the cave tour
26 schedule would be updated to coordinate with parking turnover. Monument staff would monitor
27 parking availability and use electronic signs to update visitors before they drove to the
28 Monument. The overall management flexibility to manage visitor use would be limited by the
29 available parking. However, the parking layout would allow for the installation of a shuttle
30 system if that became necessary in the future. Additionally, an online ticket reservation system
31 would be installed and 100 percent of tickets would be available in advance. This would improve
32 Monument's ability to plan cave tours and communicate ticket availability to visitors.

33
34 Park operations at the Highland site would be the same as described in Alternative B.

35
36 Effects to park operations would be long-term, moderate, and beneficial due to the new facilities
37 and improved management tools.

38
39 **Cumulative Effects**

40
41 The same projects discussed in the No Action Alternative would affect park operations in a
42 similar manner. As a result, impacts from these actions when combined with the long-term,
43 moderate, beneficial impacts associated with Alternative D would result in long-term, moderate,
44 beneficial cumulative impacts to park operations.

45
46 **Conclusion**

47
48 The implementation of Alternative D would result in long-term, moderate, beneficial impacts to
49 park operations as a result of improved facilities. The overall flexibility to provide cave tours
50 with formalized parking capacity and the improved visitor management tools would be long-

1 term, moderate, and beneficial. Cumulative impacts on park operations would be long-term,
2 moderate, and beneficial.

3
4 **Impacts of Alternative E – Canyon Site Capacity Improvements with Advanced**
5 **Demand Management**

6
7 **Analysis**

8
9 At the Canyon site cave trailhead, facilities would be updated and Monument operations would
10 be adjusted as described in Alternative B.

11
12 Managing visitor demand as a function of parking capacity would be the same as described in
13 Alternative D. However, more parking spaces would be available to visitors so the number of
14 Monument staff for cave tours would be adjusted accordingly.

15
16 Park operations at the Highland site would be the same as described in Alternative B.

17
18 Effects to park operations would be long-term, moderate, and beneficial due to the new facilities
19 and improved management tools.

20
21 **Cumulative Effects**

22
23 The same projects discussed in the No Action Alternative would affect park operations in a
24 similar manner. As a result, impacts from these actions when combined with the long-term,
25 moderate, beneficial impacts associated with Alternative E would result in long-term, moderate,
26 beneficial cumulative impacts to park operations.

27
28 **Conclusion**

29
30 The implementation of Alternative E would result in long-term, moderate, beneficial impacts to
31 park operations as a result of improved facilities. The overall flexibility to provide cave tours
32 with formalized parking capacity and the improved visitor management tools would be long-
33 term, moderate, and beneficial. Cumulative impacts on park operations would be long-term,
34 moderate, and beneficial.

35

1 CONSULTATION AND COORDINATION

2 3 Internal Scoping

4
5 Internal scoping was conducted by an interdisciplinary team of professionals from the
6 Monument, Uinta-Wasatch-Cache National Forest, Denver Service Center (DSC), and the NPS
7 Intermountain Regional Office. Interdisciplinary team members met on April 26, 2009 to discuss
8 the purpose and need for the project; various Alternatives; potential environmental impacts;
9 past, present, and reasonably foreseeable projects that may have cumulative effects; and
10 possible mitigation measures. Team members also conducted a site visit on May 26, 2009 to
11 view and evaluate the proposed sites for the new facilities. Public scoping was conducted in the
12 summer of 2009. Internal and external responses to components of the Alternatives influenced
13 the need for another VA.

14
15 Another interdisciplinary NPS team met on December 14 and 15, 2010. The 2010 VA identified
16 and evaluated a number of functional and operational alternatives to determine needed park
17 facilities at the Canyon site and the Highland site. The VA recommended further analysis of
18 shuttle bus capital and operational costs.

19
20 Initial results from the Alternative Transportation Feasibility were evaluated on January 10 and
21 11, 2012. The four Action Alternatives and No Action Alternative were identified during this
22 analysis and public scoping was conducted in February 2012. Responses from the public
23 scoping influenced the addition of concession operations at Swinging Bridge Picnic Area to
24 Alternative E.

25 26 External Scoping

27
28 The Monument conducted two external scoping periods. Input from the public is presented in
29 the “Purpose and Need” section of the EA. Some respondents offered new alternatives. These
30 suggestions are identified in the “Alternatives” section.

31 32 Agency Consultation

33
34 In accordance with the Endangered Species Act, the NPS contacted the U.S. Fish and Wildlife
35 Service with regards to federally listed special status species, and in accordance with NPS
36 policy, the Monument also contacted the Utah Division of Wildlife with regards to state-listed
37 species. The results of these consultations are described in the *Special Status Species* section
38 in the *Purpose and Need* chapter.

39
40 In addition to the aforementioned public entities, the following agencies and Native American
41 tribes were sent scoping information or were contacted for information regarding the project:

42 43 Federal Agencies

44
45 Federal Highway Administration
46 U.S. Department of the Interior – Fish and Wildlife Service
47 U.S. Department of Agriculture – National Forest Service

1 **State Agencies**

2
3 Utah Department of Transportation
4 Utah Historical Society (office of the State Historic Preservation Officer)
5 Utah Division of Wildlife Resources
6

7 **Affiliated Native American Groups**

8
9 Paiute Indian Tribe of Utah
10 Skull Valley Band of Goshute Indians of Utah
11 Ute Indian Tribe of Uinta and Ouray Reservation
12

13 No response was received from the affiliated Native American Groups.
14

15 **Section 106 Consultation**

16
17 Section 106 of the National Historic Preservation Act (P.L. 108-72) requires federal agencies to
18 take into account the effects of their “undertakings” on cultural resources that are on or eligible
19 for the NRHP. Section 110 of the National Historic Preservation Act identifies the broad historic
20 preservation responsibilities of Federal agencies.
21

22 Consultation for Section 106 and 110 of the National Historic Preservation Act was conducted
23 for the project. The Monument initiated consultation with the Utah SHPO on April 12, 2010,
24 regarding the status of the existing structures and the proposed construction of new facilities at
25 the Monument. The communication included a copy of “Mission 66 Resources at Timpanogos
26 Cave National Monument” prepared by Rodd L. Wheaton. The document outlined the
27 construction details, modifications, and existing conditions of the Maintenance shop, Residence
28 #8, Residence #9 (Headquarters building), picnic area comfort station, and the Concessions
29 building. On April 15, 2010, Utah SHPO concurred that, based on the assessment, the above
30 listed buildings were not considered historic. A copy of this EA will be sent to the Utah SHPO
31 during the public review of this document.
32

33 **List of Preparers**

34
35 Louis Bridges, Senior Project Manager – Kleinfelder
36 Jenny Esker, Technical Writer – Kleinfelder
37 Kerry Ruebelmann, Senior Quality Assurance and Review – Kleinfelder
38

39 **List of Contributors** (Provided and developed EA content)

40
41 Jim Ireland, Superintendent – Timpanogos Cave National Monument
42 Denis Davis, Former Superintendent – NPS Utah State Coordinator
43 Camille Pulham McKinney, Chief of Resources Management – Timpanogos Cave National
44 Monument
45 Mike Gosse, Chief Ranger – Timpanogos Cave National Monument
46 Gary Togstad, Chief of Maintenance – Timpanogos Cave National Monument
47 Craig Yow, Facility Manager – Timpanogos Cave National Monument
48 Rodney Larson, Chief of Administration – Timpanogos Cave National Monument
49 Edwin Harper, Rock-Fall Management – U.S. Geologic Survey
50 Mike Martin, Hydrologist - Floodplain Management – NPS

-
- 1 Sylvia Clark, Former District Ranger – US Forest Service, Uinta National Forest, Pleasant
 - 2 Grove Ranger District
 - 3 Charmaine Thompson, Heritage Specialist – US Forest Service, Uinta National Forest, Region 4
 - 4 Ron Shields, Project Manager – NPS, Denver Service Center
 - 5 Nola Chavez, Project Specialist – NPS, Denver Service Center
 - 6 Laurie Domler, NEPA Specialist – NPS, Intermountain Regional Office
 - 7 Linda Clement, Compliance Specialist – NPS, Intermountain Regional Office
 - 8 Jill Jones, Principal – AJC architects
 - 9 Bill Byrne – IBI Group
 - 10
 - 11

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APPENDIX A – Public Law 107-329

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Public Law 107–329
107th Congress

An Act

To provide for the acquisition of land and construction of an interagency administrative and visitor facility at the entrance to American Fork Canyon, Utah, and for other purposes.

Dec. 6, 2002
[S. 1240]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

**TITLE I—TIMPANOGOS INTERAGENCY
LAND EXCHANGE**

16 USC 431 note.

SEC. 101. FINDINGS AND PURPOSES.

(a) FINDINGS.—Congress finds that—

(1) the facility that houses the administrative office of the Pleasant Grove Ranger District of the Uinta National Forest can no longer properly serve the purpose of the facility;

(2) a fire destroyed the Timpanogos Cave National Monument Visitor Center and administrative office in 1991, and the temporary structure that is used for a visitor center cannot adequately serve the public; and

(3) combining the administrative office of the Pleasant Grove Ranger District with a new Timpanogos Cave National Monument visitor center and administrative office in one facility would—

- (A) facilitate interagency coordination;
- (B) serve the public better; and
- (C) improve cost effectiveness.

(b) PURPOSES.—The purposes of this title are—

(1) to authorize the Secretary of Agriculture to acquire by exchange non-Federal land located in Highland, Utah as the site for an interagency administrative and visitor facility;

(2) to direct the Secretary of the Interior to construct an administrative and visitor facility on the non-Federal land acquired by the Secretary of Agriculture; and

(3) to direct the Secretary of Agriculture and the Secretary of the Interior to cooperate in the development, construction, operation, and maintenance of the facility.

SEC. 102. DEFINITIONS.

In this title:

(1) FACILITY.—The term “facility” means the facility constructed under section 106 to house—

- (A) the administrative office of the Pleasant Grove Ranger District of the Uinta National Forest; and

(B) the visitor center and administrative office of the Timpanogos Cave National Monument.

(2) FEDERAL LAND.—The term “Federal land” means the parcels of land and improvements to the land in the Salt Lake Meridian comprising—

(A) approximately 237 acres located in T. 5 S., R. 3 E., sec. 13, lot 1, SW $\frac{1}{4}$, NE $\frac{1}{4}$, E $\frac{1}{2}$, NW $\frac{1}{4}$ and E $\frac{1}{2}$, SW $\frac{1}{4}$, as depicted on the map entitled “Long Hollow-Provo Canyon Parcel”, dated March 12, 2001;

(B) approximately 0.18 acre located in T. 7 S., R. 2 E., sec. 12, NW $\frac{1}{4}$, as depicted on the map entitled “Provo Sign and Radio Shop”, dated March 12, 2001;

(C) approximately 20 acres located in T. 3 S., R. 1 E., sec. 33, SE $\frac{1}{4}$, as depicted on the map entitled “Corner Canyon Parcel”, dated March 12, 2001;

(D) approximately 0.18 acre located in T. 29 S., R. 7 W., sec. 15, S $\frac{1}{2}$, as depicted on the map entitled “Beaver Administrative Site”, dated March 12, 2001;

(E) approximately 7.37 acres located in T. 7 S., R. 3 E., sec. 28, NE $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$, as depicted on the map entitled “Springville Parcel”, dated March 12, 2001; and

(F) approximately 0.83 acre located in T. 5 S., R. 2 E., sec. 20, as depicted on the map entitled “Pleasant Grove Ranger District Parcel”, dated March 12, 2001.

(3) NON-FEDERAL LAND.—The term “non-Federal land” means the parcel of land in the Salt Lake Meridian comprising approximately 37.42 acres located at approximately 4,400 West, 11,000 North (SR-92), Highland, Utah in T. 4 S., R. 2 E., sec. 31, NW $\frac{1}{4}$, as depicted on the map entitled “The Highland Property”, dated March 12, 2001.

(4) SECRETARY.—The term “Secretary” means the Secretary of Agriculture.

SEC. 103. MAPS AND LEGAL DESCRIPTIONS.

(a) AVAILABILITY OF MAPS.—The maps described in paragraphs (2) and (3) of section 102 shall be on file and available for public inspection in the Office of the Chief of the Forest Service until the date on which the land depicted on the maps is exchanged under this title.

(b) TECHNICAL CORRECTIONS TO LEGAL DESCRIPTIONS.—The Secretary may correct minor errors in the legal descriptions in paragraphs (2) and (3) of section 102.

SEC. 104. EXCHANGE OF LAND FOR FACILITY SITE.

(a) IN GENERAL.—Subject to subsection (b), the Secretary may, under such terms and conditions as the Secretary may prescribe, convey by quitclaim deed all right, title, and interest of the United States in and to the Federal land in exchange for the conveyance of the non-Federal land.

(b) TITLE TO NON-FEDERAL LAND.—Before the land exchange takes place under subsection (a), the Secretary shall determine that title to the non-Federal land is acceptable based on the approval standards applicable to Federal land acquisitions.

(c) VALUATION OF NON-FEDERAL LAND.—

(1) DETERMINATION.—The fair market value of the land and the improvements on the land exchanged under this title shall be determined by an appraisal that—

(A) is approved by the Secretary; and

(B) conforms with the Federal appraisal standards, as defined in the publication entitled “Uniform Appraisal Standards for Federal Land Acquisitions”.

(2) SEPARATE APPRAISALS.—

(A) IN GENERAL.—Each parcel of Federal land described in subparagraphs (A) through (F) of section 102(2) shall be appraised separately.

(B) INDIVIDUAL PROPERTY VALUES.—The property values of each parcel shall not be affected by the unit rule described in the Uniform Appraisal Standards for Federal Land Acquisitions.

(d) CASH EQUALIZATION.—Notwithstanding section 206(b) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1716(b)), the Secretary may, as the circumstances require, either make or accept a cash equalization payment in excess of 25 percent of the total value of the lands or interests transferred out of Federal ownership.

(e) ADMINISTRATION OF LAND ACQUISITION BY UNITED STATES.—

(1) BOUNDARY ADJUSTMENT.—

(A) IN GENERAL.—On acceptance of title by the Secretary—

(i) the non-Federal land conveyed to the United States shall become part of the Uinta National Forest; and

(ii) the boundaries of the national forest shall be adjusted to include the land.

(B) ALLOCATION OF LAND AND WATER CONSERVATION FUND MONEYS.—For purposes of section 7 of the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601–099), the boundaries of the national forest, as adjusted under this section, shall be considered to be boundaries of the national forest as of January 1, 1965.

(2) APPLICABLE LAW.—Subject to valid existing rights, the Secretary shall manage any land acquired under this section in accordance with—

(A) the Act of March 1, 1911 (16 U.S.C. 480 et seq.) (commonly known as the “Weeks Act”); and

(B) other laws (including regulations) that apply to National Forest System land.

SEC. 105. DISPOSITION OF FUNDS.

(a) DEPOSIT.—The Secretary shall deposit any cash equalization funds received in the land exchange in the fund established under Public Law 90-171 (16 U.S.C. 484a) (commonly known as the “Sisk Act”).

(b) USE OF FUNDS.—Funds deposited under subsection (a) shall be available to the Secretary, without further appropriation, for the acquisition of land and interests in land for administrative sites in the State of Utah and land for the National Forest System.

SEC. 106. CONSTRUCTION AND OPERATION OF FACILITY.

(a) CONSTRUCTION.—

(1) IN GENERAL.—Subject to paragraph (2), as soon as practicable after funds are made available to carry out this title, the Secretary of the Interior shall construct, and bear responsibility for all costs of construction of, a facility and all necessary infrastructure on non-Federal land acquired under section 104.

(2) DESIGN AND SPECIFICATIONS.—Prior to construction, the design and specifications of the facility shall be approved by the Secretary and the Secretary of the Interior.

(b) OPERATION AND MAINTENANCE OF FACILITY.—The facility shall be occupied, operated, and maintained jointly by the Secretary (acting through the Chief of the Forest Service) and the Secretary of the Interior (acting through the Director of the National Park Service) under terms and conditions agreed to by the Secretary and the Secretary of the Interior.

SEC. 107. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such sums as are necessary to carry out this title.

TITLE II—UTAH PUBLIC LANDS ARTIFACT PRESERVATION

SEC. 201. FINDINGS.

Congress finds that—

(1) the collection of the Utah Museum of Natural History in Salt Lake City, Utah, includes more than 1,000,000 archaeological, paleontological, zoological, geological, and botanical artifacts;

(2) the collection of items housed by the Museum contains artifacts from land managed by—

- (A) the Bureau of Land Management;
- (B) the Bureau of Reclamation;
- (C) the National Park Service;
- (D) the United States Fish and Wildlife Service; and
- (E) the Forest Service;

(3) more than 75 percent of the Museum's collection was recovered from federally managed public land; and

(4) the Museum has been designated by the legislature of the State of Utah as the State museum of natural history.

SEC. 202. DEFINITIONS.

In this title:

(1) MUSEUM.—The term “Museum” means the University of Utah Museum of Natural History in Salt Lake City, Utah.

(2) SECRETARY.—The term “Secretary” means the Secretary of the Interior.

SEC. 203. ASSISTANCE FOR UNIVERSITY OF UTAH MUSEUM OF NATURAL HISTORY.

Grants.

(a) ASSISTANCE FOR MUSEUM.—The Secretary shall make a grant to the University of Utah in Salt Lake City, Utah, to pay the Federal share of the costs of construction of a new facility for the Museum, including the design, planning, furnishing, and equipping of the Museum.

(b) GRANT REQUIREMENTS.—

(1) IN GENERAL.—To receive a grant under subsection (b), the Museum shall submit to the Secretary a proposal for the use of the grant.

(2) FEDERAL SHARE.—The Federal share of the costs described in subsection (a) shall not exceed 25 percent.

(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section \$15,000,000, to remain available until expended.

TITLE III—SALT RIVER BAY NATIONAL HISTORICAL PARK AND ECOLOGICAL PRESERVE BOUNDARY ADJUSTMENT

SEC. 301. BOUNDARY ADJUSTMENT.

The first sentence of section 103(b) of the Salt River Bay National Historical Park and Ecological Preserve at St. Croix, Virgin Islands, Act of 1992 (16 U.S.C. 410tt-1(b)) is amended to read as follows: “The park shall consist of approximately 1015 acres of lands, waters, and interests in lands as generally depicted on the map entitled ‘Salt River Bay National Historical Park and Ecological Preserve, St. Croix, U.S.V.I.’, numbered 141/80002, and dated May 2, 2002.”

Approved December 6, 2002.

LEGISLATIVE HISTORY—S. 1240 (H.R. 3928):

HOUSE REPORTS: No. 107-669 (Comm. on Resources).

SENATE REPORTS: No. 107-178 (Comm. on Energy and Natural Resources).

CONGRESSIONAL RECORD, Vol. 148 (2002):

Aug. 1, considered and passed Senate.

Sept. 24, considered and passed House, amended.

Nov. 19, Senate concurred in House amendment.



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1 **APPENDIX B – ROCKFALL**
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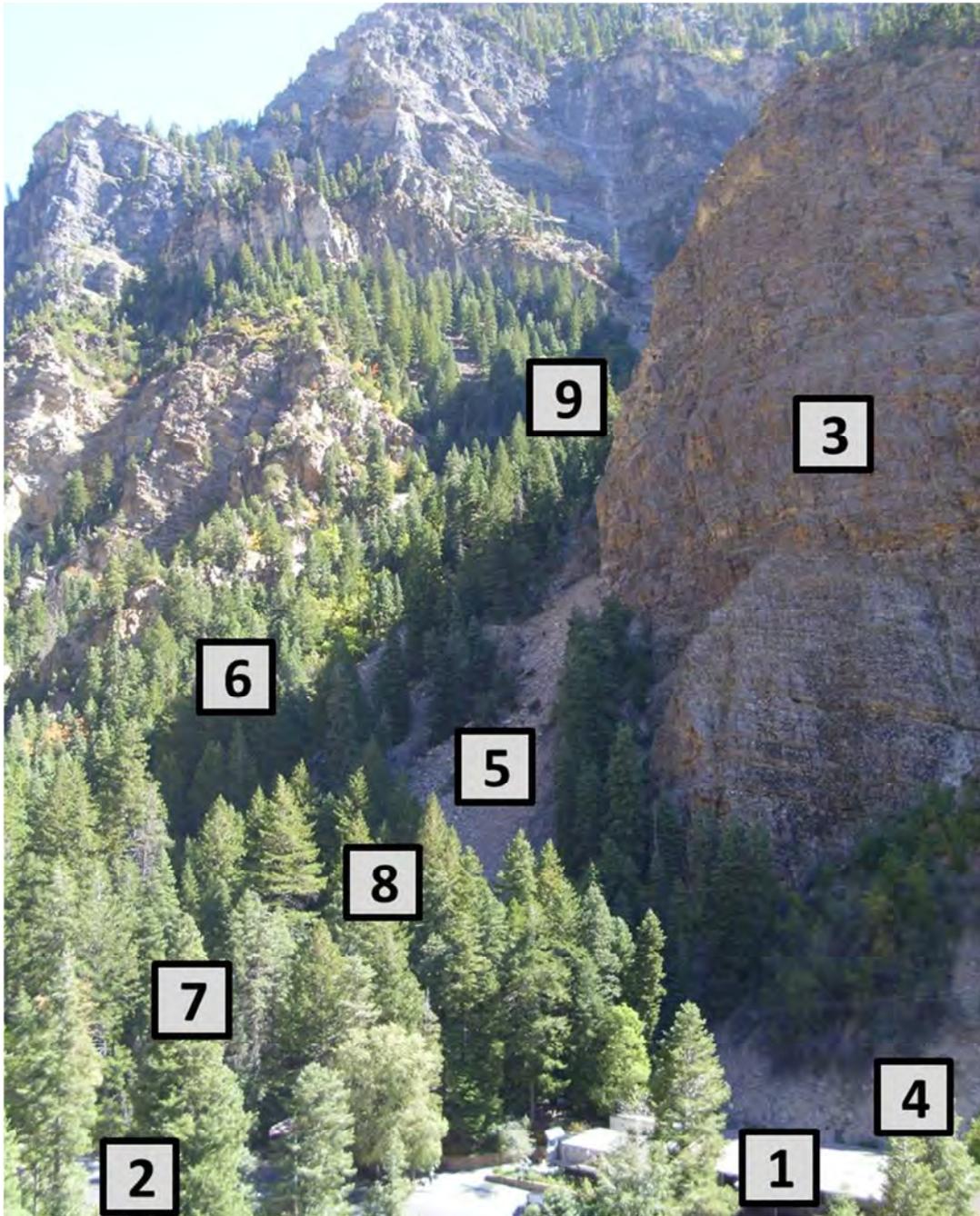


Figure 1: View looking southeast at Visitor Center and proposed building site on the south side of American Fork Canyon showing: (1) Visitor Center, (2) east end of parking lot underlain by stream terrance deposits, (3) cliffs composed of fractured quartzite, (4) apron of talus derived from north-facing cliffs, (5) slope of talus derived from east-facing cliffs, (6) approximate location of active debris-channel (obscured by trees), (7) Northwest edge of debris fan [Alternative Dismissed proposed building site] (obscured by trees), (8) approximate final location of talus boulders from winter 2010 rock fall (obscured by trees), (9) source location (light-colored area) of winter 2010 rock fall.

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1 **ROCK-FALL SUSCEPTIBILITY OF CLIFFS ABOVE VISITOR CENTER AT TIMPANOGOS CAVE**
2 **NATIONAL MONUMENT, UTAH**

3
4 By
5 Edwin L. Harp
6 U.S. Geological Survey
7 Golden, Colorado 80401
8 (303) 273-8557
9 harp@usgs.gov

10
11 **INTRODUCTION**

12
13 The location of the visitor center at Timpanogos Cave National Monument has been a problem for many
14 years from the standpoint of its proximity to near-vertical rock cliffs of highly fractured Precambrian Mutual
15 Quartzite. At their closest point, the cliffs are approximately 50 m from the visitor center and are more
16 than 200 m in height. An active talus apron is present below the cliffs and extends downslope to the
17 visitor center. Rocks falling from the cliffs commonly reach the visitor center and end up on top of the roof
18 or collide with the chain-link fence behind the building. The roof of the center has been breached by
19 falling rocks that have ended up inside of the building.

20
21 The NPS proposes to move the visitor center from below the cliff to a location to the east that is not
22 directly below the cliff. This proposed location is about 70 m from the nearest portion of the cliff and is out
23 of the travel path of most of the rocks that fall from the cliff. A request for assistance from the U.S.
24 Geological Survey to the NPS was for an evaluation of the proposed site of the visitor center from a rock-
25 fall hazard perspective. Will the new site be less hazardous to visitors or not? To answer this question, a
26 quantitative assessment of the susceptibility of rock cliffs above the present and proposed visitor center
27 sites was undertaken in addition to considerations of the respective distances from the cliffs and the
28 topography between the cliffs and these sites.

29
30 **ROCK MASS QUALITY ASSESSMENT**

31
32 To evaluate the susceptibility of the rock cliffs above the present and proposed sites, I employed an
33 engineering classification that estimates the susceptibility of rock slopes in a quantitative fashion, known
34 as the "rock mass quality" method (Harp and Noble, 1993; Barton and others, 1974). This method uses
35 descriptive tables to obtain numerical scores regarding six different fracture characteristics (number of
36 fractures per cubic meter, fracture roughness, materials filling fractures, number of major fracture sets,
37 water reduction factor, and fracture aperture) of the rock mass being evaluated. The possible scores from
38 rock slopes range from numbers in the thousands (stable rock) to numbers in the thousandths (extremely
39 unstable rock). I took measurements at 16 locations across the bottom of the cliff face above the talus
40 slope behind the visitor center and along the east-facing cliff above the proposed location (Fig. 1).

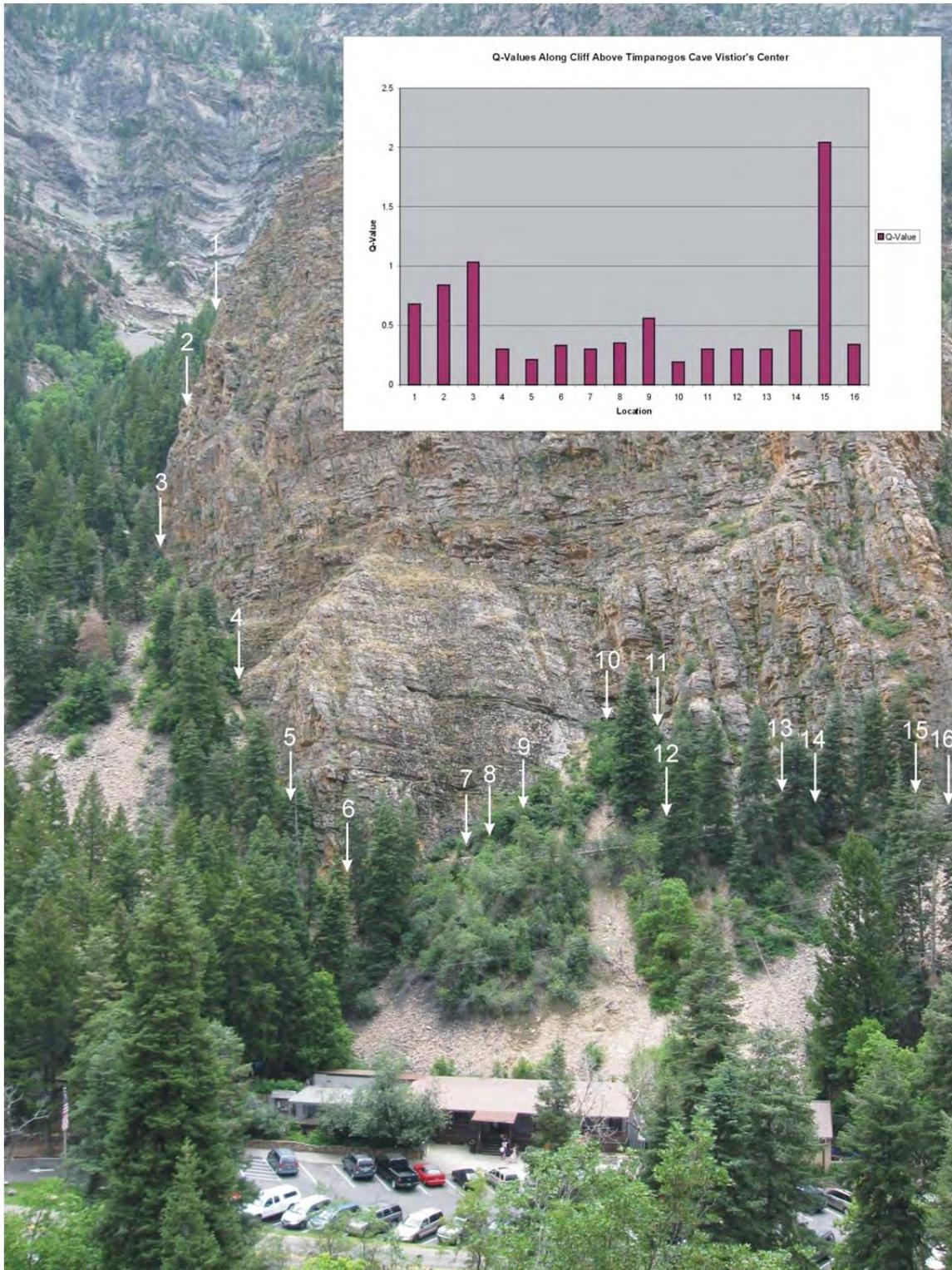
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42 All but two Q-values are within the "susceptible" range of 0.1-0.99. Points number 3 and 15 at 1.03 and
43 2.04 respectively are within the "moderately susceptible" range of 1.0-9.9. None of the Q-values were
44 within the "highly susceptible range of 0.001-0.09 or within the "low susceptibility" range of 10.0-1,226
45 (the maximum possible score). The two factors that make the rock cliff above the visitor center
46 "susceptible" are the closely spaced fractures of the rock and a major fracture set that dips steeply out of
47 the rock face toward the visitor center. A factor unrelated to the rock susceptibility is the close proximity
48 of the visitor center to the cliff face. It is within the runout zone of the talus that is accumulating beneath
49 the cliff and has resulted in numerous rocks impacting the visitor center fence and roof.

50
51 The Q-values of the rock slope above the proposed visitor-center site are not significantly different from
52 those above the present location. However, because of the east-facing aspect of the cliff face above the
53 proposed site, the major fracture set that dips out of the cliff above the present visitor center does not do
54 so along the east-facing cliff.

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 2 Figure 2. Photo of cliff in Precambrian Mutual Quartzite above Timpanogos Cave Visitor Center with
 3 showing locations where "rock mass quality" measurements were made to calculate Q-values. Inset
 4 histogram shows the Q-values corresponding to these locations. (Photo from Denis Davis,
 5 Superintendent).
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2 Additionally, the proposed site is much farther away from the cliff. Inspection of the slopes between the
3 proposed site and the east-facing cliff show no evidence that active talus production extends to the
4 proposed site. Also numerous trees are established between the east-facing cliff and the proposed
5 visitor-center site providing some additional protection from rock fall. A final benefit of the proposed site
6 is that there is a topographic swale between the proposed site and the cliff that would tend to deflect
7 rocks falling from the cliff in a northeasterly direction to a northerly direction away from the proposed site.
8

9 **SUMMARY AND CONCLUSIONS**

10
11 The present location of the visitor center at Timpanogos Cave National Monument is directly downslope
12 from and within the active talus zone of a cliff in Precambrian Mutual Quartzite. Its proximity to the cliff
13 has led to numerous impacts from rock falls along the fence behind the visitor center and on the roof of
14 the building. A proposed alternate site for the visitor center to the east and farther away from the same
15 cliff was evaluated from the standpoint of its hazard from rock fall from the cliff.
16

17 After making "rock mass quality" measurements at 16 locations along the cliff and calculating their
18 respective Q-values, it is obvious that the susceptibilities of both the north-facing cliff above the visitor
19 center and the east-facing cliff above the proposed site are not significantly different. All but two locations
20 have Q-values within the "susceptible" range of 0.1-0.99. In view of this, the proposed site for the visitor
21 center has the following advantages over the present site:
22

23 The proposed site is significantly farther from the cliff and is not within an active talus zone below the cliff.
24 The proposed site does not lie below a north-dipping major fracture set that dips steeply out of the north-
25 facing slope above the present visitor center.

26 The proposed site has a stand of mature trees between it and the cliff offering a measure of protection
27 from rock fall.

28 The proposed site also has a topographic swale between it and the cliff that would tend to deflect
29 northeast-traveling rocks to the north away from its location.
30

31 For the above reasons, the proposed site for the visitor center has distinct advantages over the present
32 location in that its location lies in an area of significantly lower hazard from rock fall. This would lower the
33 exposure to rock-fall hazard of visitors to the Monument who spend much of their time in and around the
34 visitor center.
35

36 **REFERENCES CITED**

37
38 Barton, N., Lien, R., and Lunde, J., 1974, Engineering classification of rock masses for the design and
39 tunnel support: Norwegian Geotechnical Institute, Oslo, Norway, 49 p.
40

41 Harp, E.L., and Noble, M.A., 1993, An engineering classification to evaluate seismic rock-fall susceptibility
42 and its application to the Wasatch Front: Association of Engineering Geologists Bulletin, v. XXX, no., 3, p.
43 293-319.

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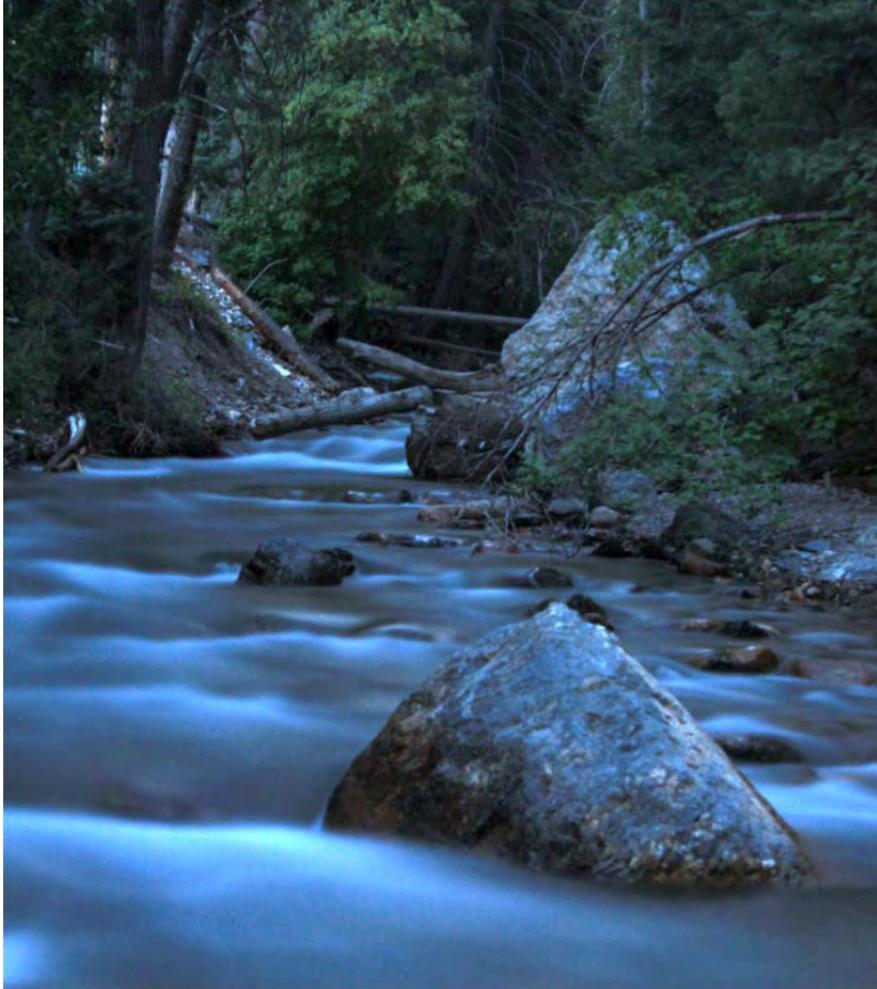
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1 **APPENDIX C – FLOODPLAINS STATEMENT OF**
2 **FINDINGS**

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Statement of Findings



Proposal for GMP Amendment and Facility Development at Timpanogos Cave National Monument, Utah

Superintendent Recommended: _____ Date: _____

Chief of Water Resources Division, WASO, Certification of Technical Adequacy and Servicewide
Consistency: _____ Date: _____

Regional Director Approved: _____ Date: _____

Introduction

Description of the Proposed Action

Timpanogos Cave National Monument (TICA) is proposing to construct a new visitor contact station at the cave trailhead. About 700-800 feet of Highway 92 would be realigned and parking for the cave trailhead would be consolidated on the south side of the highway.

The Preferred Alternative includes:

- Construct visitor contact station in eastern parking area, into hillside, outside of the 100 year floodplain and in a reduced rock fall hazard area.
- Consolidate and redesign cave trailhead parking, but remaining in the 100 year floodplain.
- Highway 92 realigned for pedestrian safety, but remaining in the 100 year floodplain.
- Headquarters building would become a seasonal operations center and is partially within the 100 year floodplain.
- Implement flood evacuation planning and warning system.
- Should any additional development occur in the canyon it would be located to minimize floodplain risks and loss of capital investment.

Site and Flood Hazard Description

Timpanogos Cave National Monument is located entirely within the American Fork Canyon in the Wasatch Range, Utah. The canyon itself is deeply incised, steep and very narrow for most of its length. Consequently, there is very limited, non-flood prone, developable land within the Monument. As a result, almost all Monument facilities are within the 100 or 500-year floodplain (see Figure 1.1 map below). Furthermore, almost the entire infrastructure utilized by the park was developed well before issuance of the Executive Order providing guidance for Federal Actions in floodplain locations (EO 11988, May 1977). Flash floods and debris flows have been recorded within the Monument in 1965 and 1983, resulting in damage to the road and some minor damage to structures. In each of these events, staff and visitors reacted and no life was harmed. Unfortunately, the narrowness of the canyon reduces escape routes and warning time for flood events. A final element of potential flooding is the presence of two water retention structures, Tibble Fork Dam and Silver Lake Flat Dam, upstream from the Monument. If they failed a probable maximum flood could result (see Figure 1.2 map below).

Figure 1.1

100 Year and 500 Year Floodplains & Lower Monument Facilities

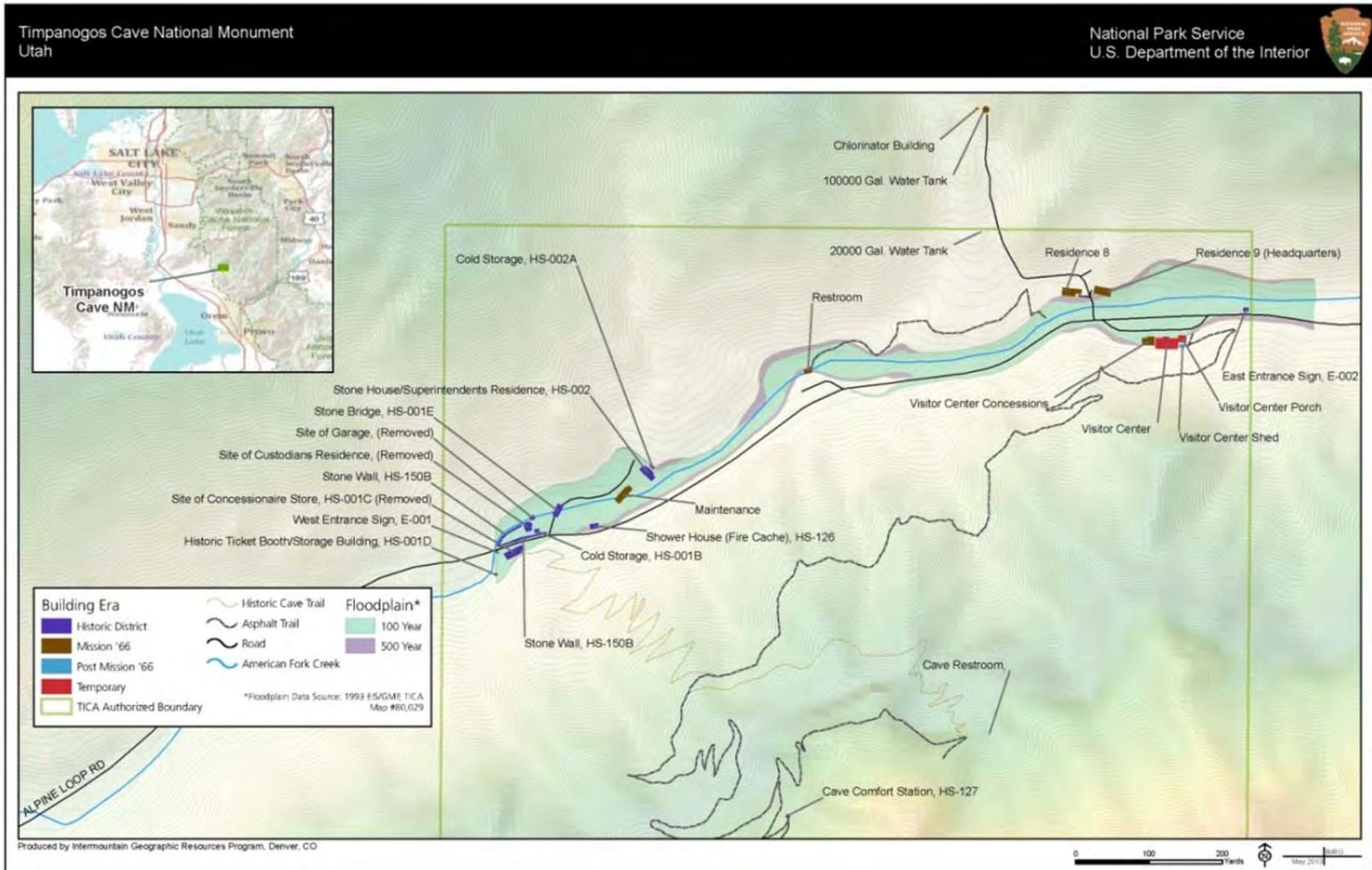
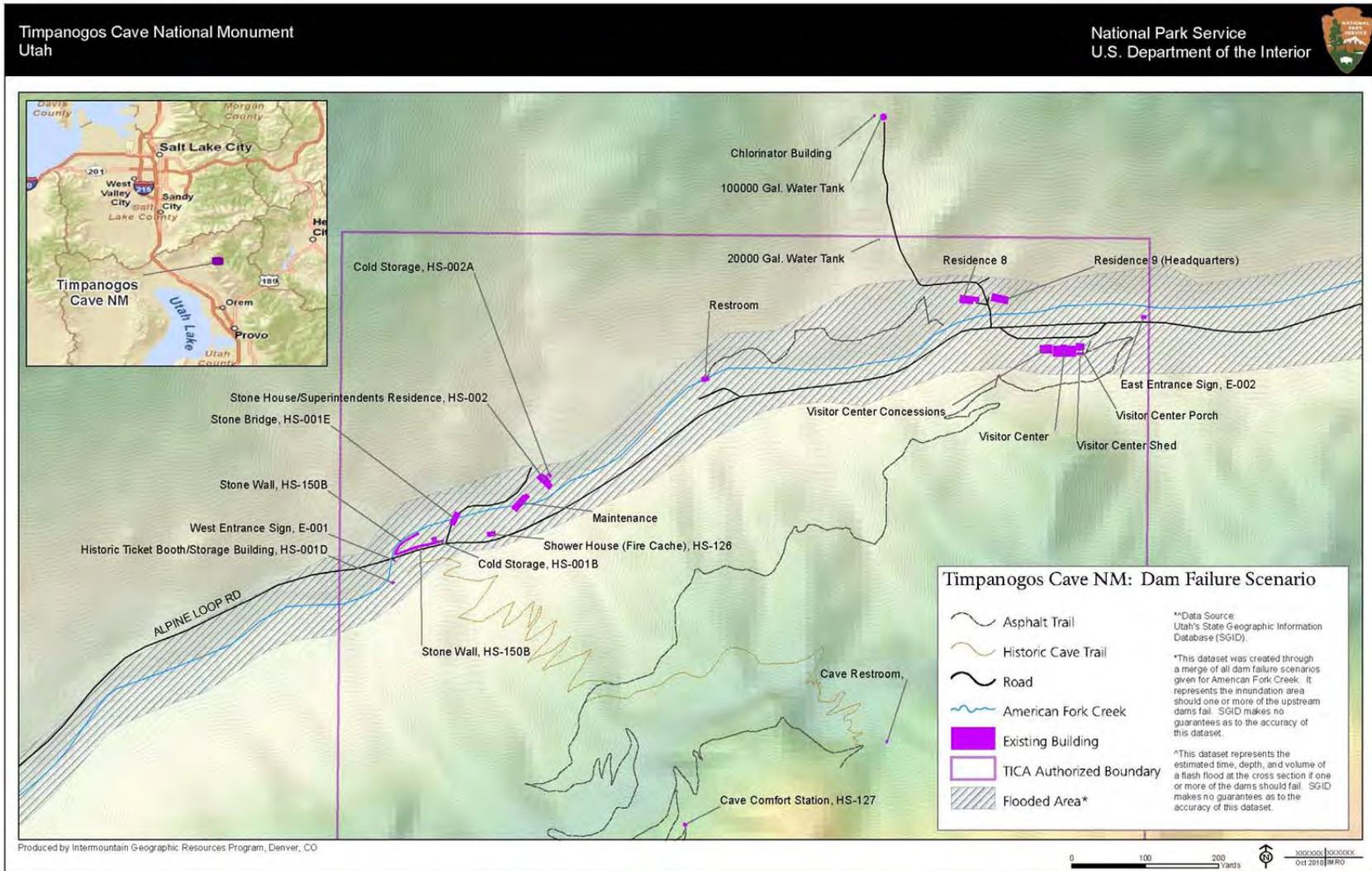


Figure 1.2 Dam Failure Probable Maximum Floodplain & Lower Monument Facilities



Floodplain Use

Highway 92 and almost all the canyon bottom Monument facilities are currently located within the 100- or 500-year floodplain. The physical geography of the canyon makes relocation of these facilities to non-floodplain locations impractical and/or not economically feasible. The construction of a visitor contact as identified in the Preferred Alternative would place this structure outside of the identified 100-year floodplain, reducing the potential for harming human life. However, the visitor contact station parking, part of the seasonal operation center, and over half the length of UT-92 in the Monument would be in the 100-year floodplain.

Mitigation

It is intended that through the development of the new visitor contact station building outside the 100 year floodplain that the major visitor and employee congregation area would be in a safer location than the current facilities. While parking and the seasonal operation center would still be located in the 100 year floodplain, the Monument plans to implement other mitigation measures to improve the safety of park visitors, employees and property.

Due to the geographic constraints of the canyon, the Monument's primary objective is to protect human life. To mitigate the hazard posed from flooding in the Monument, a detailed Flood Preparedness and Evacuation Plan would be written to identify flood awareness stages and staff actions. The plan would identify levels of flood awareness with coinciding actions. Pedestrian escape routes from all the Monument's facilities exist and would be appropriately signed as routes to higher ground in case of flooding. Signage would be developed and placed in strategic locations identifying flash flood zones and directing visitors and staff to climb to higher ground. Paths leading out of the flood zone would be clearly marked with rest areas clearly identified when visitors/ staff have reached an area that is above the high water level.

Preparedness Levels and actions to be taken at each level would be identified in the plan, and this is a preliminary template of what would be included.

Level I: Increased awareness, and increase in visitor contact as preliminary flood conditions arise. Staff would monitor meteorological conditions and river levels. There would be increased communication between TICA staff and the National Weather Service.

Level II: Staff moves to warning level. At this point, flooding conditions are more likely. Staff would close the picnic area to prevent stranding visitors and protect from likely rising river levels. Staff would also notify visitors of the likelihood of flooding. Visitors would be encouraged to leave the Monument and canyon by their own means of transportation. As the likelihood of flooding increases, park vehicles with fuel storage tanks would be driven out of the American Fork canyon to a safe location outside of the flood zone. Communication with the National Weather Service would be more intense.

Level III: At this level, flooding is imminent. Staff would encourage visitor evacuation to higher ground by identified trails. Visitors would be discouraged from trying to drive out of the canyon by their own

vehicles. The canyon floor would no longer be considered safe. Further guidance and information would be developed in the Flood Preparedness and Evacuation Plan that is currently under development.

As a part of the Flood Awareness and Evacuation Plan, the Monument would pursue the installation of an automated flood warning device below the lower dam (Tibble Fork Dam). Although the dams are inspected annually, the unlikely event of a dam failure would place the Monument and lower canyon in maximum potential flood conditions.

Partnerships with the Northern Utah County Water Conservancy District, National Weather Service, United States Forest Service, Natural Resources Conservation Service, the cities of Highland and American Fork, and others are being developed to determine how they can best work together and lend support with flood planning, mitigation, evacuation, and emergency preparedness and response. Increased communication, defined responsibilities, and cooperation between these agencies will help to facilitate an organized and unified response during an emergency. Agreements reached from this effort would be detailed in the Flood Preparedness and Evacuation Plan.

In conclusion, the Flood Preparedness and Evacuation Plan would:

- Include a signage plan to show visitors and staff where the flood zones are and where people should go to higher ground to safety.
- Define preparedness levels and actions to be taken at each one.
- Plan for a flood warning device to be located below Tibble Fork Dam.
- Identify coordination and partnerships with a number of entities who have concern for flood planning in American Fork Canyon.

1 **APPENDIX D – SHPO LETTER**

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10-0489



United States Department of the Interior
NATIONAL PARK SERVICE
Timpanogos Cave National Monument
RR 3, Box 200
American Fork, UT 84003



April 12, 2010

Wilson G. Martin
Utah State Historic Preservation Officer
300 S. Rio Grande Street
Salt Lake City, UT 84101

Re: Determination that several Mission 66 structures at Timpanogos Cave National Monument are not eligible for the National Register of Historic Places

Dear Mr. Martin:

The National Park Service is requesting concurrence from the Utah State Historic Preservation Office on a consensus determination that the historic Mission 66 Remains of Visitor Center Site (Concession Building), Quarters 8, Quarters 9 (now used for Headquarters), Picnic Area Comfort Station, and the Equipment Storage and Utility Building (now known as the Maintenance Shop) are not eligible for listing on the National Register of Historic Places. Although these structures are representative of structures built during the Mission 66 park development era, they are less than fifty years old, most have been substantially modified, and they do not now meet the standard of "exceptional significance" needed to meet the National Register of Historic Places eligibility requirements. We also believe that when they become 50 years old, they will not qualify as well.

To assist us in reaching this recommendation, we hired Rodd L. Wheaton, who retired from the National Park Service several years ago, as Associate Regional Director for Cultural Resources, Intermountain Region to prepare the documentation. It helped that he was already familiar with the structures under consideration.

While the enclosed *Mission 66 Resources at Timpanogos Cave National Monument, 1962-1964* report provides more details about each structure, a summary of each follows.

Remains of Visitor Center Site (Concession Building): In 1991, a fire destroyed the visitor center and park offices that were built in 1962-1963. Only the concession building and roofed breezeway eating area remained in tact. This remaining structure bears no resemblance to the



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former visitor center/offices structure. A double wide modular structure sits in the footprint of the former visitor center next to the concession building and breezeway.

Quarters 8 and 9: Both houses were constructed from standard Mission 66 plans, adjusted for local conditions. They have been modified with new wide exposure metal siding replacing original narrow siding and board and batten in the gable ends. The window trim was narrowed at the living room openings. Roofs are standing seam metal, replacing shingles. All the windows openings have storm windows. Quarters 9 has been modified into offices.

Picnic Area Comfort Station: It was constructed from standard Mission 66 plans. Its exterior façade and roof have been modified.

Equipment Storage and Utility Building: It was from standard plans. With its flat roof, it is incompatible with the gabled roof structures of the park. It has also lost integrity through subsequent alternations including the addition of an office wing, a lumber storage shed and the changing of the garage doors that represents nearly 75 percent of the façade.

With the loss of the key building, the visitor center in 1991, and the fact that the other four buildings display minimal design inspiration having been built to meet utilitarian needs, the Mission 66 structures of Timpanogos Cave National Monument do not meet the criteria for “exceptional significance” for nominating them to the National Register of Historic Places, and because they are not yet 50 years old. Further, once they reach that milestone they do not have sufficient architectural integrity to consider them for the National Register. The visitor center was destroyed. The residences and the comfort station were built from standard designs that represented the most expedient stock designs for construction; they have also been modified with new siding and roofs that effects their integrity. The Equipment Storage and Utility Building is a very basic flat roofed design that has been extensively modified with new doors, a primary feature, and the construction of additions. As such none of the Mission 66 buildings at Timpanogos Cave meet criteria or have integrity for nomination to the National Register of Historic Places. Also, the NPS is undertaking a service-wide historic context study in order to better evaluate Mission 66 architecture of the 1956-1970 era, which will aid in evaluating such simple but functional structures as those at Timpanogos Cave National Monument when they become fifty years old.

However, since the structures are less than fifty years old, most have been substantially modified, and they do not meet the “exceptional significance” standard, the National Park Service has determined that the historic Mission 66 Remains of Visitor Center Site (Concession Building), Quarters 8, Quarters 9 (now used for Headquarters), Picnic Area Comfort Station, Equipment Storage and Utility Building (now known as the Maintenance Shop) at Timpanogos Cave National Monument are not eligible for listing in the National Register of Historic Places. If you concur with this determination of eligibility please sign and date in the space provided below.



Utah State Historic Preservation Officer Concurrence
(Chris Hansen, Preservation Planner, UT SHPO)

4/15/10

Date



MISSION 66 RESOURCES AT TIMPANOGOS CAVE NATIONAL MONUMENT, 1962-1964

SECTION I

Name of Property:

Primary Name: Timpanogos Cave National Monument Mission 66 Buildings

Other Names: Quarters 8 and 9, Equipment Storage and Utility Building, Comfort Station, Visitor Center
Structural Remains

Address of Property:

Street Address: Utah State Highway 92, 7 miles northeast of American Fork

City: American Fork vicinity

County: Utah

Zip: 84003

Present Owner of Property:

Name: Superintendent, Timpanogos Cave National Monument

Address: R.R. 3, Box 200

Phone: 801 756-5239

City: American Fork

State: Utah

Zip: 84003

Preparer:

Name: Rodd L. Wheaton

Address: 3021 S. Cornell Circle

City: Englewood

Date: March 2010

Phone: 303 789-9550

State: Colorado

Zip: 80113

SECTION II

Associated Historic Designation:

Name: Timpanogos Cave Historic District

Date designated: October 13, 1982; amended August 17, 2007

Designated by: National Register of Historic Places

Mission 66 Resources:

Year of Construction: 1962-1964

Source of Information: Construction documents on file at the Denver Service Center, Technical Information Center, National Park Service, Denver, CO

Architect, Builder, Engineer, Artist or Designer: Visitor Center: Cannon & Mullen Architects, Salt Lake City, UT; other buildings "Standard" designs and "Cheatham," Architect with the National Park Service, Western Office of Design and Construction

Source of Information: Construction Documents

SECTION III

Descriptions and Alterations:

Site:

Most of the development at Timpanogos Cave National Monument is a lineal and extends along the American Fork River valley from the west to the east boundary. Near the east end is the site of the visitor center on the south side of the river from which the trail to the cave ascends up the escarpment. Across the river from the visitor center site are the two Mission 66 houses, Quarters 8 and 9. Towards the west end is the Timpanogos Cave National Historic District that includes the Rustic style buildings from the 1920s and the 1930s, the old Superintendent's House, campground comfort stations, a 1935 bridge, and the old trail to the cave entrance. The historic district also includes the Mission 66 Equipment Storage and Utility Building that was listed as non-contributing in 1982. In 2007, the historic district was amended with a DOE to include the two entrance signs, and stone retaining walls, all of which were built during the designated historic period. Located in the center of the park on a south bank of a bend of the river is the Mission 66 comfort station. As such, the Mission 66 buildings do not form a cohesive district being widely dispersed in the park's river valley.

Visitor Center Site:

The original Mission 66 visitor center was designed in 1961 and constructed in 1962-1963 on a site south of the American Fork River and adjacent to the escarpment rising to 8000 feet to the south. Nearly totally destroyed by fire in 1991, all that remains is the western most structure that housed a concession facility and the breezeway. The original building was a lineal structure with a series of gable roofs stepping down to the west end. An auditorium was located in the eastern end and extended to a central entrance lobby space, and a rear museum. Park offices extended from the museum to the east end of the building to the museum space. Public restrooms were located adjacent

to the lobby and entrance plaza. The main building was separated from the concession building by a roofed breezeway connecting to the concession building.

The visitor center site is now occupied by a gabled roof double-wide prefabricated structure, serving as a visitor contact station, with a shed porch extending across the façade. To the east is a small structure set within the low stone walls and a planter from the original building. The double-wide structure is clad in horizontal siding and the east structure is clad in T-111 siding. The remaining section of the visitor center is gable roofed with common bond concrete block masonry, beige colored walls. A stone masonry wall is set in front of the open breezeway that has wooden columns supporting the extended eave. The floor is concrete. The west elevation is an open gable with a service door set into vertical siding. The other half is common bond concrete block masonry.

The existing structure bears no resemblance to the former visitor center that was almost wholly lost to the fire of 1991.

1964



2008



Quarters 8 and 9:

The two residences, constructed in 1962-1963, were based on the Park Service's "Standard Plans for Employee Housing," dating from 1956. At Timpanogos Cave, the Western Office of Design and Construction elected to use the "Three Bedroom Standard" plan of 1960, somewhat modified to provide a half-bath opening directly from the master bedroom. Quarters 9 generally followed the standard design with a one-car garage on the west end. Quarters 8 reversed the plan and added the garage at the east end, constructing it perpendicular from the house. The houses are located north of the highway through the park and north of the American Fork River across a small bridge built for access to the houses. The two houses generally face south and have a connecting driveway between them. The site is northwest of the former visitor center.

Typically, one-story, low gabled roof, frame houses are rectangular in plan above a crawl space. Trusses support the roof. Each has a central entrance doorway that is slightly recessed into the façade walling forming a narrow porch at a concrete pad with one step to grade. The living room windows are a tripartite design with a fixed center plate glass window and double-hung sidelights. Adjacent to the entry are a pair of double-hung windows that light the first bedroom. A single double-hung window lights the corner bedroom. The end elevation of the bedroom wing has two double-hung windows lighting the two end bedrooms. The typical rear elevation has a double-hung window lighting the master bedroom, two small double-hung windows lighting the bathrooms, and a small double-hung window lighting the utility room. A glazed door opens from the utility room. A slightly smaller tripartite window lights the dining room and a shortened, wide double hung window lights the kitchen. Quarters 9 garage door opens south, and it has a door and a double-hung window on the west elevation. Quarters 8 has a single opening on the south façade and a door on the north elevation; the garage door faces east. The houses are clad in modern wooden siding that extends into the gable ends that have overhanging verges with a raked fascia matching the fascia of the boxed overhanging eaves. Vents are located in the gable ends. The interiors are undistinguished with typical stock trim, a galley kitchen, and wood floors.

Both houses have been modified with new wide exposure metal siding replacing original narrow siding and board and batten in the gable ends. The window trim was narrowed at the living room openings. Roofs are standing seam metal, replacing shingles. All the windows openings have storm windows. Quarters 9 has been modified into offices.

Quarters 8 1963



2010



**Quarters 9
1963**



2010



Picnic Area Comfort Station:

The 1962-1963 comfort station is a standard design. It is located north of the entrance road and south of a bend in the American Fork River that is contained by a stone masonry wall. The long elevation faces south onto a parking area. Walkways extend to the end entrances into the restrooms and extend from the comfort station across two bridges to trails on the opposite bank of the river.

The comfort station is a small rectangular plan building that has 4-inch high concrete block walling constructed in common bond and originally beige in color. Above the walling is a ribbon of clerestory windows. The low gabled roof has an elongated ridge that forms a prow at each end and is supported on Glu-lam beams. A narrow fascia extends around the eaves and verges. Each end elevation has a doorway and a solid core door opening into the respective men's or women's restroom near the rear

corner. Two doorways are located on each long elevation providing access into the utility room at the front and into sewage pump room at the rear. A ribbon of three windows extends from each end door to the corners. At the long elevations, two clerestory windows with panel spacers flank the central doorways. The interiors are typical with two wash basins, and three toilet fixtures per each section.

The original concrete block building had the clerestory ribbon of windows painted cream color that tended to blend the band and make it uniform in appearance. The roof eave was painted dark brown. The building was subsequently painted white with reddish trim. The entire building is now painted dark brown causing the windows to stand out in design. The built-up roof is now clad with standing seam metal.

1966



2010



Equipment Storage and Utility Building:

The 1962-1963 Equipment Storage and Utility Building (now known as the Maintenance Building), is located within the designated Timpanogos Cave Historic District as a non-contributing structure. It is located north of the main park roadway and is accessed from a road that extends from it. The building faces somewhat northwest onto an open vehicle parking area and beyond to the American Fork River.

It is a one-story building constructed of stack bond tanish concrete block units that are 4" high. It has four bays below a nearly flat shed roof that slopes towards the rear elevation. The roof is supported on open web steel joists. Block piers separate the garage bays and at the southwest end enclose a doorway into service areas. Over the garage doors are vertically corrugated metal panels. The northeast end elevation has a doorway; a doorway and a window were located on the southwest end elevation. The rear elevation has a pair of large openings near each end. Each masonry opening is infilled with metal 16-light sash with a center awning type opening. A small window is located near the southwest end. The original garage doors had a band of horizontal windows except in the southwest end opening that was glazed with a pedestrian door set into it. All the doors have been replaced with modern glazed and insulated doors.

An addition was added to the southwest end in 1989. The stack bond concrete block addition contains three rooms to provide office space and storage that opens to the original spaces of the 1962 building that contained storage and a mechanical and a toilet room. The roof is lower than the main roof, though the front and rear elevations align with the original building. The façade has a side door and two window openings with slider sash. There are no openings on the other two elevations.

A wooden shed was added to the east end of the building in 1990. It is a wood shed with a metal slat roof and used to store wood and metal construction materials.

The Equipment Storage and Utility Building, with its flat roof, is incompatible with the gabled roof structures of the park. It has also lost integrity through subsequent alternations including the addition of an office wing and the changing of the garage doors that represents nearly 75 percent of the façade.

1965



2010



SECTION IV

Significance of Property

Timpanogos Cave National Monument was established in 1922 to protect the associated caves of the site, Timpanogos, Middle, and Hansen that were originally discovered starting in 1887. The caves were initially managed by the U. S. Forest Service until their transfer to the National Park Service in 1933.

During the Mission 66 program of the National Park Service, from 1956 to 1966, original facilities were considered to be inadequate to meet the needs of park management and visiting public. The original buildings of the 1930s, part of the Timpanogos Cave Historic District, were augmented in 1962-1963 with modern style buildings including a new visitor center, two residences, a comfort station, and the Equipment Storage and Utility Building.

First to be built were the two residences at a combined cost of \$38,000 followed by the maintenance facility. Construction began on the visitor center in 1963 at a total cost of \$146,808. It was dedicated in July of 1964. The visitor center was the focal point of the park until it was nearly totally destroyed by fire in 1991. Design and construction of visitor centers during the Mission 66 program was a primary focus and the most innovative building type of the program. The intent was to provide the visitors various services such as spaces for audio visual programs, a museum, restrooms, and in the instance of Timpanogos Cave, a concession facility. The building also was intended to centralize staff offices. It was designed by Cannon & Mullen, Architects, well known Salt Lake City, Utah, architects, who worked directly for the National Park Service's Western Office of Design and Construction (WODC) in San Francisco. The workload for WODC often dictated contracting with national and local architectural firms to design major buildings. Frequently, as in the case of the Timpanogos Cave visitor center, preliminary designs were produced by WODC and then turned over to private-sector architects to prepare the construction documents. Howell Q. Cannon, who was the firm's construction supervisor, and James M. Mullen, who was the designer, modified the preliminary drawings improving the design. Cannon and Mullen began their Park Service work with the design of the Bryce Canyon Visitor Center in 1958-1959 and went on to prepare the construction documents for the Zion Visitor Center at Oak Creek in 1960-1961. Subsequently, they provided services for the Natural Bridges Visitor Center and the Golden Spike Visitor Center.

The other buildings from the Mission 66 program were standard plans adapted to the local conditions. While the residences and the comfort station construction drawings were marked "Standard," it was noted on them that WODC architect Richard "Dick" Cheatham was responsible for their preparation. He also is shown as the designer for the maintenance facility. Little is known about his background or influences.

With the loss of the key building, the visitor center in 1991, and the fact that the other four buildings display minimal design inspiration having been built to meet utilitarian needs, the Mission 66 resources of Timpanogos Cave National Monument do not meet the criteria for "exceptional significance" for nominating them to the National Register of Historic Places, and because they are not yet 50 years old. Further, once they reach that milestone they do not have sufficient architectural integrity to consider them for the National Register. The visitor center was destroyed. The residences and the comfort station were built from standard designs that represented the most expedient designs for construction; they have also been modified with new siding and roofs that effects their integrity. The Equipment Storage and Utility Building is a very basic flat roofed design that has been extensively modified with new doors, a primary feature, and the construction of an office addition. As such none of the Mission 66 buildings at Timpanogos Cave meet criteria or have integrity for nomination to the National Register of Historic Places.

BIBLIOGRAPHY:

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Pulham, Cami. *Heart of the Mountain, The History of Timpanogos Cave National Monument*. 2009.

SKETCH MAP:

USGS Map: Timpanogos Cave Quadrangle

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As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. Administration.