National Park Service
U. S. Department of the Interior

GLACIER NATIONAL PARK
Montana
Waterton-Glacier International Peace Park

Rebuild Sperry Chalet for the Next 100 Years
Environmental Assessment

April 2018

NPS Photos

Contents

Chapter 1

The Proposed Action

As a result of the 2017 Sprague Fire, the Sperry Chalet Dormitory building (B796), a National Historic Landmark and contributing structure to the Great Northern Railway National Historic Landmark District, sustained major damage, which included the destruction of all combustible elements. Two chimneys, interior masonry footings and four exterior masonry walls were all that remained after the fire. The dining hall (B797) (also within the NHL district; herein after NHL or NHL District) also caught fire and sustained minor damage to the roof and deck. The National Park Service (NPS) is proposing to rebuild the Sperry Chalet Dormitory at its original site within the original walls and to repair the dining hall. The objectives of these actions are to: 1) restore the Sperry Chalet visitor experience (characterized by sharing family style meals at the dining hall and overnight lodging in a structure) for the next 100 years, and continue to provide a remote backcountry chalet experience surrounded by recommended wilderness in Glacier National Park; 2) preserve an NHL district and other associated historic properties listed in the National Register of Historic Places, including Glacier National Park Tourist Trails, that together help illustrate the story of this unique location and keep as much of the remaining historic fabric of the chalet in place as possible and, 3) minimize impacts to natural and cultural resources while restoring the Sperry Chalet experience. More detail about the proposed action is described in Alternative A.

Need for Action

The property's designation as an NHL affords the buildings the highest levels of preservation considerations. Action is needed to preserve the property as there is high risk of further damage or loss from weather and weather related events such as avalanches and high snow loads. Action is also needed to restore an iconic remote backcountry chalet visitor experience into the next 100 years.

Sperry Chalet has offered an iconic visitor experience for hundreds of thousands of visitors (overnight, day-hikers and guided horse trips) and has been a major contributor to the stewardship and understanding of Glacier National Park and recommended wilderness by providing access into the more remote wilderness areas of the park including Sperry Glacier, Comeau Pass and Gunsight Pass.

The chalet has served visitors to Glacier National Park continuously since 1914 with only a short break in service during WWII and another break in service between 1992 and 1999. Pre-fire, the Sperry Chalet hosted an average of just under 50 visitors per night, and operated approximately nine weeks each summer. The NPS's 2005 Commercial Services Plan for Glacier National Park identified the Sperry Chalet visitor experience as a necessary and appropriate visitor service.

Background

The Sperry Chalet is located six miles by trail from the Going-to-the-Sun Road, and below Sperry Glacier and Comeau Pass. It lies within a 25 acre enclave, excluded from the park's recommended wilderness, but surrounded by recommended wilderness (Figure 1). The dining hall and the dormitory contribute to the Great Northern Railway Buildings National Historic Landmark. The Great Northern Railway constructed buildings (which include the Sperry Chalet dormitory and dining hall) throughout Glacier National Park. Combined, these buildings are the largest collection of Swiss Chalet-style buildings in the United States. "It is the only instance in which one distinct architectural style is used on such a massive scale for a concession development and the only instance in which a European system of hostelries built a day's hike or ride apart is used" (National Park Service, 1986). The current 10-year concession contract is held by Belton Chalets, Incorporated, which is owned by a family who has operated Sperry Chalet for three generations.

Late on August 10, 2017 the Sprague Fire was ignited by lightning that struck approximately 2.5 miles down valley from the chalet. Initial response included water drops and insertion of firefighters on August 11th. The area trails were closed and chalet visitors were evacuated. Throughout the duration of the fire, a *confine and contain* suppression strategy was used to slow the fire. Natural fire breaks, such as ridgelines with sparse fuels, damp areas such as creek bottoms, and changes in vegetation such as avalanche chutes or cleared trail area were enhanced in some areas with sprinklers, pumps and water dropped from helicopters and airplanes. The rugged and steep terrain and very active fire behavior precluded use of ground crews to directly engage the fire; however, firefighters were stationed at the chalet. The principal objectives were firefighter and visitor safety and protection of valued assets. Demand on firefighting resources was very high due to high fire activity throughout the west during the 2017 fire season.

On August 31, 2017 high winds from the south and west pushed the Sprague Fire to the Sperry Chalet area. During an ember storm, the dormitory caught fire under the eaves. Despite the efforts of on-scene firefighters and four helicopters, the building was substantially damaged. The firefighters' efforts saved the other buildings associated with the complex, including the historic dining hall and the non-historic employee quarters, trails cabin, and toilet facility. The Sperry Chalet Dining Hall sustained minimal damage to the roof and deck.

A Burned Area Emergency Recovery (BAER) team conducted an analysis of the burn on September 25-26, 2017, as required by NPS Director's Order 18 and Reference Manual and Interior Departmental Manual Part 620 DM 7, Chapter 3. In addition to the BAER Team's analysis, the ruin was also assessed for stability and preservation potential, as well as visitor safety by a Facilitated Learning Analysis team that included an historical architect and engineer with NPS, and a contracted structural engineer. An initial structural assessment of the Sperry Chalet Dormitory and Sperry Chalet Dining Hall was performed on September 12, 2017.

In an effort to preserve the dormitory walls during the winter of 2018 from heavy snow loads that could collapse the walls and give the NPS the opportunity to develop appropriate preservation action plans, emergency stabilization of the ruin was carried out October 4-17, 2017. These temporary measures (based on recommendations from a contract structural engineer, NPS historic preservation specialists and with concurrence by the State Historic Preservation Officer (SHPO)), shored up masonry features including the remaining walls and chimneys and afforded some protection for the winter. The fire continued to burn late into the fall, and by November 3, 2017 the burn area included an estimated 18,000 acres.

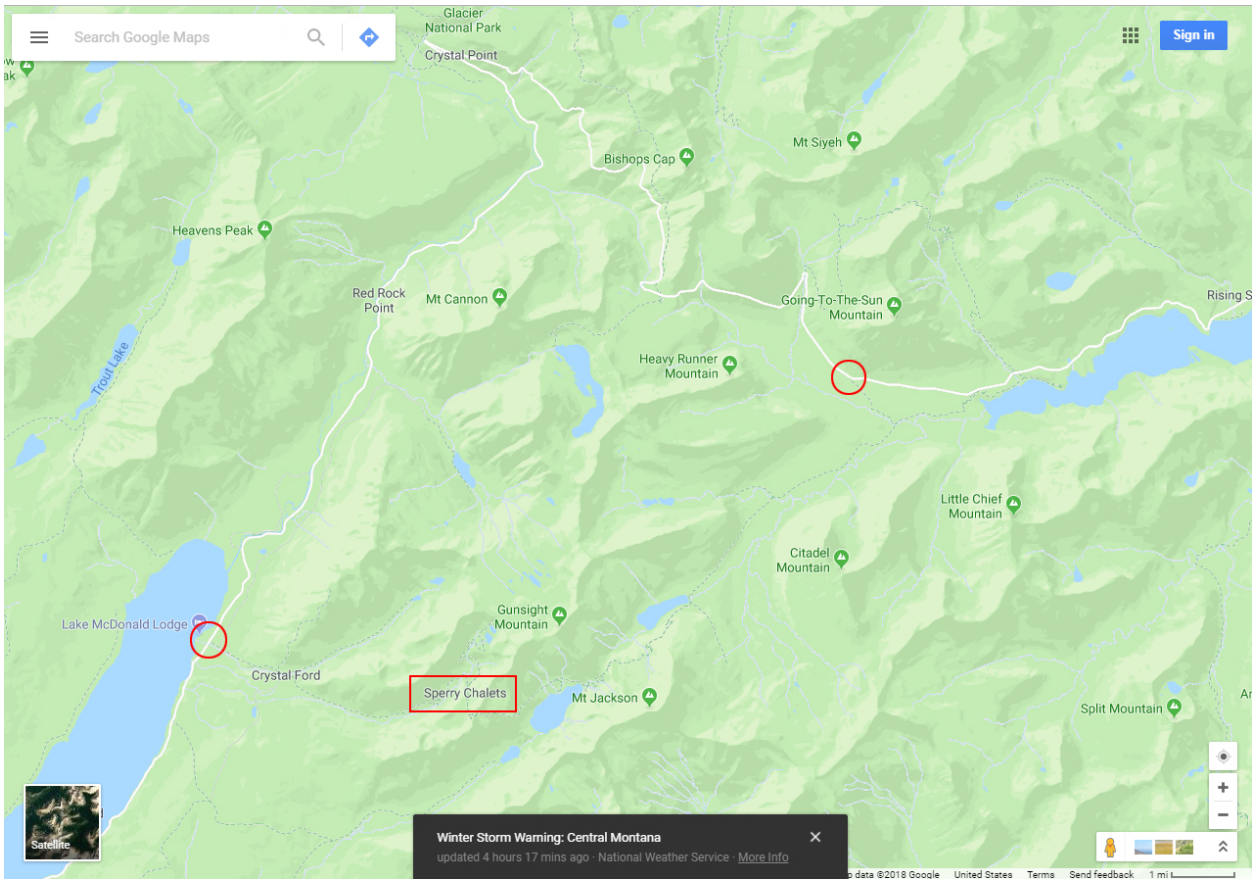

Figure 1 Sperry Chalet Trailheads (noted with red circles)

Impact Topics Analyzed

The following impact topics are of critical importance and are analyzed in detail in Chapter 3; wildlife, federally listed, proposed and candidate species (grizzly bears, Canada Lynx, wolverine, whitebark pine), state listed species of concern, recommended wilderness, vegetation/soils, natural soundscapes, visitor experience, and historic structures.

Impact Topics Dismissed from Detailed Analysis

The following impact topics are not analyzed because they are not of critical importance in regards to this project, do not exist in the analysis area, would not be affected by the proposal, the likelihood of impacts are not reasonably expected, or through the application of mitigation measures, there would be no measurable effects from the proposal.

Federally Listed Threatened and Endangered and Proposed Species under the Endangered Species Act (ESA)/Montana State Listed Species

Water Howellia (*Howellia aquatilus*) – Threatened. Habitat for the federally threatened water howellia, a wetland dependent species, may be present in the park, but there are no recorded observations in the project area. No funding has been available for inventories specific to water howellia. However, a number of wetlands in the park have been surveyed during recent field studies, including Montana Natural Heritage Program surveys of selected wetlands in the North Fork (Cooper et al. 2000), Peter Lesica's plant inventory for the GNP Flora (Lesica

2002), Jerry DeSanto's surveys of Lee Creek fen and other park wetlands (DeSanto 1998), John DeArment's surveys of selected wetlands in developed areas (DeArment 2001), and vegetation mapping surveys (unpublished data on file at GNP). No water howellia has been detected during any of these projects. Implementation of the proposed action will have no effect on water howellia.

Spalding's Catchfly (*Silene spaldingii*) – Threatened. Spalding's catchfly, recently listed as a federally threatened species, has never been reported in the park, nor has potential habitat been identified. A recently completed study of east side grasslands, which included 155 vegetation plots in a wide variety of grasslands under 5,500 ft. (1,676 m) elevation did not result in identification of Spalding's catchfly in any of the surveyed grasslands. The species has not been found in fire effects plots in North Fork grasslands, in inventories for the park flora, nor in vegetation mapping plots anywhere in the park (unpublished data on file at GNP). The proposed project area does not include any grassland habitats suitable for use by Spalding's catchfly. Implementation of the proposed action will have no effect on Spalding's catchfly.

Meltwater Lednian Stonefly (*Lednia tumana*) and Western Glacier Stonefly (*Zapada glacier*) – Proposed Threatened. There are no meltwater lednian or western glacier stoneflies or potential stonefly habitat present in the project area. The closest documented population of either species of stonefly is outside and upstream from the project area. In addition, all proposed construction activities will be land based and do not include excavation or dirt work that would contribute to downstream sedimentation. Similar to the trout species found in the park, stoneflies are not considered at risk from construction activity or aircraft disturbance, as they would not be anticipated to experience terrestrial sound at levels that would influence behavior or cause a physiological response (NPS 1995). The proposed project would not result in any change to the mortality risk, or the availability of habitat and forage. Implementation of the proposed action will have no effect on meltwater lednian or western glacier stoneflies.

Bull Trout (*Salvelinus confluentus*) – Threatened. There are no bull trout or critical bull trout habitat within the project area. All proposed construction activities would be land based and do not include excavation or dirt work that would contribute to downstream sedimentation. In general, fish have not been considered at risk from construction activity or aircraft disturbance, as they do not experience terrestrial sound at levels that would influence behavior or cause a physiological response (NPS 1995). The proposed project would not result in any change to critical habitat, mortality risk, prey populations, or the range of competitors and/or predators. Implementation of the proposed action would have no effect on bull trout or designated critical habitat.

Montana State Listed Species of Concern

Douglas' Neckera Moss (*Neckera douglasii*). There is a historic record from 1901 of this species in the Lake McDonald drainage. However, a survey in 2001 of the Lake McDonald area could not locate it and there have been no observations of the species in the park since 1901. There have been no records of this species within the project area. This species has not been observed in the park since 1901 and is not likely to occur. If Douglas' neckera moss is detected in areas where it could be affected by activities under this plan, surveys would be conducted and any additional locations would be marked and avoided.

Slim Larkspur (*Delphinium deparuperatum*). Slim larkspur is typically found in moist habitats, including moist meadows and along streams (Lesica 2012). This species has rarely been documented in Montana despite the availability of its preferred habitats. There is only one record documenting this species in 1945 in the Camas Creek area (Lesica 2002). This species is not likely to occur within the project area as it is generally associated with habitat characteristics that are not found there. As a result, impacts to this species are not likely to occur as a result of this project.

Fisher (*Pekania pennant*). Fishers have not recently been detected in Glacier National Park, previous reports are difficult to confirm, and the species may not be present. If fishers do use the project area, they are not likely to

be measurably affected by the project, which would occur outside the denning period. Increased noise within the project area would result from construction activities, helicopter flights, and human presence. This noise disturbance may displace some individuals in the immediate vicinity however; individuals are very unlikely to be using the project area and there is significant amounts of unoccupied natural habitats available adjacent the project area. The proposed project would not result in any meaningful changes to fishers or fisher habitat available within the project and adjacent areas.

Little Brown Myotis (*Myotis lucifugus*). Little brown myotis are known to use habitats within GNP, with recorded observations as recently as 2017. Little brown myotis could be found in some of the habitat types within the project area including roosting within the buildings that make up the Sperry Chalet Complex. Buildings are primarily used day or night for roosts, not hibernacula due to sub-zero temperatures experienced throughout the winter. Day roost habitats include attics, barns, bridges, snags, loose bark, rock crevices, caves, talus slopes, and bat houses. Most of the actions associated with the project would occur within the existing walls of the Sperry Dormitory which is not suitable for roosting bats at this time, and as a result would have no impact to little brown myotis habitats. Bats are highly mobile except when hibernating or when females give birth, and would not likely be affected in any meaningful way if temporarily displaced due to the elevated noise disturbance associated with construction and helicopter flights. It is highly unlikely that the Sperry chalet would support a maternity roost, given the cool, or cold, temperatures experienced at this elevation. There would continue to be ample natural bat day – and night-roost habitat, including rock crevices, talus slopes, and roost trees, in both the project and adjacent areas. Little brown myotis commonly forage over water. The project area does not support foraging habitat for this species and there will be no impacts to foraging habitat or prey abundance as a result of the proposed project. There will continue to be ample foraging habitats in areas adjacent to the project area.

Water Resources (Quantity/Quality/Aquatic Resources)

There would be no effect on aquatic resources for Sperry dormitory reconstruction as the project is not taking place within any water bodies. Use of water resources in the area for drinking and construction activities would not require any more water than is normally used during a season. The onsite system, assuming a normal summer, would be sufficient for all water needs. Any soil disturbance would include best management erosion and sediment control measures to prevent introduction of sediments into downstream wetlands and waterways outside the project. Stock use on the trail, leading to the chalet, could result in temporary adverse impacts to water quality of Sprague and Snyder Creek, from animal waste; but would not be measurable.

Air Quality

The proposal would cause temporary and slightly increased emissions of pollutants in the project areas during construction and from increased flight activity. However, the increase would not be measurable above existing conditions. The increased number of flights is less than total number of air tours and one operator has recently relocated their business.

Environmental Justice

Executive Order 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The proposed action would not have any health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Environmental Justice Guidance (1998) because this site does not support a permanent population, nor would the action adversely affect human health or programs and policies for minorities or low income communities because none are associated with the project area.

Archeology

Eight intensive surface surveys and subsurface testing of the area have been conducted to date. No prehistoric archeological resources have been identified. Historic archeological materials were identified in 1975 National Register boundary expansion to include a portion of the talus slope where stone for the construction of Sperry Chalet was quarried. No new historic materials were revealed until the 2017 Sprague Fire.

Cultural resource reporting of the Sprague Fire Burned Area Emergency Response (2018) revealed dispersed surface historic trash middens and isolated historic debris within the NHL District. These materials are consistent with visitor amenities (china, glasses), food containers (tin cans and glass bottles), and the utility of operating a backcountry chalet (i.e. bucket, nails, glass and miscellaneous metal fragments) as well as evidence of the railway (railroad spike). Historic maps of the developed area (pre-1968) also show locations of numerous privies, water systems, and communications systems. However, the combination of these surveys and historic references cover all the surface area that may be disturbed by any of the alternatives considered. Therefore there would be no effect on archaeological resources.

Indian Trust Resources and Indian Sacred Sites

The Blackfeet and Confederated Salish and Kootenai Tribes were notified of the Sprague Fire impacts on September 1, 2017, and regularly during the active fire. Notification of public scoping for this project occurred on March 2, 2018. Neither the Blackfeet and Confederated Salish and Kootenai Tribes expressed concern about Trust resources, as defined by NPS Management Policies Section 1.11.3, which are not known to be present in the project area. Neither tribe expressed concerns about treaty rights and or reserved treaty rights being affected. Neither tribe identified sacred sites of concern within the project area.

Ethnographic Resources

According to park records of known ethnographic sites, none have been identified in the vicinity of Sperry Chalet complex. Notification of public scoping for this project occurred on March 2, 2018. Neither the Blackfeet and Confederated Salish and Kootenai Tribes expressed concern about ethnographic resources.

Socioeconomic Resources

No change in capacity or operation of the chalet as a concession would be expected to occur as a result of the action alternatives. Therefore there would be no change on socioeconomic resources from the perspective of the concession business operation or visitors who stay at the chalet. Rebuilding the chalet would be funded by a public/private partnership.

Dark Skies

The 2006 NPS Management Policy directs the Service to preserve the natural lightscape of parks to the greatest extent possible. The greater Waterton-Glacier International Peace Park has taken that directive a step further by obtaining the designation of Dark Sky Park given by the International Dark-Sky Association. In order to receive this designation the park was obligated to meet minimum requirements including, but not limited to, developing a lightscape management plan. The alternatives proposed in this plan would not contribute additional artificial light into the lightscape and as a result would not have an impact on dark sky resources.

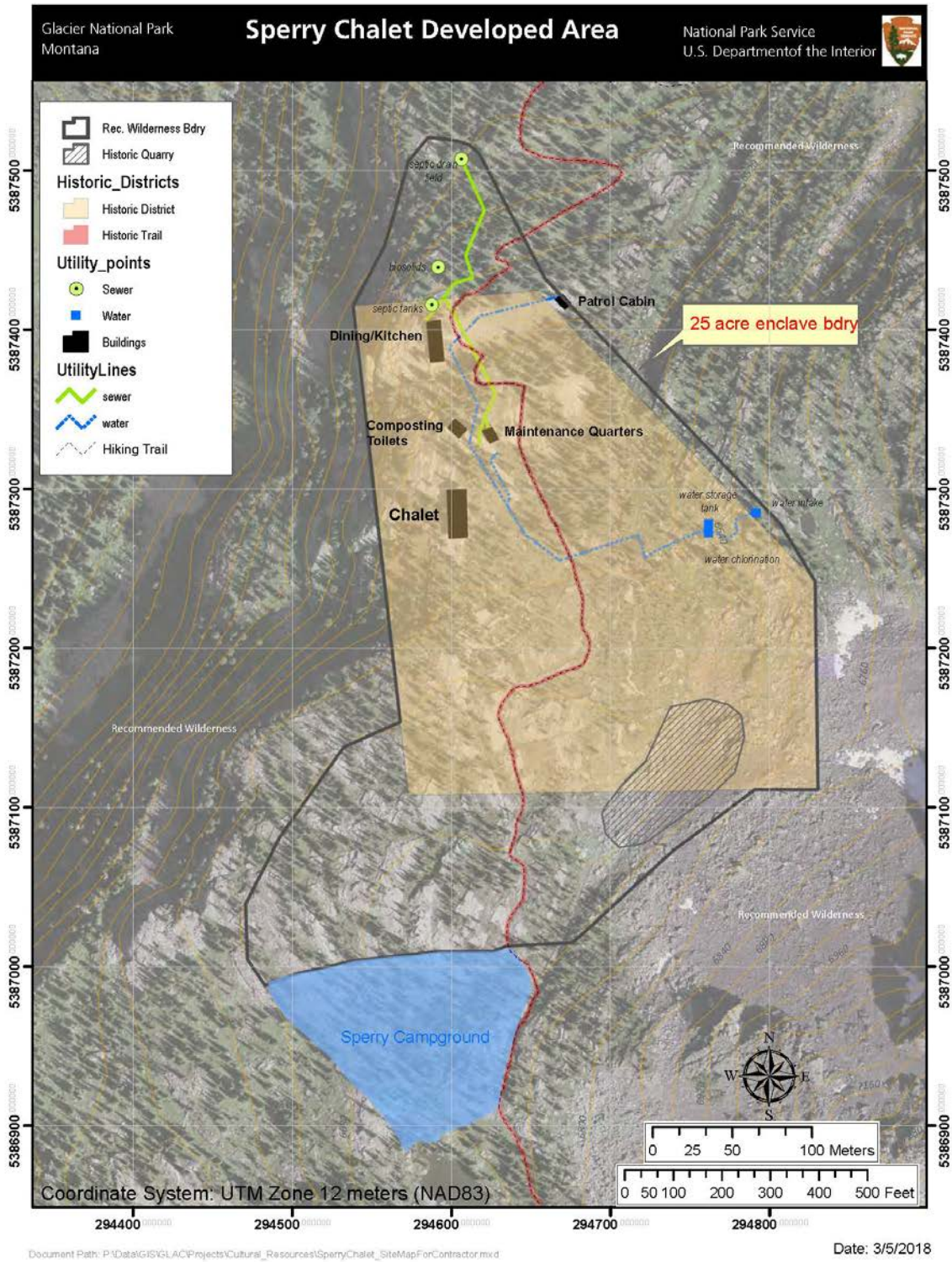

Figure 2 Sperry Chalet Developed Area

Chapter 2

ALTERNATIVES

Alternative A – Rebuild Chalet (Proposed Action and Preferred Alternative)

Alternative A is a hybrid or blend of conceptual options 1 and 2 (as presented to the public during public scoping. See Appendix 1). It would restore the chalet dormitory, reflecting its period of significance (1914-1949), using the original walls and site, provide for some critical updates to current building codes and improve life safety. The visitor experience would be very similar to what it has been for decades by using as much of the remaining historic fabric as possible. The historic capacity of the chalet dormitory would be maintained at about 54 overnight guests and 11 staff members.

Improvements would ensure its use for the next 100 years barring unforeseen events and take into account changing use patterns, long-term sustainability and climate change. Design considerations would include seismic walls to increase its ability (as much as possible) to withstand earthquakes and late season avalanches. Fire resistant materials would be used, balanced with the use of historically appropriate finishes. Improved design and fuels management techniques would be used to protect it from wildland and structural fire; and water storage, conservation measures and collection of rainwater would be used to increase water availability at the site.

Code upgrades would be addressed where possible such as the stairs to the second floor would be modified to reduce their steepness. Fire detection would be included. One room would be made accessible for visitors with disabilities. Significant historic fabric still existing after the fire would be maintained/preserved.

Construction is anticipated to be accomplished in two phases. Phase I would include additional structural investigation of the masonry walls, building a roof, and constructing seismic lateral walls in the interior. If necessary, rock from the nearby original quarry (fully located within the 25 acre enclave and partially within the historic district; see Figure 3) would be used to repair the remaining historic walls. Due to the unique historic character defining feature of the original stonework associated with the Sperry Chalet Dormitory, there is a lack of reasonably available outside sources to provide rock which matches that used in the original construction. In addition, the use of this quarry is the most reasonable economic, environmental, and ecological alternative for sourcing material for reconstruction due to the chalet's remote location. Phase II would begin the following summer and complete the reconstruction of the dormitory including finishing the roof, constructing interior floors, framing, finishes and any remaining exterior work. Cost considerations, unforeseen events or conditions, could affect the construction schedule. Phase II would complete the reconstruction of the dormitory including finishing the roof, constructing interior floors, framing, finishes and any remaining exterior work.

During both construction seasons, the Sperry Backcountry Campground and trails from Lake McDonald and Gunsight would remain open to visitors. The Sperry toilet facility would remain open to visitor use. The horse concession may continue to offer day rides to the chalet complex subject to restrictions from construction activity with the associated increased stock use on the trail and frequent helicopter activity. All Sperry area visitor use may be subject to temporary closures, for safety reasons, during construction. Signs would be placed at the trailheads informing hikers of conditions, restricted areas and temporary closures.

Phase I construction would be accomplished by a 12-25 person crew, including a project manager, resource monitor, sanitation employee and support staff. Crews would live on-site for approximately 12 weeks. Construction activity would occur from July 1 through the end of October. Crew members would camp within the boundaries of the historic district in temporary tents on platforms near the remaining structures (shown on Figure 3) in a previously disturbed area. Meals would be prepared and provided either in the dining room or in a

hard-sided temporary structure that would be flown up. Construction materials would also be brought in by mule and flown in by helicopter sling loads. Approximately 400,000 pounds or (200 tons) of materials and equipment would be flown in and carried up by stock. Helicopters carrying crew members and others as required would land at the site in the designated landing zone. To reduce noise levels to wildlife, hikers in the area, backpackers camping nearby and wilderness character in the adjacent recommended wilderness, construction materials and other items such as food that don't require helicopter transport would be carried up by stock. Approximately 150-220 helicopter trips (depending on the size of the helicopter) would be required to transport construction materials. There would likely be days of 40-50 flights and other days with fewer or no flights. Approximately 35-60 pack string trips would bring the remaining construction materials and food for the crews for Phase I. A staging area for helicopter operations would be located outside the park at a site to be determined by the contractor. If a site can't be found outside the park, helicopter operations would stage out of West Glacier in the vicinity of the NPS Wastewater Treatment Plant. The helicopter would deliver materials at a designated landing zone at Sperry Chalet shown on Figure 3.

Phase II construction would require a similar size crew and support. The construction period would be from June 1 to October 30. Approximately 200-300 helicopter flights would transport construction materials that could not be brought in by stock and 35-60 pack string trips would bring in the rest of the materials and food. Helicopter operations would be based in the same area as used in Phase I. Daily operation would be similar to Phase I.

Design. The National Park Service is utilizing the comprehensive photo documentation of the building, as well as architectural drawings from 1913, 1940, 1996, 2011, and the 2017 stabilization drawings to complete this rebuild. Much of this information was condensed into the *Sperry Chalet Dormitory Historic Systems and Finishes* (2017, see Appendix 2 for a description of these features). The building's shell provides the outline for interior and exterior reconstruction and preservation treatments.

NPS Photo

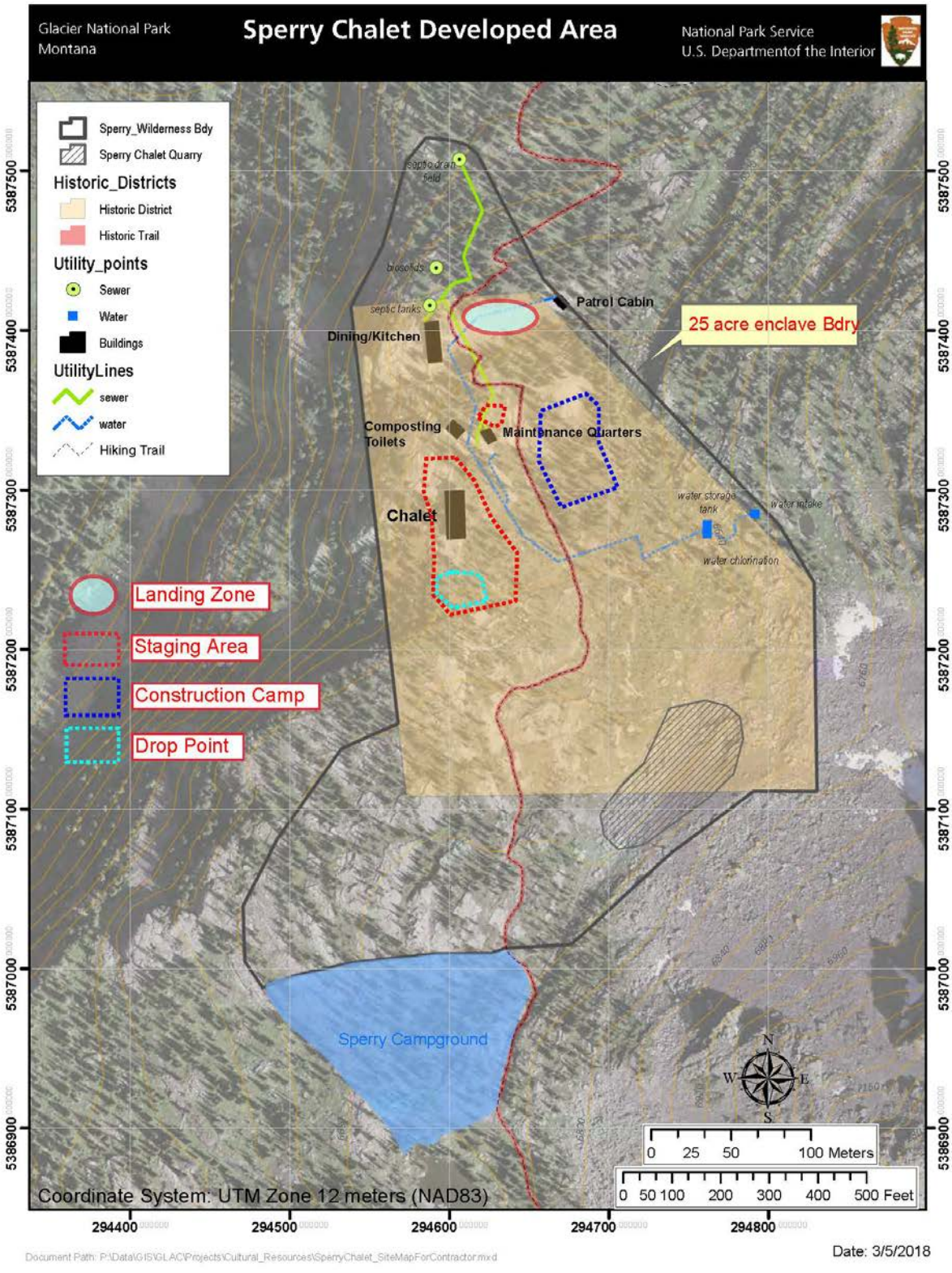

Figure 3 **Alternative A Site Plan**

Alternative B - Build New Dormitory and Preserve Remaining Walls as a Ruin

This alternative would construct an entirely new structure in a slightly different location to avoid potential avalanche strikes and to enable the historic remains of the dormitory to be preserved as a ruin. In addition to stabilizing and preserving the historic remains of the original dormitory walls, visitor interpretation would be provided.

The new dormitory would be located within the historic district boundary. Figure 4 shows a possible location, but a final location would be selected after the site is snow free this summer season. The new building would provide close to the same capacity of the original dormitory. It would be architecturally distinct but compatible with the historic district and the remaining historic structures, yet modernized. One room would be made accessible for visitors with disabilities. Rock from the nearby quarry (part of which is within the historic district) might be used in the structure (for the same reasons as described in Alternative A). Soundproofing between rooms would be added and sustainable and recycled materials would be used as appropriate.

Improvements would ensure its use for the next 100 years barring unforeseen events and take into account changing use patterns, long-term sustainability and climate change. Design considerations would include seismic walls to increase its ability (as much as possible) to withstand earthquakes and late season avalanches. Fire resistant materials would be used, balanced with the use of historically appropriate finishes. Improved design and fuels management techniques would be used to protect it from wildland and structural fire; and water storage, conservation measures and collection of rainwater would be used to increase water availability at the site.

The walls and chimneys of the original dormitory would be stabilized and portions of isolated or compromised architectural features (such as the chimneys) could be removed for safety reasons. Development of an interpretive trail, viewing area and information on the structure's history and significance and site hazards would be provided within the historic district for public education, preservation and safety.

Construction would occur as described for Alternative A, however for Phase I, the ruin would be preserved, and in Phase II, the new dormitory would be built. Helicopter flights and pack stock trips would be similar to what is described under Alternative A. Rock drills and expanding grout would be used to construct the foundation for a new dormitory. Cost considerations, unforeseen events or conditions, could affect the construction schedule.

The Sperry Chalet Dormitory and Dining Hall/Kitchen buildings are assigned to Belton Chalets Incorporated through their concession contract. The dormitory building would be removed from the contract land assignment and the new building would be added.

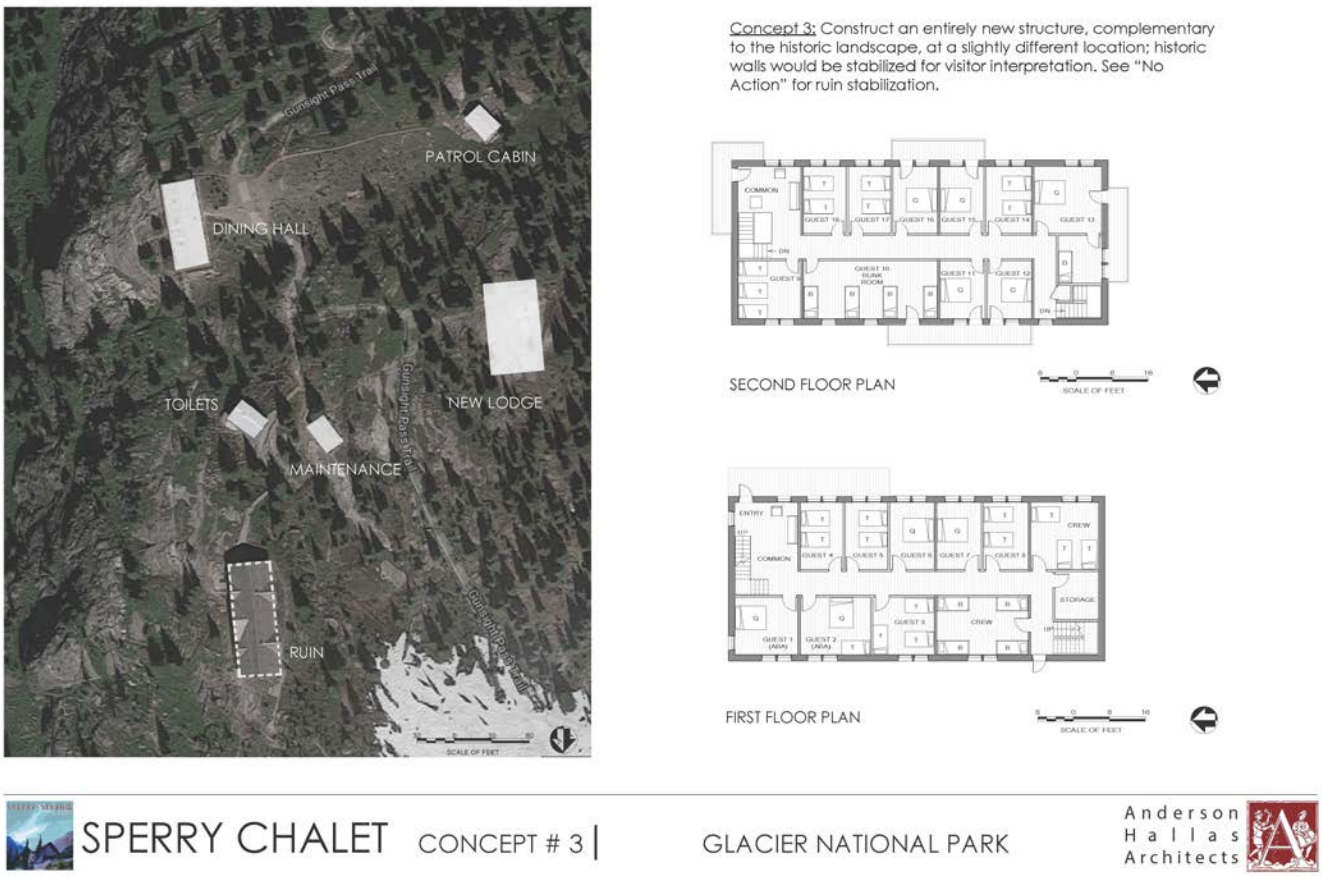

Figure 4 Alternative B

Alternative C - No Action - Preserve Remaining Walls and Other Features as a Ruin

This alternative would leave the Sperry Chalet Dormitory walls in place, and preserve the shell's form and outline. Wall and chimney stabilization, or potential removal of portions of isolated or compromised architectural features would occur. Development of an interpretive trail, viewing area and information on site hazards would be provided for public safety, education and protection of the site.

Construction efforts for stabilization would take one season and include 150-200 helicopter flights and 35-60 stock trips.

The Sperry Chalet Dormitory and Dining Hall/Kitchen building is assigned to Belton Chalets Incorporated through their concession contract. Under No Action, the dormitory building would be removed from the contract land assignment. The park would engage in discussions with the current concessioner on potential commercial visitor services at the remaining dining hall/kitchen. Depending on the outcome of these discussions, the toilet facility built in the 1990's may be removed.

Figure 5 Alternative C

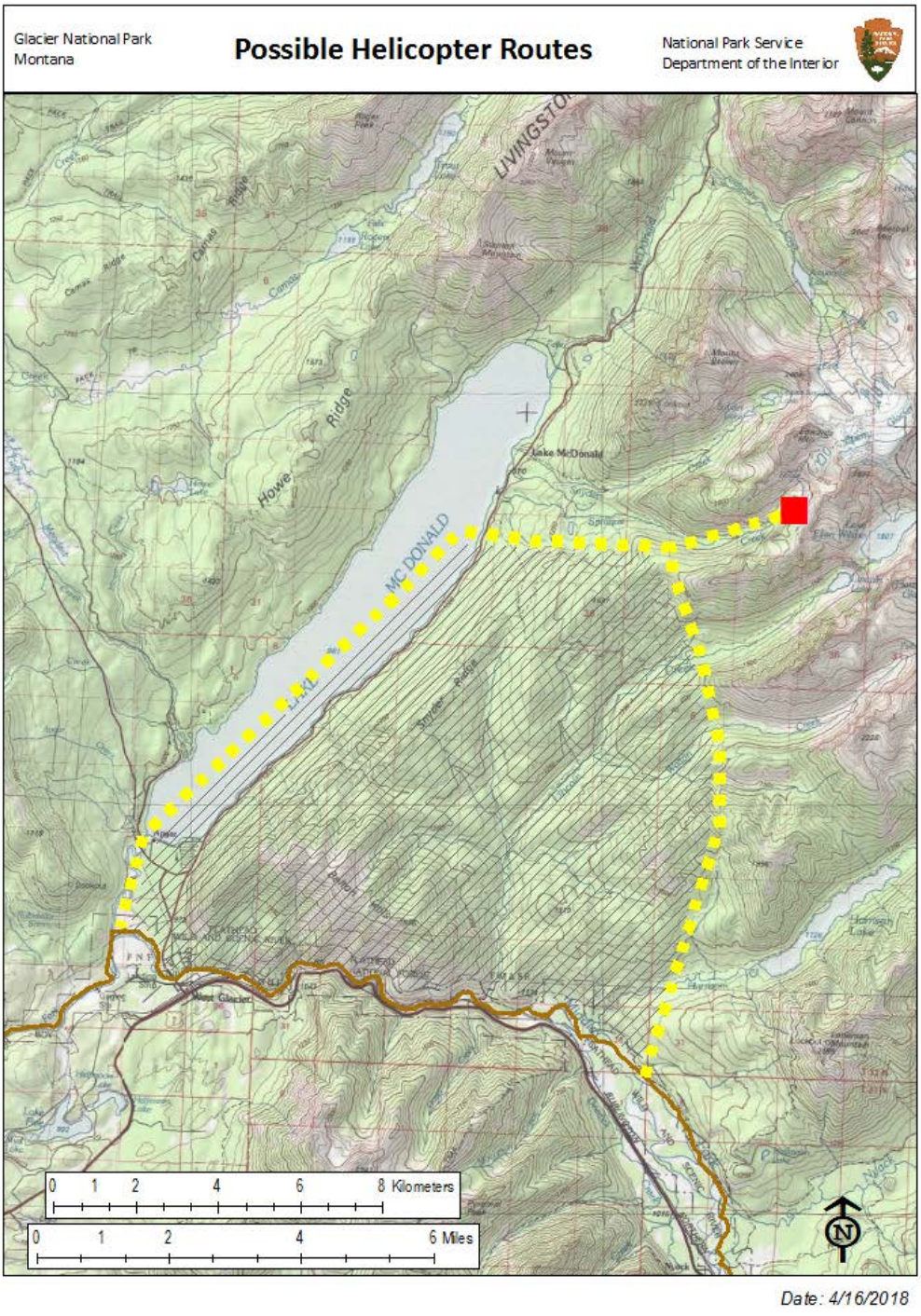

Figure 6 Possible helicopter flight routes shown in shaded area. Route would depend on location of staging area.

Mitigation Measures Common to All Alternatives

The following mitigation measures have been identified to minimize the degree, extent and or severity of adverse impacts and would be implemented during the project.

Historic Structures and Cultural Landscapes

- Preserve the *character defining features* of the Sperry Chalet Dormitory (Appendix 2).
- Work with the National Weather Service, United States Geological Survey and others to forecast and monitor avalanche events.
- Design would include measures to reduce fire hazard from both internal and external sources.
- Historic American Building Survey (HABS) documentation of the remaining historic fabric (walls) would be conducted.
- During any ground disturbing activity to construct temporary trails in the historic district, work would cease in the immediate area of discovered archeological artifacts, and the find would be reported to the site manager.
- Measures would be taken to avoid working in the portion of the quarry/talus slope where there is evidence of historic stone working.
- The park's trail crew and vegetation specialist would address trail damage to the South Circle Trail segment (from Lake McDonald Lodge to Sperry) as a result of the higher than usual stock operation to haul construction and other materials. Re-grading, ground-sculpting and revegetation of the trail would be done as necessary.
- Other buildings at the site would be protected from inadvertent damage by the construction project. Any damage that occurs would be repaired and/or replaced in-kind by the contractor.
- Temporary fencing would be installed to keep visitors out of the active construction zone for their protection.

Wildlife, Habitat, and Threatened Wildlife Species

- Storage requirements for food, garbage, and other attractants would be strictly enforced during the project. Food and garbage would be loaded or unloaded immediately from stock and helicopters and stored appropriately.
- Project crews would be trained on attractant storage regulations and appropriate behavior in the presence of wildlife. The handbook "*Bear Safety, Site Sanitation and Other Requirements While Working in Glacier National Park: a Handbook for Construction Contractors*" would be provided to all contractors and work crews.
- Park staff (e.g. wildlife technicians and law enforcement rangers) would monitor wildlife, storage of food and attractants, construction staging area and crew sleeping areas during project.
- Fluid from equipment and tools can be a wildlife attractant. Tools and equipment would be inspected for fluid leaks prior to use. Leaking tools and equipment would not be permitted to be used. Any equipment that develops leaks would be repaired immediately or removed from the park. Absorbent materials manufactured specifically for the containment and clean-up of hazardous materials would be kept onsite in case a spill should occur.
- Hand-held tools, gloves and sweaty clothing can be a wildlife attractant from the salts. Equipment and clothing would be properly stored to prevent access by wildlife.
- Helicopter flights beginning in September would be restricted, as much as possible, to early morning hours before 10:00am to avoid interfering with a *major migration route* for approximately 2,000 raptors (hawks, falcons, eagles, and accipiters). The migration route would be monitored and timing of flights would be adjusted to minimize impacts on birds and improve safety for helicopter trips.

- Use of the toilet facility would be required at all times and strictly enforced to prevent vegetation damage from human waste and urine which is an attractant to wildlife.
- Bald and golden eagle nest sites within the flight path would be identified and buffered by at least ¼ mile for bald eagles and ½ mile for golden eagles to prevent disturbance during nesting and rearing season within the flight path. These buffers would not be feasible in the project area.
- A wildlife log would be maintained on site to document all wildlife activity in the area during the project.

Natural Soundscapes and Air Quality

- To reduce the duration of helicopter noise and impacts to visitors, wildlife and wilderness character, the smallest (lightest) helicopter needed for the task would be chosen where possible. For tasks requiring a heavy lift helicopter, an appropriate model would be used, pending availability, to efficiently carry as much heavy material as possible and reduce the number of trips needed to fly in construction material. More efficient, lower noise models would be preferred (see Table 1).
- To reduce noise impacts on wilderness and other backcountry sites, the transport helicopter would fly over roads, at the maximum safe altitude possible while remaining below the surrounding ridge line in the valley where it is flying. Where possible, a minimum 2,000 foot altitude would be maintained per FAA Advisory Circular 91-36D Visual Flight Rules (VFR) Flight Near Noise-Sensitive Areas.
- Power equipment including generators, saws and other tools, would be used within the walls of the chalet dormitory (as much as possible) to reduce noise levels. More efficient, lower noise models would be preferred (see Appendix 3; NIOSH 2006 and NPS 2010). Nail guns would be used rather than hammers as much as possible to reduce the amount and intensity of impact from noise. Where possible, generators that do not exceed 60 dBA, at 50 feet, would be chosen (36 CFR 2.12; see Appendix 4).
- Construction work would be limited to the hours of 7:00 am - 7:00 pm, to reduce disturbance to backpackers in the nearby campground.

Vegetation and Soils

- Construction personnel and all others would be required to stay on established trails in the historic district. New trails would be developed as needed to new locations, such as the historic quarry and the crew's tent platforms to avoid creation of social trails. These trails would be rehabilitated at the end of the project.
- Construction staging, crew camping area and new trails would be delineated to avoid expansion of the sites.
- After construction for the entire project is complete, rehabilitation efforts would follow to revegetate areas within the developed area that were denuded or damaged by the project.
- After construction, compaction and further erosion would be mitigated by
    - Aerating disturbed ground.
    - Replanting/reseeding with native vegetation, and performing non-native invasive plant control.
    - Applying soil amendments, mulches, organic matter and other measures as appropriate to facilitate revegetation.
- After construction is complete, the trails used by stock would be repaired and restored.
- Native species from genetic stock originating in the park would be used for revegetation seeding and planting efforts. Plant species density, abundance, and diversity would be rehabilitated as nearly as possible to prior conditions for non-woody species.
- Riprap, gravel, and topsoil sources, if needed, would only be obtained from NPS approved sources that are clean and free of noxious weed species.
- Temporary tent platforms for housing construction crew would be required to reduce trampling of vegetation and compaction of soils.

- Rare plant surveys would be conducted prior to occupation including staging and camping areas within the 25 acre enclave. If species are found, they would be flagged and avoided. If absolutely necessary, plants would be salvaged and re-planted in undisturbed areas.

Archaeological and Ethnographic Resources

- Tribes hold a body of knowledge that may result in the identification of ethnographic resources in the area in the future. While no ethnographic resources have been identified to date, if ethnographic resources are identified later, consultation would occur in accordance with federal legislation and regulations and NPS policy.
- Should construction expose cultural resources, work would be stopped in the area of discovery and the park would consult with the State Historic Preservation Officer and the Tribal Historic Preservation Officers in accordance with §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.
- All contractors and subcontractors would be informed of the penalties for collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties.
- All excavation would be monitored by an archeologist or para-archeologist.

Water Resources

- Temporary barriers (silt fences, coir logs) would be installed to prevent any exposed soil from eroding.
- Fuel and tools would be stored at least 100 feet from any water to prevent contamination in the event of a spill.
- An emergency fuel spill kit would be kept on-site during staging and construction.

Alternatives and Alternative Elements Suggested During Public Scoping and Considered but Dismissed

Restore chalet experience by replacing the dormitory with tent cabins and or yurts for visitors. This concept was shared with the public during scoping. It considered canvas wall tents or yurts which could be taken down each season. A public comment was received that also suggested using tipis instead of wall tents. This option would have utilized existing structures such as the historic dining hall. The remaining walls of the dormitory would be stabilized and visitor interpretation of the original structure as a ruin would be provided. Only a few comments were received in support of evaluating this alternative. While public input isn't a vote, the NPS weighed the concerns received during scoping as well as other input and determined that this alternative would substantially change the visitor experience and have greater long term adverse impacts on park resources. Twenty tent cabins (three and five person) would be required to provide overnight facilities for approximately 50 guests and staff. This would scatter the impact throughout the 25 acre enclave and result in more impacts to soils and vegetation. The staff size would have to be increased by approximately 25% to support this type of service. This type of accommodation would also likely result in less use of the toilet facility at night, due to the further distance to walk, resulting in habituation of wildlife attracted to urine and human waste and increased wildlife encounters. Due to the potential economic infeasibility, the environmental impact would be too great, and it does not resolve the purpose and need for taking action, to a large degree; this concept was dismissed.

Other alternatives and alternative elements raised during scoping included rebuilding the chalet and keeping it open all year-round; re-designing it to serve as a hostel; and a suggestion to not make any of the proposed code upgrades to a rebuilt chalet. If a new building was constructed, suggestions included allowing the remaining walls to deteriorate or removing them and re-using the stone as well as increasing the capacity of the chalet. Commenters also suggested removing all of the structures and restoring the site to natural conditions.

Suggestions were also made to construct an avalanche diversion barrier above the chalet; modernize a new building with solar and Wi-Fi; and rebuild other chalets, such as Gunsight, at their original locations, after Sperry is rebuilt.

In general, these alternatives and/or alternative elements were dismissed because they are technically or economically infeasible, do not resolve the purpose and need for taking action, are duplicative of other less environmentally damaging or expensive alternatives, or are beyond the scope of this EA.

NPS Photo

Chapter 3

AFFECTED ENVIRONMENT/ENVIRONMENTAL CONSEQUENCES

This section describes the existing conditions (affected environment) and analyzes the potential environmental consequences (impacts or effects) that would occur as a result of implementing the alternatives. Cumulative effects are analyzed for each resource topic carried forward.

Cumulative Impact Methodology

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 all alternatives. The geographic scope for the cumulative impacts analysis is primarily the McDonald Creek Valley between Lake McDonald and Sperry Chalet. The relevant past, ongoing and future actions are listed in the cumulative impact analysis.

Wildlife

Affected Environment

In the area surrounding Sperry Chalet, mountain goats are a common large mammal. Mountain goats have become habituated to visitor activity at the chalet and often wander among the guests and facilities. Mountain goats become habituated because they are attracted to salt and predator-free zones created by human presence. Goats normally occupy rocky ledges, but habituated goats demonstrate different behavior in habitat use and herding. Habituated goats tend to prefer the meadows near popular hiking trails.

Columbian ground squirrels, red-tailed chipmunks, red squirrels, deer mice, snowshoe hares and mule deer are also common in the project area. During the summer, grizzly bears are often attracted to the riparian habitat along Sprague Creek, approximately one-half mile below Sperry Chalet. The Sperry Chalet and nearby the Mt. Brown area provides a major migration corridor for a variety of migratory bird species, including raptors and golden eagles. Golden eagle nesting habitat exists in the rocky cliff habitat east of the chalet, and historic records document former nest sites. Other bird species inhabiting the project area and adjacent habitats include but are not limited to ravens, hermit thrushes, golden-crowned kinglets, pine siskins, fox sparrows, Oregon juncos, blue grouse, and possibly ptarmigan.

The greater project area, which would be impacted primarily by the helicopter flights transporting materials, includes most of the McDonald Valley. The McDonald Valley is unique because it is the widest and deepest valley of any tributary on the west side of the park, and Lake McDonald is the largest lake in the park. Although the local climate is a modified north Pacific coast type, topographical influences, including valley-ridge configurations, elevation, lake effect, aspect and exposure combine to create extreme variations in weather over short distances and consequently, this provides a variety of wildlife habitats (Kuchel 1977).

There is year-round habitat for many species of wildlife in the McDonald Valley, including moose, elk, mule and white-tailed deer, black and grizzly bear, cougar, lynx, fisher, wolverine and marten. The valley provides nesting habitat for bald eagles, golden eagles, osprey, pileated woodpeckers and barred owls. The Going-to-the-Sun Road runs through the McDonald Valley, crossing the Continental Divide at Logan Pass (elevation 6,646 feet). The alpine and subalpine habitats traversed by Going-to-the-Sun Road (GTSR) are used by grizzly bears, lynx, golden eagles, bighorn sheep, mountain goats and wolverines. At lower elevations, there is ungulate winter range at Lake McDonald and along the Middle Fork of the Flathead River. Resident wolves from the North Fork

occasionally range into the McDonald Valley, and in 2001, wolves successfully denned adjacent to Lake McDonald. This indicates an expansion of occupied wolf habitat in Glacier National Park. A major wildlife travel corridor exists between Apgar and West Glacier. Black bear, grizzly bear, elk, deer, mountain lion, lynx and American pine marten have all been observed in this area. Elk also use the Apgar area in spring for calving and foraging. Muskrat, beaver, mink, river otters, raptors and waterfowl use the highly productive aquatic and riparian habitats along Lower McDonald Creek. Upper McDonald Creek, above the inlet of Lake McDonald, has been identified as the single most important harlequin duck-breeding stream in Montana (Ashley 1998).

Many waterfowl species, including common loons and harlequin ducks use Lake McDonald as an important staging area, for forage, and harlequin ducks use it, at night, for roosting. The inlets of Lake McDonald and adjacent areas provide breeding, foraging, roosting and wintering habitat for resident and migrant bald eagles. The outlet of Lake McDonald is an important bald eagle wintering and roosting area. These inlets and the lake outlet are particularly important in years when the lake surface freezes, because they may still provide open water for eagle foraging (Crenshaw 1985, Crenshaw and McClelland 1989, Yates 1989, McClelland et al. 1994).

The vicinity of the Lake McDonald developed area is also used by wildlife, and is the locale of several bald eagle roosting and foraging areas. Harlequin ducks are frequently seen during spring along the lower portion of Snyder Creek, which flows into Lake McDonald near the lodge. A grizzly bear travel corridor runs east of the Lake McDonald developed area, across the GTSR.

Impact Analysis

Alternative A (Preferred)

Elevated levels of human activity and noise from construction and the large number of helicopter flights and pack strings, along with the disturbance of an estimated one acre of subalpine habitat would disturb and likely temporarily displace many wildlife species within the project area and adjacent habitats. Helicopter flights would likely occur in groups; on some days there would be 40-50 flights and other days, few or none. Days when there would be 40-50 flights in one day would result in substantial noise in the McDonald Creek Valley, particularly in the area between where the flight originates and enters the park up to Sperry Chalet. The routes could include over Snyder Ridge, up over Lake McDonald and then up Sprague Creek and/or up the Harrison Creek drainage from the Highway 2 area. However the high noise levels would be temporary, lasting not more than one day at a time, with days between high flight days that either have no flights or far fewer occurring. The number of pack strings on the trail would increase from an average of 20 per season to upwards of 60 for each of the two phases. As with the helicopter flights, these pack string trips would likely be staggered throughout the season, with some days having no scheduled pack strings. Horses and mules would return each day and not be kept at the project area overnight.

Migrating raptors, including golden eagles, may be temporarily displaced due to noise and perceived threats associated with helicopters. Limiting helicopter flights to early mornings would avoid or minimize disturbance of raptors that could be affected, since raptors tend to be airborne later in the day when thermal conditions are most conducive to flight. Golden eagles nesting in or adjacent to the project area may retreat from active nests during periods of elevated noise, resulting in increased vulnerability for chicks. See the Natural Sound affected environment and impact analysis for more specific information about noise impacts from helicopters.

Alternative A would result in approximately one acre of disturbance to vegetated habitats. It is anticipated that significant rock resources would remain following the removal of the required material, to allow for recolonization. Small vertebrates (such as voles) and insects inhabiting the project area, especially the rock quarry, could be less available to wildlife as a food source during project activities. The natural succession and recovery of disturbed wildlife habitat in the project area from construction activity would take many decades due to the slow germination that occurs in high alpine conditions even with revegetation efforts. The impacts to wildlife habitat are anticipated to be small because the majority of the impacted habitats are of lower quality

due to adjacent existing development and high visitor use levels compared with the surrounding area. Impacted wildlife habitats would also be rehabilitated which would aid vegetative recovery and minimize the longevity of habitat degradation.

Wildlife would likely be attracted to the project site due to food and garbage odors, and because some animals may find refuge from predators in the presence of people (as with mountain goats, for example). Strictly enforced requirements for the storage of attractants would prevent animals from becoming food conditioned. The increased human presence may cause a temporary increase in the potential for wildlife to become habituated to people, but this would not differ significantly from the existing habituation levels, given the already high visitor use of the Sperry Chalet complex. Horses and mules would be kept in the existing areas designated for stock and would not remain overnight. Any increase in the potential for habituation would return to previous levels after the project has ended.

At the conclusion of the project, noise and human disturbance in the project area and the McDonald Creek Valley would return to previous levels, and areas from which wildlife were displaced would eventually be reoccupied. There would be no long term increase in human use, type of use or season of use by park visitors within the Sperry Chalet Complex as a result of this action.

Overall the impacts to wildlife habitat are anticipated to be small and very localized because the majority of the impacted habitats are of lower quality because they are already within or adjacent to existing development and areas of high visitor use levels (compared to the adjacent area). Impacted habitats would also be rehabilitated, which would aid vegetative recovery and minimize the longevity of habitat degradation. All impacts would be at the species' individual or local level, not at the population level. Therefore impacts would not be expected to be meaningful because they would not likely result in changes to species abundance and distribution at the park or regional scale.

Alternative B

Impacts to wildlife would be very similar in both scope and intensity to those described above for Alternative A, due to generally similar increases in noise and human disturbance. Alternative B would result in a greater amount of habitat alteration, however, with an estimated two acres of vegetated habitat that could be disturbed as a result of the additional structure in a new location. As with Alternative A, impacts to wildlife habitat are anticipated to be minimal, and not meaningful over the long term, because the majority of impact habitats are of lower quality because they are already within or adjacent to existing development and areas of high visitor use (compared to the adjacent area). The longevity of habitat degradation would also be minimized through rehabilitation as in Alternative A.

Alternative C

Preservation of the remaining structure and construction of a viewing area and additional trails would increase levels of noise and human activity at the Sperry site. This and a loss of an estimated 0.25 acre of vegetated habitat would likely displace wildlife from the immediate project area. Without the large number of helicopter flights, displacement effects would be considerably less than under Alternatives A or B. Effects would be localized to the Sperry Chalet project area and immediately adjacent habitat rather than along much of the McDonald Valley. The intensity of displacement effects would also be lower because work under this alternative would likely only be underway for a single season instead of two. Displaced animals would be expected to return to available habitats shortly upon completion of the work.

Human presence at the project area, during construction, would also be less than with Alternatives A and B, since the work would likely only require a single season. This would result in a reduced potential for animals to become habituated to people. Due to the small amount of habitat degradation, the limited duration of elevated human disturbance, and the already high level of human activity at the project site, impacts of Alternative C to

wildlife resources would be negligible. Over the long-term there would be less human presence overall in the area without an overnight facility.

Cumulative: Past, present, and future actions that have affected, continue to affect, or could affect wildlife in the Sperry Chalet area and McDonald Creek Valley for all alternatives include: maintenance of the other structures in the area, including the dining hall, construction of the existing toilet facility, improvements to the water system, up to 50 administrative flights annually that include waste removal from the chalets, trail maintenance, scenic air tours, fire and search and rescue flights, and the clearing of hazard trees associated with the Sprague fire.

The cumulative effects of these activities would result in increased noise and human disturbance. When the negative impacts from noise and human disturbance from Alternatives A and B are combined with impacts from past, present and reasonably foreseeable actions, the total cumulative impact on wildlife resources would continue to be adverse and increase during construction. However, overall, once construction is completed, noise and human disturbance would not increase from historic levels at the site.

Due to the smaller area of disturbance under Alternative A, cumulative adverse impacts would be slightly less than Alternative B. The incremental impacts of Alternative C would be less than the other alternatives due to the absence of chalet operations, the shorter time period of disturbance, and the smaller area of disturbance. Therefore, while overall cumulative impacts would continue to be adverse under Alternative C due to the other past, present, and future actions, conditions would improve compared to historic levels.

In Summary, Alternative B would result in the greatest level of impact as construction activities would occur on sites that have not been previously directly disturbed, resulting in a greater amount of permanent habitat alteration and/or destruction. Alternative A would result in similar displacement effects as Alternative B, but with less acreage disturbed (one acre under Alternative A, compared to two acres under Alternative B). Alternative C would result in the smallest degree of impacts to wildlife because work would only occur over a single season and the large number of helicopter flights necessary under Alternatives A and B would not occur. Impacts to wildlife for all three alternatives would be adverse, but would not likely be significant because the effects would be temporary, ending after approximately two years, mitigation measures described above would minimize impacts, and because there would be no population level effects or changes in overall species abundance and distribution. Over the long-term, there would be no change to existing conditions for wildlife under Alternatives A and B. Under Alternative C, wildlife may begin to occupy more of the area as there would be less human presence because of the absence of an overnight facility.

ESA Listed, Proposed, and Candidate Species

Affected Environment

Grizzly Bear (*Ursus arctos*) – Federally listed under the ESA as Threatened. GNP is part of the Greater Glacier Area (GGA) portion of the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Recovery Zone. Genetic analysis of hair samples collected during 1998-2000 resulted in a population estimate of 241 grizzly bears in the GGA (Kendall et al. 2008). No population estimate has been developed exclusively for GNP. Data from the NCDE grizzly bear population trend monitoring project indicates that the ecosystem's grizzly bear population trend is increasing at 3% per year (data from 2004-2014; Costello et al. 2016).

Grizzly bear habitat is found throughout the park from the lowest valley bottoms to the summits of the highest peaks. Grizzly bears require large areas of undeveloped habitat, including a mixture of forests, moist meadows, grasslands, and riparian habitats, and a substantial amount of solitude from human interactions (USFWS 1993). They have home ranges of 130 to 1,300 square kilometers (USFWS 1993). Generally, within the NCDE, grizzly

bear seasonal movements and habitat use are tied to the availability of different food sources, including winter-killed ungulates and early greening herbaceous vegetation at lower elevations in the spring (Martinka 1972) and glacier lilies, herbaceous forage, and roots, berries, army cutworm moths, and other insects and carrion in the summer and fall. In the fall, bears broaden their search for food considerably in order to build up enough fat reserves for the winter denning period. During the winter, grizzly bears hibernate in dens away from human disturbance, typically at higher elevations on steep slopes. The denning season in the western portion of the NCDE usually begins in early October, and females may linger near dens until late May (Mace and Waller 1997).

GNP was placed into grizzly bear management "situations" in accordance with Interagency Grizzly Bear Committee (IGBC) guidelines (USFS 1986), and as directed by the Grizzly Bear Recovery Plan (USFWS 1993). Over one million acres of the park (recommended wilderness) are established as Management Situation 1, in which management decisions favor the needs of the grizzly bear when grizzly habitat and other land-use values compete, and grizzly-human conflicts are resolved in favor of grizzlies unless a bear is determined to be a nuisance (NPS 2010). Maintenance and improvement of grizzly bear habitat and grizzly-human conflict minimization will receive the highest management priority in these areas. The remainder of the park is developed front-country and established as Management Situation 3, where grizzly habitat maintenance and improvement are not the highest management considerations, grizzly bear presence is actively discouraged, and any grizzly involved in a grizzly-human conflict is controlled (NPS 2010). The proposed project area surrounding the Sperry Chalet Complex is in Management Situation 3 grizzly bear habitat, while the flights associated with the proposed project would fly over lands in Management Situation 1.

During the summer, grizzly bears are often attracted to the riparian and wetland habitat along Sprague Creek, approximately ¼ mile below Sperry chalet. In addition to foraging habitat, the habitats adjacent to the chalet may provide connectivity, or travel corridors, between foraging sites. A search of the park's grizzly bear sightings database reveals that over 204 grizzly bear observations have occurred in the area surrounding the Sperry Chalet within the last 18 years, including sightings of females with young and individual bears (NPS files). The number of reported observations is likely correlated with visitor use, and is not necessarily an indicator of relative grizzly bear presence and habitat use.

Grizzly bear/human interaction is a management concern that can threaten bears as well as employee and visitor safety. Bears that are familiar with humans have the potential to become habituated to human presence, leading to further habituation and increased potential for bear/human encounters. Habituated bears are at greater risk of becoming food conditioned and may aggressively seek human food. Bears not habituated to humans are likely displaced from foraging areas and travel routes in proximity to hiking trails and developed areas. These factors often put females with cubs in proximity to quality habitat nearer developed areas and human use areas. Bears that move away from a disturbance risk expending extra energy and may possibly enter an area occupied by another bear. Bears that stay in the area may experience stress (McLellan and Shackleton 1989). While the majority of bears avoid the human disturbance associated with the operation of the Sperry Chalet, there have been instances where individuals have become habituated to human presence and as a result become a risk to human safety.

Canada Lynx (*Lynx Canadensis*) – Federally listed under the ESA as Threatened. Preliminary Canada lynx habitat modeling for the park defined moist conifer forest above 4,000 feet elevation as most likely to support lynx. Little is known about lynx habitat use in the park and these criteria are general in nature. Habitat throughout the park meets these criteria and the park's wildlife observation database contains records of Canada lynx including sightings and tracks in the North Fork, McDonald, Saint Mary, Many Glacier, and Two Medicine Valleys. Although no lynx den sites have been documented in the park, lynx family groups have been observed via remote camera stations, and winter tracking efforts have indicated the presence of resident lynx populations. While the park does not have records of lynx observations within the Sperry Chalet Complex or surrounding areas, there are several records documenting lynx using habitats that would be part of the proposed project's helicopter flight path.

Wolverine (*Gulo gulo*) – Proposed for ESA listing as Threatened. The wolverine is a rarely seen resident of coniferous forests and alpine meadows, although wolverine sighting and track observations have been documented in GNP on both sides of the Continental Divide. Wolverines occur in low densities and have large home ranges, making detection difficult. They utilize a range of habitats including alpine areas, mature forests, eco-tonal areas, and riparian areas. The research by Copeland and Yates (2008) and Waller et al. (in prep) suggests that Glacier National Park has very high quality wolverine habitat due to extensive alpine areas, rugged topography, remoteness, and diverse ungulate populations. During a study in Glacier National Park from 2002-2007, 27 wolverines were radio-instrumented and over 30,000 locations were recorded, providing a better understanding of wolverine population status, trends, and movement patterns in the park (Copeland and Yates 2008). The study estimated the wolverine population in Glacier National Park at between 40-50 animals (Copeland and Yates 2008). Recent population monitoring in the park, (2009-2012) using non-invasive DNA sampling, resulted in a park-wide density estimate of 13 wolverine per 1,000 square kilometers and a model-averaged population estimate of 33 individuals (Waller et al., *in prep*). This is one of the highest densities for wolverine reported in the literature. The data also indicated an increasing population, a result also obtained by Squires et al. (2007).

Wolverines move to lower elevations during the winter where they search for carrion in ungulate winter ranges. Den sites are typically located under deep snow, usually on high elevation talus slopes in sparsely forested areas with boulders, rock caves, and downed woody debris (Copeland and Yates 2008).

Average home ranges for wolverines in Glacier National Park are 521 square kilometers for males and 139 square kilometers for females (Copeland and Yates 2008). The Sperry Chalet and its associated trails are located in wolverine habitats. Since 1994, there have been 12 sightings of wolverine reported in the greater Sperry Chalet area through the GNP Wildlife Observation Reporting Form.

Whitebark Pine (*Pinus albicaulis*) – Candidate for ESA listing. The whitebark pine is a slow-growing and long-lived tree present at locations often consisting of poor soils, steep slopes, and windy exposures that are predominantly associated with tree line and subalpine communities (Tomback et al. 2001). As a keystone and foundation species, whitebark pine influences ecosystem processes on a landscape level. Whitebark pine has been shown to supply a quality food source relied upon by various wildlife species, including grizzly bears (Kendall and Arno 1990); stabilize soil and snowpack (Arno and Hoff 1989); and subsidizes the establishment and perpetuation of community succession (Arno and Weaver 1990).

It is estimated that 44 percent of the species' range is located within the United States with the majority occurring in the Canadian Rockies. Roughly 87,500 acres have been identified as seral whitebark pine habitat within GNP. The majority of whitebark pine habitat occurs on the east side of the park primarily in the St. Mary, Many Glacier, and Belly River sub districts (Peterson 1999).

Numerous studies examining mortality rates conducted throughout the species' range strongly imply that whitebark pine is in decline across its range. Within the park, the species has suffered an overall 60 percent decline (Smith et. al. 2008, Keane et. al. 2012). The primary threats to the species are numerous and include disease inflicted by nonnative white pine blister rust, predation inflicted by native mountain pine beetles, habitat loss resulting from variable climatic conditions, and habitat alteration resulting from fire suppression (USFWS 2014).

The proposed project area includes habitats suitable for whitebark pine. The whitebark pine stands in this area are not found immediately adjacent to the Sperry dormitory but are spread out in the vicinity and continue up towards Lincoln Pass.

Impact Analysis

Alternative A (Preferred)

Grizzly Bear. Although the construction activities would be contained within an area of existing development and human presence, the level of noise disturbance associated with construction activities for two summer seasons would be considerably elevated in comparison to the existing conditions. Additionally, the number of helicopter flights and pack stock (described under Alternative A) required to deliver the materials needed for the project would result in a substantial increase in noise disturbance along the flight path, project area, and in adjacent habitats, limiting the availability of areas free from human disturbance for the duration of the project. See the *Natural Sound* affected environment and impact analysis for more specific information about noise impacts from helicopters. The large number of helicopter flights would be expected to result in temporary displacement of bears from the immediate vicinity of the chalet as well as from portions of the flight path. Construction activities lasting four to five months during both phases would be expected to result in individual bears or family groups avoiding the area. Displacement of bears may be temporary, and though alternate suitable habitats are available nearby, those habitats would likely be occupied by other bears, potentially resulting in conflicts between bears. At project completion, noise and human disturbance levels would return to pre-project levels and displaced bears would be anticipated to return to previously occupied habitats.

There would be no permanent loss of grizzly bear habitat as a result of Alternative A as construction would occur within the footprint of the former Sperry Chalet. Areas that would be disturbed are not functional habitats for grizzly bears as they are adjacent to existing developments and already experience high levels of human use and disturbance. Grizzly bears foraging in open habitats such as meadows, talus fields, and shrub fields could be disturbed by some helicopter flights. Helicopters could affect grizzly bears when they descend or approach at a low level, especially in areas lacking cover, such as alpine areas, but not likely to affect them when flights are 2,000 feet or higher. A portion of the construction activities would take place in the fall (after September 15). This is one of the most vulnerable times for grizzlies, when available habitats may be most limited and caloric needs for bears are greatest. Some grizzly bears foraging below the Sperry Chalet Complex would likely be displaced by construction activities that would last several months when the construction phases occur. Grizzly bear selection or use of denning sites near the project area or along the proposed helicopter flight path could be affected by disturbance in the fall. The Sperry Chalet already maintains a level of human disturbance associated with recreation activities, and operation and maintenance of the facility, so some grizzly bears using this area are likely habituated to an existing level of human activity. However, sustained levels of construction activity, increased number of mule trains, and frequent helicopter flights would contribute to increased levels of displacement or habituation of individual bears in and around the proposed project area.

The Sperry Chalet complex is a high use area for visitors on foot and on horseback, as well as employees associated with operations and maintenance. The construction activities and associated helicopter flights may result in fewer visitors coming to Sperry, although impact of lower visitation would be negligible given the overall human and construction activity associated with the proposed project. During the duration of the project any bears spotted within the project area would be hazed out of the area in accordance with existing park policy in an attempt to reduce the likelihood of habituation. Under Alternative A, short-term impacts (displacement) during construction are anticipated, while long-term impacts are anticipated to be negligible as attractants and instances of habituation would be expected to return to pre-project levels following completion.

Canada Lynx. No Canada lynx den sites or evidence of denning activity has been observed within the proposed project area or along the associated flight path, although no studies been undertaken to document den sites or use in this area. Under Alternative A, short-term trampling of vegetation within the Sperry Chalet Complex would occur where the existing habitat is not functionally useful for lynx due to existing recreation, and operation and maintenance uses. Impacts to lynx would be small and localized because they would not be long-

term and would not have any impacts to areas that could potentially serve as den sites, forage areas or sheltering.

Studies have not examined the effects of human disturbance, such as construction activities and helicopter flights, on lynx behavior, although several authors have suggested that lynx are "generally tolerant of humans" and probably not displaced by human presence (Ruediger et al. 2000). It is not easy to assess the effects of recurring human activities such as aircraft overflights on lynx activity patterns and energetics due to the difficulty of observing lynx in the wild and the limited amount of research available on this subject.

Although the proposed construction activities would be contained within an area of existing development and human presence, the increase in noise associated with the large construction activities would be notably elevated in comparison to the existing noise levels. Additionally, the number of helicopter flights and pack stock required to deliver the materials needed for the proposed project (described in Alternative A) would result in a substantial increase in noise disturbance along the flight path, project area, and in adjacent habitats, limiting the availability of areas free from human disturbance for the duration of the project and causing lynx to be displaced. Flights would occur over areas identified as suitable lynx habitat and within the known distribution of lynx in the park. Lynx foraging could be disturbed by some helicopter flights. Helicopters could affect lynx when they descend or approach at a low level, especially in areas lacking cover, such as alpine areas, but not likely to affect them at higher overflight elevations at 2,000 feet or above. Because flights would occur during the lynx denning period and the locations of lynx dens within the park are unknown, there is the potential to displace lynx from den sites due to persistent low-level flights within suitable lynx habitat. However, the effects of flights on denning lynx are expected to be minimal due to the short-term nature of the flight activity and the species preference for forested areas for den sites. Forest cover likely provides lynx and other forest interior species with visual and audio insulation from human activities such as construction and aircraft overflights. If a lynx den site is discovered prior to initiation of the administrative flights, aircraft would be advised to avoid the area during the denning period.

Construction, helicopter flights, and human activity would not be expected to influence prey species population trends or distribution. Construction activities and helicopter flights would occur during daylight hours when lynx are less active (Ruediger et al. 2000). The likelihood of these impacts increasing the risk of lynx mortality or decreasing lynx populations would be very low.

Based on available observation data, previous use of the project area by lynx appears to be low. A large portion of the surrounding habitats were burned in the Sprague Fire and the resulting impacts to prey availability and/or lynx occupation are unknown. Alternative A would not likely to adversely affect Canada lynx that hunt or travel in the proposed project area. This effect would likely be manifested by temporary avoidance of the project area and associated flight path by lynx during periods of active construction and material delivery.

Wolverine. Under Alternative A, increased levels of human disturbance, especially noise, is anticipated to contribute to increased levels of displacement of individual wolverine in the project area and flight path. Although little is known about the specific effects of human presence and repeated disturbance to wolverine behavior (USFWS 2011), at some unknown threshold the level of increased human disturbance would likely result in negative impacts to the quality and availability of wolverine habitats in those areas as well as temporal and spatial displacement of individual wolverines. Displacement of individual wolverines from areas of high noise disturbance and human presence would not likely have significant population impacts due to the large home ranges typically occupied by individual wolverines, as well as the amount of suitable habitat available in the adjacent areas.

The project is not anticipated to result in impacts to natal den sites given the timing of construction activities. No den sites or evidence of denning activity has been observed within the proposed project area. There would be no construction activities during the denning period (February-May). As a result, there would be no effects from the proposed construction activities on denning wolverine.

Therefore, while there would likely be some short-term disturbances to wolverines, the long-term impacts to wolverine would be minor. Any effect would likely result in temporary avoidance of the project area and associated helicopter flight path by wolverine during periods of active construction.

Whitebark Pine. Actions under Alternative A would occur in areas where whitebark pine may be present. As a result, the proposed construction and associated trampling and material storage could cause damage and increase the risk of mortality to whitebark pine. Surveys would be conducted prior to construction and locations of whitebark pine would be marked and avoided whenever possible. The adverse impacts to whitebark pine habitats from construction activities under the proposed actions would be negligible given the small amount of impacted habitat in relation to the habitat available within and adjacent the project area. The anticipated changes would be so small that it would not be of any measureable or perceptible consequence to whitebark pine populations or their habitats.

Alternative B

Grizzly Bear. Impacts to grizzly bears under Alternative B would be similar to those described for Alternative A. Although Alternative B would result in twice the amount of habitat alteration of Alternative A, it would not have a meaningful impact to available grizzly bear habitats. Habitat alterations would occur on approximately two acres of habitat. These habitats are unsuitable for grizzly bear use as they are adjacent to existing developments and already experience high levels of human use and disturbance June-September. Impacts to grizzly bear habitat under Alternative B would be negligible and not meaningful as habitat alteration would occur in areas that are not suitable for grizzly bear use. In addition, impacted habitats would be rehabilitated, which would minimize the longevity of the impacts.

Canada Lynx. Alternative B would generally have the same impacts to Canada lynx as described above for Alternative A. Alternative B would result in approximately two acres of vegetation trampling or permanent habitat alteration within the Sperry Chalet Complex where the existing habitat is not functionally useful for lynx due to existing levels of recreation, and operation and maintenance uses. Lynx foraging could be disturbed by some helicopter flights. Helicopters could affect lynx when they descend or approach at a low level, especially in areas lacking cover, such as alpine areas, but not likely to affect them at higher overflight elevations at 2,000 or above. These impacts would be negligible as they would not have any impacts to areas that could potentially serve as den sites in the foreseeable future.

Wolverine. Impacts to wolverine from increased noise disturbance and human presence would be similar to those described for Alternative A. While there would likely be some short-term disturbances to wolverines, the long-term impacts to wolverine would be minor. Any effect would likely result in temporary avoidance of the project area and associated helicopter flight path by wolverine during periods of active construction.

Whitebark Pine. The restoration of the Sperry Chalet under Alternative B would increase the potential risk of damage or mortality to whitebark pine because more acreage (an estimated two acres) would be affected through trampling and other disturbance. As with Alternative A, surveys would be conducted prior to construction and locations of the species would be marked and avoided whenever possible. The adverse impacts to whitebark pine habitats would be minor given the small amount of impacted habitat in relation to the habitat available within and adjacent to the project area.

Alternative C

Grizzly Bear. The construction of a viewing area, trails, and actions taken to preserve the remaining walls and masonry features would result in a short-term increase in noise and human activity in the project area, which could displace grizzly bears. However, without the large number of helicopter flights, the scale and intensity of impacts would be much reduced during construction related activity, compared with Alternatives A and B. Noise

disturbance would be temporary, lasting only for a single season, and bears would be expected to return to available habitats following project completion. Alternative C would result in less increase in the potential for habituation because the work would only be underway for a single season.

The estimated ¼ acre of habitat that would be disturbed is unsuitable for grizzly bear use because it is adjacent to existing developments with high levels of human activity. Impacts are therefore anticipated to be negligible, as habitat alteration would occur in areas that are not suitable for grizzly bear use.

Canada Lynx. Under Alternative C, the impacts to lynx from increased noise disturbance and human presence would be less than both Alternative A and B, since a large number of helicopter flights would not be necessary and work would only be underway for a single season Under Alternative C the alteration of ¼ acre of vegetated habitat associated with construction and human activity would not be expected to influence prey species population trends or distribution.

The estimated ¼ acre of habitat that would be disturbed under this alternative is not functionally useful for lynx due to levels of recreation, and operation and maintenance uses. Impacts would therefore be negligible and no impacts would occur to areas that could potentially serve as den sites in the foreseeable future.

Wolverine. Impacts to wolverine from any increased noise and human activity from the preservation of the dormitory walls and masonry and the construction of trails and a viewing area could contribute to increased levels of displacement of individual wolverine in the project area. But the scale and intensity of any displacement would be much reduced compared to Alternatives A and B since a large number of helicopter flights would not be needed, the work would only be under way for a single season, and long- term, there would be less occupation of the area by humans.

The proposed project is not anticipated to result in impacts to natal den sites given the timing of construction activities. No den sites or evidence of denning activity has been observed within the proposed project area. There would be no construction activities during the denning period (February-May). As a result, there would be no effects from the proposed construction activities on denning wolverine.

Whitebark Pine. With only an estimated ¼ acre of disturbance from project activities, Alternative C would have a much reduced risk of damage or mortality to whitebark pine. As with the other alternatives, surveys would be conducted prior to construction and whitebark pine locations would be marked and avoided whenever possible. The adverse impacts to whitebark pine habitats from construction activities under the proposed actions would be negligible given the small amount of impacted habitat in relation to the habitat available within and adjacent to the project area.

Cumulative: Past, present, and future actions that have affected, continue to affect, or could affect grizzly bears, Canada lynx, wolverine, and whitebark pine in the Sperry Chalet area and McDonald Creek Valley for all alternatives include: maintenance of other structures in the area including the dining hall, construction of the existing toilet facility, improvements to the water system, up to 50 administrative flights annually that include waste removal from the chalets, trail maintenance, scenic air tours, fire and search and rescue flights, and the clearing of hazard trees associated with the Sprague fire.

The cumulative effects of these activities would result in increased noise and human disturbance. When the negative impacts from noise and human disturbance from Alternatives A and B are combined with past, present and reasonably foreseeable actions, the total cumulative impact on federally listed, proposed and candidate species would continue to be adverse and increase during construction. However, overall, once construction is completed, noise and human disturbance would not increase from historic levels at the site.

Due to the smaller area of disturbance under Alternative A, cumulative adverse impacts would be slightly less than Alternative B. The incremental impacts of Alternative C would be less than the other alternatives due to the absence of chalet operations, the shorter time period of disturbance, and the smaller area of disturbance.

Therefore, while overall cumulative impacts would continue to be adverse under Alternative C due to the other past, present, and future actions, conditions would improve compared to historic levels.

In Summary, Alternative C, followed by Alternative A, would result in the least amount of impacts to grizzly bears, Canada lynx, wolverine, and whitebark pine because any development and or construction is occurring on an already developed building footprint and within already disturbed areas. Alternative B would result in the greatest level of impact as construction activities would occur on sites that have not been previously disturbed and result in an estimated two acres of disturbance, compared to approximately one acre under Alternative A. Both Alternatives A and B would require many more helicopter flights that Alternative C, and as a result would have increased impacts from the associated noise disturbance and result in temporarily displacing species. See the *Natural Sound* affected environment and impact analysis for more specific information about noise impacts from helicopters. Impacts to these species for all three alternatives would be adverse, but would not likely be significant because the effects would be temporary, ending after project completion. Mitigation measures described above would minimize impacts, and there would be no population level effects or changes in overall species abundance and distribution.

State Listed Species of Concern

Affected Environment

Gray-Crowned Rosy Finch (*Leucosticte tephrocotis*). Gray-crowned rosy-finches are known to nest within GNP, with observations recorded as recently as 2017. Gray-crowned rosy-finches typically nest in cliffs and talus above tree line and near glaciers and snowfields. Foraging occurs in the rocky or grassy areas adjacent to nest sites where they feed on seeds and insects. The habitats available in the project area are highly suitable for gray-crowned rosy finches and are known to support populations of the birds.

Clark's Nutcracker. Clark's Nutcrackers are known to nest within GNP, with observations recorded as recently as 2017. Clark's Nutcracker use habitats dominated by whitebark pine at higher elevations and ponderosa pine and limber pine along with Douglas-fir at lower elevations (Saunders 1921, Mewaldt 1956, Giuntoli and Mewaldt 1978). Clark's nutcrackers typically build their nests in Douglas-fir or ponderosa pine trees. They forage primarily on the seeds of conifers, and have a mutualistic relationship with whitebark pine where they act as the primary dispersal agents for seeds by cashing seeds the birds collect as forage. The most pressing threat to populations of Clark's Nutcrackers is the loss of whitebark, limber, and/or ponderosa pine. The habitats available in the project area, including stands of whitebark pine, are highly suitable for Clark's Nutcrackers and are known to support populations of the birds.

White-Tailed Ptarmigan. White-tailed ptarmigan are known to nest within GNP, with observations recorded as recently as 2017. White-tailed ptarmigan use alpine habitats often above tree line. In GNP, white-tailed ptarmigans are often associated with net-veined willow (*Salix nivalis*), heath (*Phyllodoce* sp. And *Cassiope* sp.), and mosses (MNHP 2018). Nests are often built in sparsely vegetated or grassy slopes in alpine terrain (MTNHP 2018). Forage consists of a variety of parts and species of alpine vegetation. The habitats available adjacent to the project area are highly suitable for white-tailed ptarmigan and are known to support populations of the birds.

Alpine Glacier Poppy (*Papaver pygmaeum*). Alpine glacier poppy is found in sparsely vegetated, stony soil of exposed slopes and ridge tops in the alpine zone. Centered along the Continental Divide, its range includes the northwestern corner of Montana and adjacent areas of Alberta and British Columbia (approx. 30 kilometers north and 75 kilometers south of the International Border) (MNHP 2018). Over 16 populations of alpine glacier poppy have been identified in GNP and it is endemic to Waterton Lakes and Glacier National Park region. Although the park does not have any record of this species in the project area, it could be present and be at risk for trampling. Project areas where the species could occur would be surveyed, and any identified locations would be marked and avoided.

Pale Corydalis (*Corydalis sempervirens*). This species grows on rocky, steep slopes in the montane zone, occurring in disturbed habitats or eroding soil in open forest, often appearing after fire (Lesica 2012). The plant is known to occur in northwest Montana from approximately a dozen recently documented (past 25 years) occurrences; another five historical occurrences are also documented. Pale corydalis generally occurs at elevations between 3,200 and 5,000 feet. Although the proposed project area is outside of this elevation range the post fire habitat and avalanche chutes provide ideal habitat for new populations. As a result, this species could be present in the project area and be at risk for trampling. Project areas where the species could occur would be surveyed, and any identified locations would be marked and avoided.

Northern Beechfern (*Phegopteris connectilis*). Northern beechfern is typically found in mesic, western red cedar forests and shaded cliffs in the valley to subalpine zones. The species is rare in Montana, where it is known from the extreme northwest corner of the state to Glacier National Park. Two populations of northern beechfern have been identified in GNP one of which is located in the sub-alpine basin of Sperry Glacier. This species may be present in the project area and be at risk for trampling. Project areas where the species could occur would be surveyed, and any identified locations would be marked and avoided.

Impact Analysis

Alternative A (Preferred)

Noise disturbance associated with the large number of helicopter flights necessary for material transportation, construction activities, and human presence would temporarily disturb individuals within the project area and adjacent habitats. Construction activities and the associated disturbance would occur during the nesting period for all three bird species. Nesting birds may be displaced from the project area due to project associated noise disturbance. There would continue to be ample natural nesting and foraging habitats in adjacent areas to support displaced individuals, although those areas may already be occupied by other members of the same species, thereby increasing intra-species competition for scarce resources and habitats. Noise from construction activities and human presence would have no impact to vegetative species of concern. Under Alternative A, short-term impacts to nesting, roosting and foraging activities of bird species may occur that would adversely impact their use and behavior. Noise and human disturbance levels would return to pre-project levels and temporarily displaced wildlife are anticipated to return to previously occupied habitats following completion.

Habitat alterations associated with construction and material storage would result in temporary displacement of state listed species of concern in approximately less than one acre. These habitats are in areas that already experience high visitor use and have been or are adjacent to areas previously developed as part of the chalet complex. Mitigation measures such as the designation of areas where human activity and material storage would be allowed, would minimize the impacts to available habitats. Surveys for seeps, springs, as well as alpine glacier poppy, pale corydalis, northern beechfern, whitebark pine and other species of concern would be conducted prior to the start of construction activities in order to minimize the damage to the habitats they provide. Areas where species are found to be present would be marked and avoided to the greatest extent possible. The degree to which this area could be rehabilitated following construction would determine the extent and duration of potential impacts. There would continue to be ample natural nesting, foraging habitats, and comparable habitat types in adjacent areas to support displaced individuals and vegetation populations. The impacts to state listed species of concern habitats under Alternative A are not anticipated to be meaningful as the majority of the impacted habitats are of lower quality due to adjacent existing development and visitor use levels. In addition, vegetative species of concern would be avoided where possible and impacted habitats would be rehabilitated where feasible, minimizing the long-term effect of habitat degradation.

Alternative B

Impacts to state listed species of concern from increased noise disturbance and human presence under Alternative B would be similar to those described above in Alternative A in both scope and severity. Noise from construction activities and human presence would have no impact to vegetative species of concern. The long-term impacts of increased noise disturbance from Alternative B are anticipated to be minimal as noise and human disturbance levels would return to pre-project levels and displaced wildlife are anticipated to return to previously occupied habitats following completion.

Alternative B would result in the largest amount of habitat alteration of the three alternatives. Habitat alterations would occur on approximately two acres of habitat, half of which would be permanent. Habitat loss and/or alteration would be associated with the construction of a building at a new location, construction of a trail and viewing platform, trampling associated with construction activities and material storage, and the use of the adjacent rock quarry as a material source. The impacts associated with habitat alteration would be similar to those described above in Alternative A, but would occur over a larger area. Impacts to vegetation and the habitat it supports under Alternative B are not expected to be meaningful, as the majority of the impacted habitats are adjacent to existing development and as such provide lower quality habitats. In addition, vegetative species of concern would be avoided where possible and half of the impacted habitats would be rehabilitated where feasible minimizing the long-term effect of habitat degradation.

Alternative C

Alternative C would result in the least amount of noise disturbance associated with construction activities with the construction of a viewing area, trails, and actions taken to preserve the remaining walls and masonry features. Displacement of state listed species of concern would be expected as described above although for the shortest duration and with the least amount of impact in relation to the other alternatives. Noise disturbance would be temporary and displaced individuals would be expected to return to available habitats following completion. Noise from construction activities and human presence would have no impact to vegetative species of concern. The amount of human presence would be the least of all the alternatives and as such Alternative C would result in the smallest amount of human disturbance. Impacts of human disturbance are similar to those described above. Permanent habitat alterations would occur on approximately ¼ acre associated with the construction of the viewing area and trails, the smallest amount of the three alternatives. These alterations would have negative impacts to state listed species of concern by reducing the amount of available habitat in an area that already has reduced habitat quality due to the level of visitation that the Sperry Complex receives. Impacts of habitat alteration to state listed species of concern are similar to those described above. Due to the small amount of habitat degradation, efforts made to avoid vegetative species of concern, the limited duration of elevated human disturbance, and the existing level of human impacts at the project site the impacts of Alternative C to state listed species of concern would be minimal.

Cumulative: Past, present, and future actions that have affected, continue to affect, or could affect state listed species of concern in the Sperry Chalet area and McDonald Creek Valley for all alternatives include maintenance of other structures including the dining hall, construction of the existing toilet facility, improvements to the water system, up to 50 administrative flights annually that include waste removal from the chalets, trail maintenance, scenic air tours, fire and search and rescue flights, and the clearing of hazard trees associated with the Sprague Fire.

The cumulative effects of these activities would result in increased noise and human disturbance. When the negative impacts from Alternatives A and B are combined with past, present and reasonably foreseeable actions, the total cumulative impact on state listed species of concern would continue to be adverse and increase during

construction. Once the project is completed, cumulative impacts would not increase noticeably from what is already occurring at the site. Due to the smaller area of disturbance under Alternative A, cumulative adverse impacts would be slightly less than Alternative B. The incremental impacts of Alternative C would be less than the other alternatives due to the absence of chalet operations, the shorter time period of disturbance, and the smaller area of disturbance. Therefore, while overall cumulative impacts would continue to be adverse under Alternative C due to the other past, present, and future actions, conditions would improve compared to historic levels.

In Summary, Alternative C, followed by Alternative A, would result in the least amount of impacts to state listed species of concern because construction would occur in an already disturbed area and to an existing structure. Alternative B would result in the greatest level of impact as construction activities would involve constructing a new building on a site that has not been previously disturbed resulting in an increased level of permanent habitat alteration and/or destruction. Both Alternatives A and B would require many more helicopter flights than Alternative C, and as a result would have increased impacts from the associated noise disturbance. See the Natural Sound affected environment and impact analysis for more specific information about noise impacts from helicopters. Impacts to state listed species of concern for all three alternatives would be adverse but would not likely be significant because there would be no long-term meaningful change to these resources within the project and adjacent areas.

Recommended Wilderness

Affected Environment

In 1973, Glacier National Park completed a wilderness study and environmental impact statement to comply with the 1964 Wilderness Act. The Wilderness Study/EIS identified 25 acre enclaves around Granite Park and Sperry Chalets to be excluded from lands recommended for wilderness designation NPS, 1974).

Pursuant to NPS Management Policies, NPS manages proposed and recommended wilderness as designated wilderness. Park visitors are encouraged to practice the principles of “Leave No Trace” outdoor ethics in order to minimize impacts to park resources and visitor experiences. The use of motor vehicles, motorized equipment or mechanical transport and the presence of structures or installations are prohibited “except as necessary to meet minimum requirements for the administration of the area” for the purpose of the Wilderness Act [Section 4(c)]. Administrative activity is generally limited to trail and campsite maintenance, preservation of historic structures, non-native species control, wildlife management, fire suppression, emergency response and research.

Existing conditions in Glacier’s recommended wilderness experience that impact wilderness character and degrade the opportunity for solitude and natural quiet include sights and sounds associated with scenic air tours throughout the park, motor vehicle traffic on the GTSR, and train traffic on the Burlington Northern-Santa Fe railroad line along the park’s southern boundary. Fortunately, motor vehicle noise from the Going-to-the-Sun Road has historically not been heard along the Gunsight Pass Trail and in the Sperry Chalet area, largely due to the thick forested environment. The loss of forest cover resulting from the Sprague Fire may have changed this condition, however that won’t be known until these trails are used this coming summer. These sights and sounds affect opportunities for solitude and natural condition in a small part of Glacier National Park’s recommended wilderness. Despite these temporary and transient intrusions, the enduring natural state and primitive character of Glacier’s recommended wilderness supports the park’s biodiversity; maintains air, water, and soil quality; and influences local and widespread fire regimes.

This historic property is integral to the “other features of value” quality of wilderness character because it has a long history of providing lodging and food to park visitors seeking a wilderness experience; the chalet is visually and historically integral to the adjacent recommended wilderness lands as visitors gain access to the site via designated trails that pass through recommended wilderness and often utilize the chalet as a basecamp for day trips that explore adjacent areas and/or as a layover location that supports longer trips deeper into Glacier’s

recommended wilderness. The chalet is visible from recommended wilderness as one approaches the chalet and scenic vistas of Glacier's recommended wilderness are visible from the chalet.

Impact Analysis

The NPS uses the interagency wilderness character framework, *Keeping it Wild 2* (Landres et al. 2015), to help assess the impacts on wilderness character. The analysis considers the five qualities that contribute to wilderness character, derived from the Wilderness Act: *untrammeled, natural, undeveloped, opportunities for solitude or primitive and unconfined type of recreation,* and *other features of scientific, educational, scenic, or historical value.* The area of impact is the McDonald Creek Valley surrounding the Sperry Chalet enclave.

The alternatives analyzed do not impact the *untrammeled* quality of wilderness character as the action does not result in an intentional manipulation of the biophysical environment or community of life. Similarly, the alternatives do not impact the *undeveloped* quality of wilderness character as they do not consider placing an installation or structure within wilderness. Nor do they consider the landing of aircraft (i.e. helicopters), or use of motor vehicles, motorized equipment, or mechanical transport in wilderness. However, use of motorized construction tools and equipment and helicopter landings at the project site as well as helicopter overflights transporting materials, supplies, and personnel to and from the project site, constitute sights and sounds of human activity that would impact the *solitude* quality of wilderness character within the surrounding wilderness. See the *Natural Sound* affected environment and impact analysis for more specific information about noise impacts from helicopters.

The alternatives considered would result in noise and visual impacts which would detract from the scenic value of wilderness which is part of the *other features of value* quality of wilderness character.

NPS *Management Policies 2006*, Section 6. 3. 5, describe the minimum requirement concept as "a documented process used to determine if administrative actions, projects or programs undertaken by the Service or its agents and affecting wilderness character, resources, or the visitor experience are necessary, (Step 1) and if so how to minimize impacts" (Step 2). A minimum requirement analysis was prepared to determine if this project, within an enclave but surrounded by recommended wilderness, was necessary for the administration of wilderness and to ensure that the minimum, least intrusive methods/tools would be used during implementation.

Alternative A (Proposed Action)

While all actions would occur within the Sperry Chalet enclave, these actions would impact wilderness character on lands recommended for wilderness designation, which surround the enclave. Alternative A would have no effect on *untrammeled* and *natural* wilderness character qualities because the Sperry Chalet is an iconic national historic landmark and historic district, located in a 25-acre enclave, surrounded by lands recommended for wilderness designation.

This historic property is deemed integral to the *other features of value* quality of wilderness character for the following reasons:

1) The Sperry Chalet has a long history and tradition of providing lodging and food to park visitors seeking a wilderness experience.
2) The chalet is visually and historically integral to the adjacent recommended wilderness lands as visitors gain access to the site via designated trails that pass through recommended wilderness and often utilize the chalet as a basecamp for day trips that explore adjacent recommended wilderness areas and/or as a layover location that supports longer trips deeper into Glacier's recommended wilderness.
3) The Sperry Chalet Historic District is visible from recommended wilderness as one approaches the chalet and scenic vistas of Glacier's recommended wilderness are visible from the chalet.

Use of pack and saddle stock represents a traditional wilderness skill that does not involve the use of motorized equipment or mechanical transport, and therefore keeps the recommended wilderness from becoming more developed. It would have positive effects on *other features of value* because restoration of Sperry Chalet would preserve a historic structure and visitor experience that is integral to the surrounding recommended wilderness. There would be no effect to the *untrammeled* wilderness quality because no manipulation of biophysical environmental or community of life would occur in recommended wilderness.

Under Alternative A the motorized equipment used and landing of aircraft (i.e. helicopters) for the project would not be considered a prohibited use under Section 4(c) of the Wilderness Act because it would be used within the Sperry Chalet enclave, which is outside the recommended wilderness boundary. However, noise from the equipment and construction activity would travel beyond the enclave and be audible within recommended wilderness, which would affect the opportunity for *solitude* within wilderness. Additionally, helicopters transporting materials and personnel to the enclave (i.e. project site) would fly over recommended wilderness. Effects from helicopters overflights would be adverse to the *solitude* quality of wilderness character and adversely impact the opportunity for visitors to hear the natural sounds on trails and in the nearby campgrounds in recommended wilderness.

Construction noise would have a negative effect on *solitude* because the sights and sounds of construction activity associated with the project would adversely affect this quality. The construction operation would likely be seen and heard from the surrounding wilderness, including on the trails surrounding the area, in the nearby backcountry campground and from the peaks and passes nearby. However these impacts would be short term (during construction) and somewhat transient as flights would not occur every day and work on the chalet would occur between 7:00 am to 7:00 pm allowing for some quiet time. The impacts to the *solitude* quality of wilderness character may be reduced in Phase II as the work moves into the interior of the chalet.

Alternative B

Impacts would be the same as described under Alternative A.

Alternative C

Activities to construct a viewing area and protect the walls and other masonry features using motorized equipment and hand tools would be heard temporarily in the surrounding recommended wilderness for one season, impacting the *solitude* quality of wilderness character, for the reasons described under Alternative A. The loss of the overnight and dining experience at the chalet would have an adverse effect on the *other features of value* quality of wilderness character because of the loss of this experience, which has historically provided visitors access to the surrounding recommended wilderness experiences.

Cumulative: : Past, present, and future actions that have affected, continue to affect, or could affect wilderness character qualities in the Sperry Chalet area and McDonald Creek Valley for all alternatives include: up to 50 administrative flights annually that include waste removal from the chalets, trail maintenance activities, scenic air tours, fire and search and rescue flights.

When the negative impacts from all alternatives are combined with past, present and reasonably foreseeable actions, the total cumulative impact on wilderness character qualities would continue to be both beneficial and adverse. While the level of cumulative impact would increase from flights and construction activity, this would be temporary and transitory and would not be a permanent impact on wilderness character. Because the direct and indirect impacts of Alternatives A and B are the same, the cumulative impacts are also the same. The

incremental impacts of Alternative C would be less than the other alternatives due to the absence of chalet operations, the shorter time period of disturbance, and the smaller area of disturbance. Therefore, while overall cumulative impacts would continue to be adverse under Alternative C due to the other past, present, and future actions, conditions would improve compared to historic levels.

In summary, impacts on recommended wilderness would be adverse on the *solitude* quality of wilderness character for all three alternatives. Alternatives A and B would result in a positive impact on the *other features of value* quality of wilderness character because of the significance of Sperry Chalet as a NHL, national historic district, and restoration of the historic property. The visitor experiences that it supports would be integral to the public purposes of the surrounding recommended wilderness. All three alternatives would result in negative impacts on recommended wilderness but would not likely be significant because the effects would be temporary for one-two seasons and transitory during those times. Restoration of the Sperry Chalet Dormitory would be consistent with the public purposes of wilderness in the national parks which include recreational and historical use.

Vegetation/Soils

Affected Environment

The Sperry Chalet complex is near the tree line at an elevation of 6,640 feet. The chalet buildings are perched near the edge of a rocky ledge that drops approximately 220 feet to an alpine meadow and meandering stream system immediately below. A well-defined bench, perched among steeply sloping rock and vegetated faces, contains the developed area (about 10 acres). Sperry Chalet occupies a disturbed area of approximately one acre within a 25 acre enclave surrounded by recommended wilderness which is undeveloped except for backcountry trails. To the north and east of the chalet, a well-developed stand of subalpine fir and Engelmann spruce extends up a steep-sloping hillside from the lower stream bottom to the chalet bench. Approximately 140 yards across the bench, behind and to the east of the chalet's, steep, rocky, mountainous terrain protrudes immediately upward toward the ridge crest leading to the 7,500-foot Lincoln Peak.

The area around Sperry Chalet has a variety of subalpine vegetation community types including whitebark pine, subalpine fir/Engelmann spruce/hellebore forest, hellebore/groundsel/sedge meadow, rush/penstemon rock outcropping, dry subalpine fir/ mock hazel forest, rocky ledge subalpine fir krummholz/beargrass/penstemon associations. A stone quarry, located within the historic district (see Figure 3), may be used for restoration of the dormitory's stone walls, if needed. The stone is argillite, local to the area. Soils within the area range from bedrock outcrop to shallow pockets (1 to 3 feet deep). These soils are wet along stream courses and in depressions. Snowmelt from the immediate site and drainage from areas upslope result in large volumes of water passing through these soils on a seasonal basis (Macconnell 1982 and Dutton 1993).

Impact Analysis

Alternative A (Preferred)

Approximately one acre of vegetation and soils would be temporarily disturbed within the chalet developed area from construction, staging and general occupation of the site. Disturbance would be confined as much as possible because at this elevation, vegetation growth is very slow and successful revegetation is challenging. Impacts would include soil compaction, trampling, root exposure, and erosion. The use of the quarry would not result in impacts to soils or vegetation communities.

Alternative B

Approximately two acres of vegetation and soils would be disturbed from construction of a new foundation and building, staging and general occupation of the site. Of this new disturbance about ½ acre would be restored, and revegetated. Disturbance would be confined as much as possible because at this elevation vegetation growth is very slow and successful revegetation is challenging. Approximately ½ acre would be permanently disturbed for the new building and trails associated with it and for a viewing area and trails around the original structure. Removal of less than ½ acre of trees could occur for the new structure, depending on its location.

Alternative C

Construction of a viewing area, trails and actions taken to preserve the remaining walls and masonry features of the historic chalet dormitory would affect 1/4 acre of vegetation and soils.

Cumulative: Past and present actions that have affected and continue to affect vegetation include maintenance of other structures, including the dining hall, construction of the existing toilet facility in an undisturbed area, improvements to the water system, trail maintenance, and the clearing of hazard trees associated with the Sprague fire. Reasonably foreseeable future actions that would result in impacts to vegetation and soils include trail maintenance and continued operation and maintenance of the chalet complex. These actions would result in soil compaction and trampling, disturbance and/or removal of individual plants. When the negative impacts of vegetation and soil disturbance under the alternatives are combined with those from past, present and reasonably foreseeable actions, the total cumulative impact on vegetation and soils would continue to be adverse. Due to the smaller area of disturbance under Alternative A, cumulative adverse impacts would be less than Alternative B. The incremental impacts of Alternative C would be much less than the other alternatives due to the absence of chalet operations, and the smaller area of disturbance. Therefore, while overall cumulative impacts would continue to be adverse under Alternative C due to the other past, present, and future actions, conditions would improve compared to existing conditions.

In summary, Alternative A and Alternative C would result in fewer impacts to vegetation and soils than Alternative B because the actions would occur on an already disturbed site at the dormitory's original location. No trees would be removed and impacted areas from construction staging would be revegetated. The use of tent platforms would reduce the impacts to vegetation in the contractor camping area, avoid plant removal and compacting soils. Impacts to vegetation and soils for all three alternatives would be adverse but would not likely be significant because there would not be a change in species abundance, distribution and no population level effects. Therefore, there would be no long term meaningful change to these resources within the project area at this site.

Natural Soundscapes

Affected Environment

An important part of the NPS mission is to preserve the natural soundscapes of national parks. Natural soundscapes are the sounds of nature, a diminishing resource in an ever modernizing world. Natural sounds have intrinsic value as part of the unique environment of Glacier National Park, and they predominate throughout most of the park. Glacier's natural soundscape includes the pervading quiet and stillness, low decibel background sounds, birdsong and animal calls, the buzz of insects, and the sound of wind, rain, and water, among others. Natural soundscapes vary across the park, depending on elevation, proximity to water, vegetative cover, topography, time of year, and other influences.

Sperry Chalet is located in the park's day use zone but is surrounded by recommended wilderness and a backcountry management zone within an alpine/subalpine acoustic zone. The natural ambient sound level

between the McDonald Creek Valley and Sperry Chalet ranges from 23-34 dBA (FAA 2016). According to the park's General Management Plan (NPS 1999), day use and backcountry zones, where natural sounds predominate, are managed for natural quiet. However, soundscapes in day use zones are managed for a range of conditions that include some artificial noise as well as natural quiet, depending on their location in the park.

While the soundscape at Sperry Chalet is mostly dominated by natural quiet, artificial noise does originate from human activities in the area and varies depending on location, time of day, and time of year. Sources of artificial noise include aircraft; human activity around the chalet area and at the campground, along trails in the area; and park administrative activities that require power tools, and helicopters.

Road traffic on the GTSR is a primary contributor to artificial noise in the upper McDonald Creek Valley, especially during the summer when visitation is highest. Natural sounds along the GTSR corridor are punctuated with noises generated by human activity and traffic on the road, at picnic areas and campgrounds, between Apgar and the Lake McDonald Lodge, and on the shorelines of Lake McDonald and upper McDonald Creek. In the backcountry of the upper McDonald Creek Valley and the adjacent Snyder and Sprague Creek drainages, within recommended wilderness, the natural soundscape is characterized almost exclusively by natural sounds and is interrupted only now and then by hiking parties, stock and horseback trips or aircraft.

Impact Analysis

The area of analysis is defined as the location of the noise source and the surrounding area, to the distance at which the noise level falls below the measured ambient sound level within the valley. This area includes the site of the helicopter operation, representing the highest noise-producing activity, and includes the distance required for the helicopter noise to attenuate to the measured natural ambient sound level of 23-34 dBA (FAA 2016). Beyond this distance, there is an increased likelihood that the noise source would no longer adversely affect the natural sounds of the valley.

Alternative A (Preferred)

Under Alternative A, the ability to hear natural sound in the McDonald Creek Valley and at the Sperry Chalet site would be adversely affected by the construction activity and transportation by helicopter of equipment and materials. Generally helicopter noise goes up with the weight and size of the machine. For example, according to Figure 6 and Table 1 below, the Sikorsky S-64 Skycrane generates 59.3 dBA at 4000 feet and the Bell 206L-4 generates 59.5 dBA at 2000 feet. Therefore the Skycrane produces impacts (at or above 59 dBA) across a 4x larger area than the Bell 206L-4. Noise from a Bell 206L-4 is estimated to attenuate to 34 dBA at 13,250 feet (2.5 miles); noise from a Skycrane is estimated to attenuate to 34 dBA at a distance of 25,000 feet (4.5 miles). Construction equipment such as generators would be expected to attenuate to ambient sound levels at much smaller distances (see Appendix 4).

In the medium to heavy lift category, the Bell 212 (a Huey type helicopter) and the Sikorsky S-64 Skycrane create about the same noise level. However, the Skycrane is able to carry substantially more weight, thus reducing the number of required flights. 150-200 flights between July 1 and the end of October would likely occur in groups. Some days there could be 40-50, other days less flights or none. There would be periods of relative quiet between the days of heavy flying. Days when there would be 40-50 flights in one day would result in substantial noise in the McDonald Creek Valley, in recommended wilderness, and in developed areas, particularly in the area between where the flight originates and enters the park, up to Sperry Chalet. The flight routes could occur over Snyder Ridge, over Lake McDonald, up Sprague Creek and/or up the Harrison Creek drainage from the Highway 2 area. All these routes require flying over recommended wilderness. However the high noise levels would be temporary, lasting not more than one day at a time with days between high flight days that either have no flights or far fewer occurring. Additionally the increased number of helicopter flights for this project

would be temporary and likely not last more than two seasons. The impacts to natural sounds in this area of the park would be adverse but transitory and temporary.

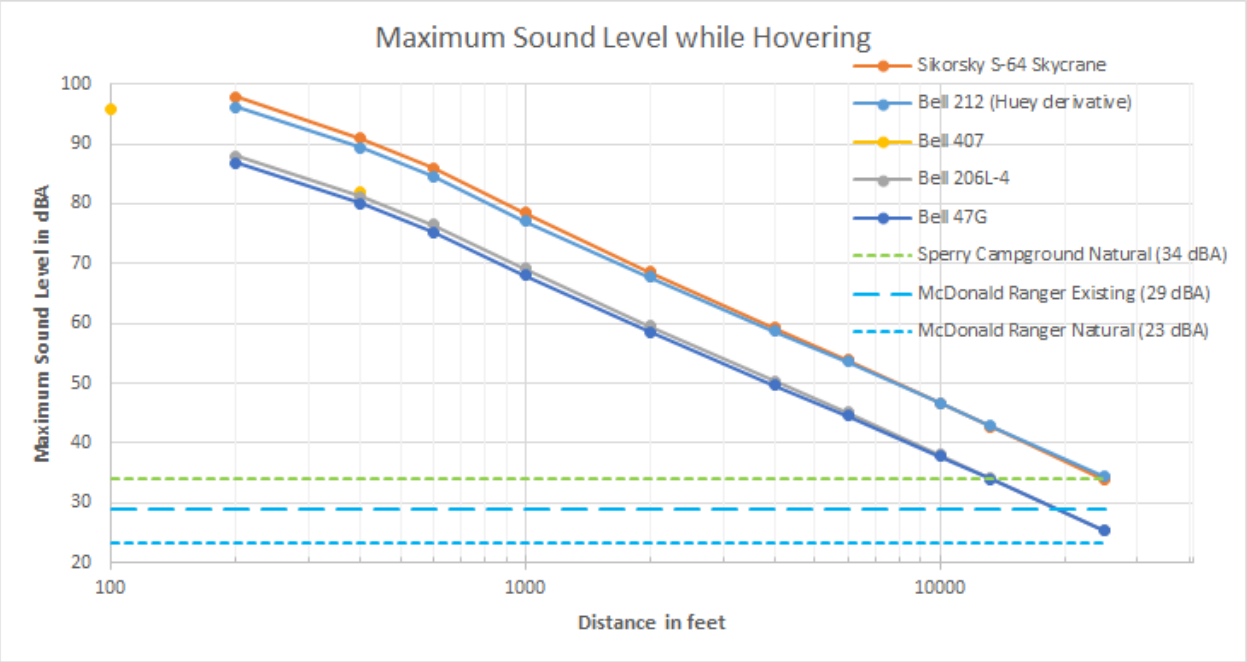

Figure 7 Helicopter Sound Levels While Hovering

Alternative B

Impacts to natural sounds are roughly the same as described under Alternative A.

Alternative C

Under Alternative C, noise levels from helicopter use would be the same as Phase I for Alternative A.

Cumulative: There are no past actions that continue to affect this resource. Current and future actions in the Sperry Chalet area and McDonald Creek Valley for all alternatives include trail maintenance activities, scenic air tours, fire and search and rescue flights, and up to 50 administrative flights annually that include waste removal.

When the negative impacts described above are combined with negative impacts from the incremental impacts of Alternatives A and B, the total cumulative impact would continue to be adverse. The incremental impacts of Alternative C would be much less than the other alternatives due to the absence of chalet operations, the shorter time period of disturbance, and the fewer number of flights. Therefore, while overall cumulative impacts would continue to be adverse under Alternative C due to the other past, present, and future actions, those impacts would be much less than under Alternatives A and B.

In Summary, natural ambient sound in the park in the vicinity of the McDonald Creek Valley and Sperry Chalet, would be substantially adversely affected for both Alternative A and B during the days there are 40-50 flights. These flights would be temporary and transitory with days with no flights or far fewer flights in between these high flight days. On those other days, there would be little to no noise from helicopter traffic except for administrative flights or from other unanticipated events such as wildfires and rescues.

Helicopter	Class	Approx. Passenger Capacity	Empty Weight (lbs)	Max Takeoff Weight (lbs)	Main Rotor Blades	Maximum Sound Level, Lmax at Low Angle Hover (dBA, at distance in feet)									Extrapolated	
						100	200	400	600	1000	2000	4000	6000	10000	13250	25000
Bell 47G	Light	3 seats	1,893	2,950	2		86.8	80.0	75.3	68.0	58.5	49.7	44.6	37.7	33.9	25.3
Bell 206L-4	Intermediate	5 seats	2,331	4,550	2		88.0	81.2	76.5	69.1	59.5	50.4	45.1	38.0	34.1	25.3
Bell 407	Intermediate	7 seats	2,668	6,000	4	95.9		82.0								
Bell 212 (Huey derivative)	Medium	15 seats	6,529	11,200	2		96.1	89.3	84.5	77.1	67.7	58.7	53.6	46.7	42.9	34.3
Sikorsky S-64 Skycrane	Heavy		19,234	42,000	6		97.8	90.9	86.0	78.5	68.6	59.3	53.9	46.7	42.7	33.8
Boeing CH-47C Chinook	Heavy		24,578	50,000	2 x 3		99.6	92.9	88.1	80.8	71.4	62.7	57.8	51.4	47.9	39.9
Sperry Campground Natural and Existing (34 dBA)						34	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
McDonald Ranger Existing (29 dBA)						28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
McDonald Ranger Natural (23 dBA)						23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4

Table 1 Glacier NP Ambient Sound Levels, Helicopter Capacities and Maximum Sound Levels While Hovering

Visitor Experience

Affected Environment

Glacier has a long tradition of providing visitor services and hospitality. Early visitors came by train and horseback and then traveled by tour boat to Lake McDonald Lodge. Early in the park's history, the many chalets, including Sperry Chalet, allowed visitors to stay overnight in the backcountry. There were chalets at Gunsight Lake, Cut Bank and Goat Haunt, Granite Park, Many Glacier, St. Mary Lake and Two Medicine in addition to Sperry. Today only three chalets remain and are in use; Two Medicine (operates as a camp store), and Granite Park and Sperry (which still offer overnight accommodations), until last August when the Sperry dormitory burned.

Over the last five years, Sperry Chalet accommodated an approximate average of 2,340 overnight guests each year and provided food and sustenance to thousands more who hiked or took guided day horseback rides or rode their own horses on the trail either from Lake McDonald or Gunsight. The chalet has been a popular day-use destination for many hikers and overnight backpackers passing through on their way to the nearby Sperry Campground, or on to Lake Ellen Wilson Campground, Gunsight Shelter or Gunsight Lake Campground. The hike from Gunsight Trailhead on the east side of the park all the way to Lake McDonald Lodge (18 miles) is a popular day hike. Many of these hikers and backpackers stop to visit the chalet and take advantage of the services offered including toilet facilities and food and beverages. The chalet operates at almost full occupancy throughout the season. Daily horse rides are provided to Sperry Chalet from the Lake McDonald corral. Over the last five years, approximately 340 visitors a year have taken these rides.

A four-site campground is approximately 250 yards to the south of the chalet dormitory building and is open from 8/1-9/30 each season. It is full most nights. Campground hikers visit the chalet and use its dining room and toilet facilities.

While visitors to the area largely experience hearing only natural sounds, this area of the park does have scenic air tours overhead and administrative flights are made to the chalet each year in the fall to remove human waste. Other administrative flights occur each year to bring in items that can't be carried by stock due to their weight or size. Administrative flights to Sperry Chalet are usually 4-6 flights per year. Scenic air tours have been operating for decades over the park.

Impacts Analysis

The area of analysis is the Sperry Chalet area including the adjacent campground and other nearby campgrounds, and the trail corridor from Lake McDonald Lodge to the chalet site.

Alternative A (Preferred)

Visitors would be adversely affected during the summer seasons while the dormitory is being constructed, but these affects would be temporary. Visitors who want to stay at the chalet would not be able to during both summer seasons, and visitors who are either camping or hiking through would find a busy and noisy construction site, particularly when helicopters are landing, taking off or dropping sling loads. A viewing area would be offered for visitors who want to watch the construction take place, but they would be restricted to certain areas within the enclave for safety reasons and to prevent vegetation trampling and destruction.

Visitors hiking on the trail from Lake McDonald Lodge would experience high noise levels from 150-220 flights during Phase I and 200-300 flights during Phase II. On days with fewer or no flights, visitors would experience a lot of pack stock and horses on other days (35-60 pack strings each year of construction) on

the trail. The park horse concessioner might continue to offer horseback rides to the chalet except on days when use of the trail is restricted for safety reasons due to the high level of activity to support the construction effort.

Some visitors would be adversely affected by the increased noise in the vicinity of the McDonald Creek Valley and Sperry Chalet, and especially during the days with 40-50 scheduled flights. Other days there would be fewer flights. However all of these flights would be temporary and transitory with days in between with no flight activity. Some visitors outside the park may be impacted by noise from helicopter activity if staging occurs outside the park. Impacts would be temporary and transitory.

The visitor experience would see a beneficial long term effect from the eventual completion and re-opening of the Sperry Chalet Dormitory and Dining Hall and restoration of the Sperry Chalet experience that is highly valued by many people. Visitors would be able to enjoy both overnight and day trips to the chalet. It is anticipated that stock use would return to current levels, daily horseback rides would resume without interruption and noise from administrative helicopter flights would be reduced to present day levels. All of these actions would result in a long-term beneficial impact on visitor experience from returning to the traditional and historic types of use and conditions.

Alternative B

Impacts under Alternative B would be similar to Alternative A in regards to the time visitors would be affected and the types of activities they would be affected by, including a large number of helicopter flights, high levels of stock use, periodic closures of areas for safety, periodic disruptions in concessioner offered horseback rides and poor trail conditions. Visitors would eventually experience a new chalet structure in a different location, though nearby to the historic dormitory which would be preserved as a ruin. This would offer a new interpretive experience and activity for visitors who visit the Sperry area.

Alternative C

Alternative C would result in the permanent removal of the backcountry chalet experience at Sperry and adversely impact the visitor experience for those who want to experience staying overnight at the Sperry Chalet and associated accommodations. It would negatively affect returning visitors in the long-term who want to continue to have an overnight backcountry Sperry Chalet experience. Granite Park Chalet would still remain in operation although it does not offer the dining experience and bed linens that Sperry Chalet offered. Not restoring Sperry Chalet Dormitory may result in more visitors trying to stay at Granite Park Chalet, which operates near capacity. It also reduces the park's ability to accommodate visitors who are seeking a backcountry chalet experience. It would have a beneficial short term impact on visitors who want to hike to the site and/or hike through the area as there would be no restrictions, other than protections put in place for the dormitory ruin. Alternative C would have a beneficial long term effect by offering a viewing area and trails around the ruin to enable visitors to learn about the historic dormitory, development of the park, the Sperry Chalet complex and the role of wildland fire in the environment.

Cumulative: Past, present and reasonably foreseeable actions that have affected, continue to affect, or could affect visitor experience in the Sperry Chalet area and McDonald Creek Valley area include up to 50 administrative flights annually that include waste removal from the chalets, maintenance of the other structures, including the dining hall, scenic air tours, and fire and search and rescue flights. The presence of the dining hall, part of the national historic landmark district, would provide a benefit to visitors.

When the positive and negative impacts from Alternatives A and B are combined with the impacts from past, present and reasonably foreseeable actions, the total cumulative impact under Alternatives A and B to visitor experience would be beneficial, although there would be short term adverse impacts to the visitor experience associated with construction noise, disturbance and temporary closures. When the positive and negative impacts of Alternative C are combined with the impacts from past, present and reasonably foreseeable actions, cumulative impacts to the visitor experience would be both adverse as a result of the loss of the Sperry Chalet overnight experience and beneficial due to the addition of a viewing area, interpretation of the ruin and less maintenance activity at the site.

In summary, impacts to visitor experience would be adverse in the short term due to the construction related activities but beneficial in the long term for both Alternatives A and B, by restoring the overnight backcountry experience. Impacts would not likely be significant because construction impacts to visitor experience would be temporary and mitigation would reduce the level of impact. Under Alternative C, the visitor experience would overall be negative as a result of the loss of the Sperry Chalet overnight experience, but would shift to a different and beneficial visitor experience, in the form of interpretation and education of the ruin.

Historic Structures

Affected Environment

Sperry Chalet was constructed in 1913-1914 by the Great Northern Railway. The location was selected by Louis Hill to augment a network of backcountry Swiss-style chalet experiences for park visitors. Originally designed by Samuel Bartlett, materials used in the construction of the building were acquired locally, while labor was provided by Italian stonemasons. The chalet has provided visitors with a backcountry experience for over 105 years with brief interruptions during wartimes. The service included hearty meals served in a dining room and lodging in a rustic mountain atmosphere. The Great Northern Railway sold the chalet to the NPS in 1954 for $1.00. From that time it was operated under a concession contract on a seasonal basis. Another interruption occurred from 1993-1996 to address human waste management and code compliance.

In addition to being listed in the National Register of Historic Places, Sperry Chalet is a National Historic Landmark. The buildings are significant for their architecture (see character defining features in Appendix 2) and for their role in the development of Glacier National Park by providing lodging and food in an isolated area of the park. The historic district comprises the dormitory, kitchen/dining room, and a portion of the quarry.

Historically, visitors began to travel to the area as a destination in the late 1890s, especially after Lyman Sperry located the glacier that bears his name. As part of the expanding services offered by the Glacier Park Hotel Company (a subsidiary of the Great Northern Railway), the Glacier National Park Tourist Trails, South Circle Trail network connected the Chalet at Sun Point to Sperry Chalet, and from Sperry Chalet to Lake McDonald Lodge (National Register, 1995). This segment of the circle trail represents one of the oldest trails in the park. Although it has been rerouted numerous times in its history, it still parallels the historic route.

Impact Analysis

Areas of analysis include the Sperry Chalet Dormitory, Sperry Chalet Dining Hall, Sperry Chalet National Historic Landmark boundary, Sperry Chalet Historic District, Glacier National Park Tourist Trail- South Circle Trail Segment.

Alternative A (Preferred)

This alternative would afford the best preservation of the remaining historic fabric (masonry). The masonry features of the dormitory would be incorporated into the "new" building; thus, it would be architecturally compatible with the historic character of the area and the overall experience would be nearly identical. Louis Hill's original dormitory siting would remain intact, and visitors would be afforded an experience that retains the character defining features of the building reflected in its period of significance from 1914-1949 as described in Appendix 2. Repairs to the dining hall building would not result in any measurable impacts because none of the character defining features detailed in Appendix 2 would be changed.

Phase I and Phase II construction would not adversely impact the historic structures or cultural landscapes. Utilizing teams of relatively small craft focused crews camped on-site approximates the historic construction of the dormitory building in 1913. Aircraft blade loading, angular velocity (etc.) would be considered when working near historic properties. Historic surface debris or compromised mortar could become airborne from downwash. While use of modern transport systems would occur, traditional mule transport methods would also be used whenever possible.

Alternative B

This action would preserve the remnant masonry features of the dormitory shell through stabilization and it would be managed as a ruin. Portions of some of the architectural features could be removed or isolated for safety and preservation such as the chimneys. The building shape and openings would be preserved as character defining features within the National Historic Landmark boundaries. Louis Hill's original dormitory siting would remain intact, and visitors would be afforded an interpretive experience for public education and safety.

The "new" dormitory would be designed to be architecturally distinct yet compatible with the historic character of the area as it would be located within the historic district boundary and outside of the National Historic Landmark Boundary. The siting of the new building would be away from the cliff margin, which would lessen scenic vistas afforded by the National Historic Landmark. The building's capacity would be unchanged.

Construction would occur over two seasons. The first season would be spent stabilizing and preserving the ruin. The second season would involve construction of a new dormitory. Transport of equipment, supplies and crew would be similar to what is described in Alternative A. The number of flights and stock trips would be similar. While use of modern transport systems would occur, traditional mule transport methods would also be used.

This alternative would increase the amount of development within the historic district boundary, but would not be obtrusive to the historic district or national historic landmark.

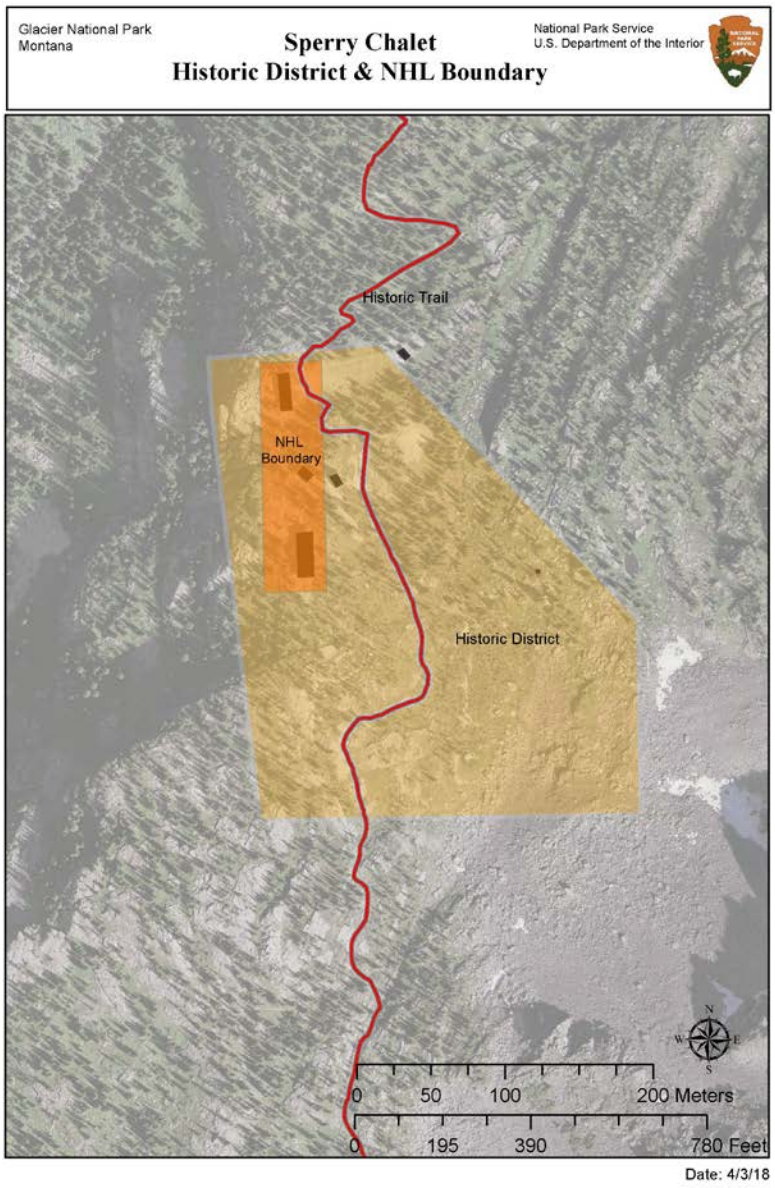

Figure 8 National Historic District and National Historic Landmark Boundaries

Alternative C

This action would preserve the remnant masonry features of the dormitory shell through stabilization and potential removal of portions of isolated or compromised architectural features. The building shape and openings would be preserved as character defining features within the National Historic Landmark boundaries. No further impacts would occur to the Dining Hall, or South Circle Trail segment. This action would change the historic dormitory use, but would provide preservation through stabilization as well as education and interpretation of the site in keeping with NPS policy.

Depending on the level of visitor use and other types of visitor services in the immediate area, the toilet facility could be removed. The National Historic Landmark boundary would benefit through removal of

the facility and return to a setting in keeping with the period of significance (1914-1949). Removal of the facility would result in limited benefits to the Historic District boundary, as other buildings would still be in the vicinity. To date, all buildings have been constructed to be compatible with the historic district.

Cumulative: A past impact to the Sperry Chalet Dormitory and Dining Hall was the addition of the toilet facility. This facility resulted in visual impacts to the National Historic Landmark boundary, Historic District boundary and South Circle Trail Segment. The SHPO concurred with a no adverse effect determination. Mitigation of the visual intrusion resulted in a building that is architecturally distinctive yet compatible with the surrounding historic district, structures and cultural landscape. There are no present or future foreseeable actions that would have further effect on historic structures and the cultural landscape.

When combined with the beneficial impacts of Alternative A, the overall cumulative impact would be beneficial and long-term. Under Alternative B, the addition of a new building that is architecturally distinctive yet compatible with the surrounding historic district combined with the past action of the addition of the toilet facility would result in overall beneficial cumulative impacts. Under Alternative C, the actions and impacts from adding a trail and viewing area and preservation of the structure as a ruin combined with past actions of the toilet facility would result some additional visual impacts but would not introduce any new features to the landscape, and would not be visible from the South Circle Trail Segment and therefore overall cumulative impacts would be neither adverse or beneficial.

In Summary, Alternative A would adhere to the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and NPS policy standards for treatment, resulting in limited or no impacts to the dormitory's character defining features. This alternative would also benefit the dining hall, national historic landmark and historic district boundary as well as the South Circle Trail segment through preservation of the dormitory site and continue the historic use of the area. While Alternatives B and C preserve the dormitory as a ruin, in keeping with the *Secretary's Standards* and NPS Policy, these alternatives would result in a change to the historic use of the site. But these changes would not be adverse because the ruin would remain. Construction teams and staging areas would be temporary and not meaningfully impact the other historic structures and cultural landscape. Alternative B would have greater impact to the historic district due to placement of a new structure within the historic district but it would not result in a meaningful impact because it would be architecturally distinct, yet in-keeping with historic character of the area, to mitigate visual impacts.

Chapter 4

CONSULTATION, AND COORDINATION

Internal and External Scoping/Consultation

Public scoping began February 28, 2018 and ended April 2, 2018. Two public meetings were held and approximately 400 comment letters were received. A public meeting is being planned during the review period for the EA.

Mike Martin, Hydrologist with the NPS Water Resources Division was consulted regarding the need for a Statement of Findings for Floodplains on April 3, 2018

Agency Consultation

The Endangered Species Act (ESA) of 1973, as amended (16 U. S. C. 1531 et seq.) is designed to ensure that any action authorized, funded, or carried out by a federal agency does not jeopardize the continued existence of any endangered or threatened plant or animal species. If a federal action may affect threatened or endangered species, then consultation with the USFWS is required. In accordance with section 7 of the Endangered Species Act, the park advised the USFWS on March 2, 2018 about the project. On March 27th, the USFWS was advised about the compressed timeline to complete NEPA and Section 7. The USFWS agreed to meet the compressed schedule. The park determined that grizzly bears would be adversely affected under Section 7 of the ESA due to the amount of construction activity and helicopter flights at the Sperry Chalet area. The USFWS will prepare a Biological Opinion and Incidental Take.

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (54 U. S. C. 306108) requires all federal agencies to consider effects from any federal action on cultural resources eligible for or listed in the National Register of Historic Places prior to initiating such actions. On January 31, 2018, Glacier National Park initiated consultation with the Montana SHPO on the project in accordance with 36 CFR 800. Subsequent in-person meetings occurred on March 13-14, 2018. A follow up letter was sent on March 27, 2018 in which character defining features were identified as part of the project. Over the course of the project, features identified in the correspondence shall be retained. The park has issued a finding of historic properties affected, no adverse effect for stabilization and preservation treatments that follow these standards.

Consultation on designs would be initiated when available. Designs would not depart from character defining features.

Native American Consultation

Glacier National Park notified the Confederated Salish and Kootenai Tribes (CSKT) Tribal Historic Preservation Office (THPO) and Council members, and the Blackfeet THPO and Blackfeet Tribal Business Council on February 22, 2018 in accordance with 36 CFR 800. They were contacted again on March 2, 2018. Neither the Blackfeet Tribe nor the CSKT raised concerns about the proposed action. On April 3, 2018 Blackfeet Nation Tribal Historic Preservation Officer, John Murray provided concurrence of *Historic Properties Affected, No Adverse Effect* by phone for the Sperry Chalet Dormitory character defining features. Mr. Murray further recommended reuse of the original dormitory walls. In a meeting on April 9, 2018, the Confederated Salish and Kootenai Tribal Historic Preservation Officer, Kyle Felsman indicated no concerns with the project.

List of Preparers and Contributors

PREPARERS Name/ Title	**Contribution**
Katie Eaton, Compliance Specialist, Glacier National Park	Prepared wildlife, threatened and endangered species, and state listed species section of EA and Biological Assessment for Section 7 Consultation with USFWS.
Dawn LaFleur, Restoration Biologist, Glacier National Park	Provided technical information on vegetation, wetlands & soils and BAER Report
Sierra Mandelko, Cultural Resource Specialist, Glacier National Park	Provided technical information on historic structures and cultural landscapes; coordinated SHPO consultation
Stephen Pisani, Historical Architect, Park Historic Structures and Cultural Landscape Program, National Park Service	Provided technical information on historic structures and design.
Mary Riddle, Chief of Planning and Compliance, Glacier National Park	Prepared EA in cooperation with subject matter experts; directed internal review, agency consultation, reviewed/edited EA; coordinated EA schedule
Amy Secrest, Natural Resources Specialist/Environmental Protection Specialist, Glacier National Park	Reviewed/edited EA
Roger Semler Chief, Wilderness Stewardship Division, National Park Service	Prepared recommended wilderness analysis and minimum requirements determination
Randy Stanley, Natural Sounds and Night Sky Coordinator, Intermountain Region, National Park Service	Prepared natural sound analysis
John Waller, Wildlife Biologist, Glacier National Park	Provided technical information on wildlife and federally listed species and Montana Species of Concern
OTHER CONTRIBUTORS Name/ Title	**Contribution**
Lisa Bate, Wildlife Biologist, Glacier National Park	Impacts on bird species
Mark Biel, Natural Resources Program Manager, Glacier National Park	Provided technical information on wildlife, federally listed species and Montana Species of Concern.
Chris Downs, Fisheries Biologist, Glacier National Park	Provided technical information on aquatic resources including federally listed species and Montana Species of Concern.
Steven Byrd, Concession Specialist, Glacier National Park	Provided maps and site information
Jim Foster, Chief of Facility Management, Glacier National Park	Provided technical information on construction
John Lucke, Facility Operations Specialist, Glacier National Park	Provided technical information on construction and operations at Sperry Chalet
Mike Martin, Hydrologist, DOI-NPS-Water Resource Division	Floodplain consultation
Jack Polzin, Historic Building Restoration Specialist, Glacier National Park	Technical knowledge of Sperry Site.
Dave Soleim, Fire Management Officer, Glacier National Park	Helicopter operations
Jean Tabbert, Concession Specialist, Glacier National Park	Reviewed/edited EA
Phil Wilson, Chief of Science and Resources Management, Glacier National Park	Cultural resources and reviewed and edited EA
Mary Wysong, Chief of Concessions, Glacier National Park	Provided technical information on chalet operation and concessions

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Appendices

Appendix 1

Preliminary Concepts:

1. Restore the dormitory to as "close to as it was," reflecting its period of significance (1914-1949). Such an approach would provide for some critical updates to current building codes and improve life safety. The visitor experience would be very similar to what it has been for decades.

2. Restore the dormitory "in place, but modernized" using as much of the historic fabric as possible. This type of approach would provide the best opportunity to ensure its use is well-suited for a visitor experience for the next 100 years. This would include code upgrades, insulation between interior walls and some additional engineering and design work.

3. Construct an entirely new structure, complementing the historic landscape, in a slightly different location to avoid recent avalanche activity. This alternative would also stabilize the remaining walls and provide visitor interpretation of the original structure.

4. Consider an entirely different approach to providing the Sperry Chalet visitor experience such as canvas wall tents or yurts, which could be taken down each season. Tent cabins were used in the early years of the Sperry Chalet operation. This option would still utilize existing structures such as the historic dining hall. The remaining walls of the dormitory would be stabilized and visitor interpretation of the original structure as a ruin would be provided.

Appendix 2 (Character Defining Features Letter to SHPO below)

United States Department of the Interior

NATIONAL PARK SERVICE
Glacier National Park
West Glacier, Montana 59936

L76 GLAC-18-048; H30

MAR 2 7 2018

Dr. Mark Baumler
State Historic Preservation Office
Montana Historical Society
P.O. Box 210202
Helena, MT 59620-1202

Dear Dr. Baumler:

On August 31, 2017 Sperry Chalet Dormitory, part of a National Historic Landmark was consumed by fire. Subsequent efforts ensued to stabilize the structure for alpine winter conditions. Stabilization needs were met to date; however engineering has strongly recommended that more substantial stabilization be carried out for preservation. Additionally, the park has initiated an environmental assessment in support of preserving the Sperry Chalet experience.

The National Park Service is relying on comprehensive photo documentation of the building, as well as architectural drawings from 1913, 1940, 1996, 2011, and the 2017 stabilization drawings. Much of this information was condensed into the *Sperry Chalet Dormitory Historic Systems and Finishes* (2017). The location was selected by Louis Hill to augment a network of backcountry Swiss-style chalet experiences for park visitors. Originally designed by Samuel Bartlett, materials used in the construction of the building were acquired locally, while labor was provided by Italian stonemasons. The massive masonry walls and two interior masonry chimney's survived fire impacts and were incorporated in the 2017 stabilization treatments. The building's shell provides the outline for further stabilization and preservation treatments.

Analysis of the building's exterior and interior, prior to the fire has resulted in this list of Character Defining Features that must be retained during future stabilization and preservation actions.

Building Shape: The rectangular outline is built directly on bedrock using stone drawn from a nearby quarry. The remaining historic fabric consists of random ashlar masonry walls. Should masonry treatments be required during stabilization or preservation treatments, special attention will be made to the mortar texture, depth, color, width and tooling. Any stonework will match original rough texture and color. Additionally, should any stones need to be replaced due to spalling or other fire or weathering effects, the new stone color, size, shape and type will be matched as closely to the original using locally available materials. This action will preserve the remaining historic materials and the distinguishing character.

Stones exhibit hand tooling to shape with some patterned stonework visible. Corners are quoined. Building on this theme, stones extend up to a foot from the rest of the wall in distorted shapes.

Some of these stones act as corbels that formerly supported the pole brackets which held up the log framing utilized on the roof and balconies. Arched stone lintels are visible at windows and doorways. Additionally, the south wall's prominent gable "GNRY" motif and lower diamond shaped stone.

Roof and Roof Features: The Sperry dormitory had a double-pitched gable roof with front and rear eave gables. The ridge ran north-south in the long direction of the building. The roof had a 9 in 12 slope (9" vertical rise for every 12" horizontal run). It measured approximately 24' along the slope from the center ridge to the end of the eaves and 110' long along the ridge running north-south. According to original plans, the eaves were raised 18". Log purlins about 7" to 8" in diameter were spaced about 3' apart on center and spanned from the exterior east and west stone walls to the 10" diameter ridge beam running the length of the building. These purlins extended beyond the east and west stone walls to support the eaves on the building's exterior and small log braces were used to support these beams outside. The extended purlins of the log framing are not exposed past the drip line of the roof. Midway between the outer walls and the ridge beam, the purlins were supported by a 10" diameter intermediate beam running parallel to the ridge beam. The intermediate beams and ridge beams were supported on 6" to 8" diameter log columns. Some of the intermediate beams were also supported by diagonal log members leaning on the center log column and the perimeter stone walls. While references do not state how far the eve's extended past the walls, photo estimates range from 2.5 feet – 3 feet. Two flying rafters should be exposed at the eve.
On the north and south gable walls, the overhanging roof eaves were supported by additional eave purlins and pole braces that rested on corbelled wall stones. Two gabled dormers extended from the roof on the east side of the building, spaced midway between the center of the building and the ends. The west side of the building had a large gabled dormer in the center with two small gabled dormers on either side of it. The dormer roofs each had their own set of log purlins, ridge beams, and intermediate beams and were supported by an elaborate system of log braces in the building's interior and pole braces resting on corbelled wall stones on the exterior.

The roof rests primarily on sanded decking of 1x8 boards visible on the interior second floor rooms. Some decking appears rough sawn in photos.

During the period of significance for the dormitory building (1914-1949), two differing roofing systems were employed. The preferred system includes 16" fire retardant cedar shingles installed to match the historic roof pattern with +/- 5 inch exposure and a rough cut cedar board ridge cap. However, the building was also historically clad with "worm green" colored asphalt shingles and galvanized ridge cap with ball finials. A roofing system that provides the appearance of either roofing material must be retained during stabilization or preservation treatments.

Additionally, two masonry chimneys extend from the bedrock, through both "floors" and would have exited the roof on the eastern slope (mountain). These should be preserved and maintained in place.

Should preservation treatments include more of the building, the following character defining features shall be retained:

Exterior Features

Openings: Intentional patterning of the 36 openings for windows and doors are located within the historic masonry. These openings provide symmetrical balance not only to the wall elevation, but also to the gables and dormers. Arched stone lintels are the main decorative detail above all exterior openings. Painted arched wood infill is located above framing for windows and doors. The two entrances are located on the west elevation. These doors had had a 2-light window in the top half of

the door with a thin wooden muntin dividing the two lights. The exterior side of the doors had horizontal head, lock, and bottom rails as well as vertical lock and hinge stiles. Within this framing was diagonal wood panels. The interior side of the doors only had the diagonal wood panels with no stile or rail elements. All balcony doors should be wood with rustic design patterns exterior and interior. Due to the plainness of the rooms, door patterning (diagonal and vertical planks, cross bracing) were a distinctive detail. All doorways have separate screen door. There is adequate documentation and photographs of doors that would enable replication.
The Sperry dormitory had 52 6-light wooden casement windows. Most of these windows (44) were built in pairs (22 pairs total) within a single opening in the stone wall, separated by vertical wooden mullions. The rest of the windows were single 6-lite units. Every sleeping room of the dormitory had windows. Thin wooden muntins divided each window into 6 lights. Each of these lights measured approximately 10" wide by 20" high, making each window unit approximately 30" wide by 40" high, excluding the outside casing and sash. Each window had a removable wood screen panel fastened from the outside. There is adequate documentation and photographs of windows that would enable replication.

Projections: First floor decking should be of sufficient width to be historically appropriate. Vertical log posts are hand peeled and have rounded tops. Horizontal top and bottom railings are hand peeled logs with vertical log posts at regular intervals for a symmetrical appearance. 2x6 wooden planks laid side by side perpendicular with their edges coped against the stone wall. A short stone staircase of five concrete steps is located on the north end of the front deck. The landing of this stair is surrounded by a short stone retaining wall on two sides.

Second floor balconies should have sufficient scaled width to historic appearance. A total of five log-framed balconies extending from the dormitory's second floor. Post and rail construction are similar to first floor. Two balconies on the east side of the building and one on the west side were sheltered by the dormers above them. The balconies on the north and south gable walls were sheltered by the eaves of the roof. The decks were made up of eight 2x6 planks laid side by side, parallel to the wall, with small gaps between them. Like the eaves, the balconies were further supported by log pole braces extending to the wall diagonally and resting on corbelled wall stones. Posts have rounded tops with axe pointed bases. All woodwork is painted.

Interior Features

Trim and Secondary Features: A rectangular concrete lintel is situated above all interior openings, contrasting with the arched exterior detail. A small apron was affixed to the interior window framing which lacked a stool. Because of the plainness of the interior rooms, the paint scheme (floors only) and use of light stain (all walls, interior doors, interior window framing and sash) is distinctive. Walls were clad with beaded tongue and groove wood paneling and finished to reflect wood grain. Finished tongue and groove wood flooring is painted throughout. "Sperry Orange" color only used on the floor of sleeping rooms.

Spaces, Close Range Materials and Craft Details: The building was used as a dormitory, sleeping spaces and storage of linen is required as is retention of plain, sparse furnishings. This heightens texture, patterns and use of color within spaces. Every sleeping room has masonry wall exposed with hand tooling evidence. While the stone walls convey rustic design, stones are dressed in distinctive contrast to the exterior ruggedness. Each sleeping room has wood window with 6-light sash. Ball tip hinges used throughout building. Historic interior and exterior door patterns should be retained. Stone masonry chimneys are visible on first and second floors. The building must have two interior

stairways. Starting newel and landing newel are hand peeled rounded logs. Rails and balusters conveyed rustic stairway design.

Exposed Structure: Log framing is visible on the interior especially on the second floor sleeping rooms. Exposed finished and rough sawn roof decking and is visible overhead. Log framing or similar look should also be visible on the first floor overhead.

Future stabilization and preservation treatments for the Sperry Chalet Dormitory will preserve these character defining features. Enclosed is a compact disk with extensive photo documentation of these character defining features. The park has reached a finding of **historic properties, affected, no adverse effect** for stabilization and preservation treatments that follow these standards. As supplemental designs are available, these will be circulated to your office for review. We request your concurrence with our finding. If you have any questions, please contact Sierra Mandelko, Cultural Resources Specialist, at 406-888-7943.

Sincerely,

ACTING FOR

Jeff Mow
Superintendent

Enclosures

cc: Chairman Trahan, Kyle Felsman, CSKT THPO
Chairman Barnes, John Murray, BN THPO
Christopher Wilson, Advisory Council for Historic Preservation

Appendix 3

Sound Power Levels of Powered Hand Tools (NIOSH 2006):

NIOSH has developed a database of sound power levels (SWLA), hand-arm vibration levels m/s^2, and technical specifications of powered hand tools commonly used in construction settings. The tools were tested in accordance with ANSI S12.15, ISO 3744, ISO 5349/1, and 5349/2. This table displays SWLAs for both the loaded and unloaded conditions. The loading conditions are indicated above the SWLA values in columns three and four.

The purpose of the database is to provide the necessary information for tool purchasers to buy quiet. Additionally the greater of the loaded and unloaded SWLA can be used to choose appropriate hearing protection and estimate noise exposure. Reduction of noise induced hearing loss in occupational settings is a long term goal of NIOSH. To further this goal, NIOSH recommends that hearing protection be worn, when operating tools with a sound pressure level (SPLA) above 85 dBA. To learn more about the NIOSH database and hearing conservation, please visit the website at www.cdc.gov/niosh/topics/noise/workplacesolutions/toolsDatabase_alt.html.

The hand-arm vibration data were acquired with triaxial accelerometers and the total frequency weighted acceleration values are reported for each hand. The injury potential of hand-transmitted vibration is estimated from the total frequency weighted acceleration value. Lower values of frequency weighted acceleration have less risk of vibration-related health effects.

This table is an excerpt of the NIOSH power tools database. The column headings in the table are described in more detail below.

Column 1 Manufacturer Brand Name
Column 2 Model Number
Column 3 Loaded Sound Power Level A-weighted (SWLA) dBA
Column 4 Unloaded Sound Power Level A-weighted (SWLA) dBA
Column 5 Loaded Total acceleration of Right Hand (Accel 1) Frequency Weighted rms m/s^2
Column 6 Loaded Total acceleration of Left Hand (Accel 2) Frequency Weighted rms m/s^2
Column 7 Technical Specification Tool Bit Size, Blade Size, etc.
Column 8 Rated Electrical Power Watts
Column 9 Rated Speed Revolutions Per Minute (RPM) or Strokes Per Minute (SPM)

Disclaimer: The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the National Institute for Occupational Safety and Health or National Park Service.

Belt Sander		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Belt Size	Watts	RPM
Porter Cable	352VS	97	102	-	-	3 inch x 21 inch	960	2837

Circular Saw		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Saw Blade	Watts	RPM
Porter Cable	345	103	95	2.2	2.4	6 inch	1080	6000
Milwaukee	6370-20	102	104	8.3	6.1	8 inch metal	1560	3700
Porter Cable	314	104	95	3.4	4.1	4 1/4 inch	540	4500
Makita	5277NB	105	95	2.9	3.3	7 1/4 inch	1800	4300
Makita	5057KB	105	101	3.6	3.0	7 1/4 inch	1560	5800
Hitachi	C7SB2	106	100	4.2	3.2	7 1/4 inch	1800	5800
Porter Cable	743	107	98	2.5	2.5	7 1/4 inch	1800	5800
Bosch	CS20	107	99	2.7	3.1	7 1/4 inch	1800	5600
DeWalt	DW364	108	103	1.9	2.1	7 1/4 inch	1800	5800
Ridgid	R3200	108	102	3.0	2.1	7 1/4 inch	1800	5800
DeWalt	DW378G	108	96	3.3	4.7	7 1/4 inch	1800	4600
DeWalt	DW384	109	102	5.7	4.5	8 1/4 inch	1800	5800
Milwaukee	6390-20	109	97	2.5	2.9	7 1/4 inch	1800	5800

Milwaukee	6375-20	109	102	3.2	4.4	7 1/4 inch	1800	5800
DeWalt	DW369	109	99	5.1	4.7	7 1/4 inch	1800	5800
Makita	4200NH	109	99	3.3	2.3	4 3/8 inch	1092	11000
Milwaukee	6378	110	102	3.9	4.4	8 1/4 inch	1800	4400
Makita	5007FK	110	98	2.5	3.0	7 1/4 inch	1800	5800
Porter Cable	324MAG	110	109	3.0	3.5	7 1/4 inch	1800	5800
DeWalt	DW368	110	101	4.0	3.6	7 1/4 inch	1800	5800
Skil	5400	110	105	5.0	4.8	7 1/4 inch	1440	4600
Ryobi	CSB121	110	104	6.5	5.7	7 1/4 inch	1440	4600
Milwaukee	6460	111	101	6.8	4.2	10 1/4 inch	1800	5200
Black and Decker	FS1300C	111	103	4.1	5.1	7 1/4 inch	1560	5000
Skil	5750	111	104	3.1	4.3	7 1/4 inch	1560	4600
Makita	5008NB	112	101	2.8	3.0	8 1/4 inch	1560	5200
Skil	5600	112	104	4.0	5.6	7 1/4 inch	1560	4600
Skil	5500	113	107	3.8	4.2	7 1/4 inch	1560	4600

Drill		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Chuck Size	Watts	RPM
Milwaukee	0302-20	91	90	2.7	4.5	1/2 inch	960	850
Milwaukee	0299-20	91	91	3.0	4.3	1/2 inch	960	850
Milwaukee	0300-20	91	90	3.5	5.0	1/2 inch	960	850
Makita	6303H	91	89	4.9	5.2	1/2 inch	780	850
Hitachi	D10VH	91	90	3.8	5.6	3/8 inch	680	2500
Makita	6408	87	91	5.8	13.3	3/8 inch	588	2500
Hitachi	D13VF	92	92	2.9	3.5	1/2 inch	1020	850
Global Machinery	RAD45KUL	92	91	8.0	6.5	3/8 inch	630	1600
DeWalt	DW235G	93	91	3.5	6.2	1/2 inch	936	850
Black and Decker	DR211	92	93	3.2	4.6	3/8 inch	600	1350
DeWalt	DW130	94	93	2.2	1.9	1/2 inch	840	450
Black and Decker	DR501	93	94	1.8	3.8	1/2 inch	720	750
Milwaukee	0375-1	93	95	3.2	3.3	3/8 inch	420	1300
Skil	6265	94	98	3.1	5.6	3/8 inch	600	1700

Grinder		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Grinder Wheel	Watts	RPM
Ryobi	AG401	95	93	2.5	7.4	4 inch	528	11000
Ryobi	AG451	97	91	5.2	11.9	4 1/2 inch	660	11000
Hitachi	G12SR2	97	94	6.7	14.4	4 1/2 inch	580	11000
Ridgid	R1000	98	96	5.6	21.7	4 1/2 inch	960	10000
Milwaukee	6148-6	99	98	6.5	10.5	4 1/2 inch	1020	10000
DeWalt	DW402	98	99	10.8	22.8	4 1/2 inch	900	10000
Bosch	1700A	99	96	4.5	11.6	4 1/2 inch	840	11000
Hitachi	G18MR	100	98	7.5	16.7	7 inch	1700	6000
McCulloch	MG832500	100	97	4.7	14.4	5 inch	900	10000
Milwaukee	6154-20	101	99	19.4	23.4	4 1/2 inch	1440	11000
Hitachi	G12SE2	101	94	5.3	10.2	4 1/2 inch	1080	10000
DeWalt	DW818	100	101	8.4	14.3	4 1/2 inch	936	11000
Bosch	1700	101	97	5.1	13.0	4 1/2 inch	840	11000
Makita	9527NB	101	97	7.1	22.5	4 1/2 inch	552	10000
DeWalt	DW400	102	98	11.0	17.3	4 1/2 inch	600	10000
Milwaukee	6156-20	103	98	14.2	21.5	5 inch	1440	11000
Porter Cable	7430	98	103	8.3	19.7	4 1/2 inch	720	10000
Bosch	1752G7	107	102	9.7	16.3	7 inch	1800	6000

Hammer Drill		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Chuck Size	Watts	RPM
Hitachi	DH24PE	101	95	41.2	27.2	7/8 inch	620	1350
DeWalt	D25103	102	89	-	-	1 inch	900	1100
Bosch	11224VSR	102	93	-	-	7/8 inch	828	1100
DeWalt	DW505	103	91	-	-	1/2 inch	936	2700
Bosch	11236VS	104	95	-	-	1 1/8 inch	900	850
Black and Decker	FS6000HD	104	89	-	-	1/2 inch	720	2750
Black and Decker	DR601	105	94	-	-	1/2 inch	720	900
Makita	HP1501	105	92	-	-	9/16 inch	600	2800
Hitachi	FDV16VB2	106	90	-	-	1/2 inch	550	2900
Bosch	1194AVSR	106	96	-	-	1/2 inch	960	2600
Bosch	1199VSR	107	97	-	-	3/8 inch	1020	3000
Bosch	11235EVS	116	94	-	-	1 3/4 inch	1560	-

Impact Wrench		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Output Shaft Size	Watts	RPM
DeWalt	DW290	107	91	-	-	1/2 inch	900	-

Jig Saw		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Stroke Length	Watts	SPM
Skil	4380	97	92	11.5	17.7	5/8 inch	444	3250
Milwaukee	6266-22	98	98	4.9	8.0	1 inch	744	3000
Black and Decker	JS600	99	95	17.5	23.2	3/4 inch	540	3200
Bosch	1590EVS	100	96	7.4	10.2	1 inch	768	2800
DeWalt	DW318	102	98	6.6	11.3	1 inch	540	3100

Miter Saw		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Saw Blade Size	Watts	RPM
Delta	MS250	103	100	-	-	10 inch	1800	5200
Hitachi	C10FCE	103	100	-	-	10 inch	1520	5000
DeWalt	DW706	104	100	-	-	12 inch	1800	4000
Global Machinery	MS1015AU	110	102	-	-	10 inch	1800	5200
Tradesman	M2501W	111	101	-	-	10 inch	1800	4800
Tradesman	M3052LW	113	102	-	-	12 inch	1800	4200

Orbital Sander		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Sander Size	Watts	RPM
Black and Decker	MS500K	74	74	-	-	3 5/8 x 5 1/4 inch	60	11000
Black and Decker	MS550GB	74	76	-	-	3 5/8 x 5 1/4 inch	60	11000
Ridgid	R2610	85	85	-	-	6 inch disk	456	10000
Black and Decker	FS350	81	86	-	-	3 1/2 by 8 1/2 inch	144	10000
Ryobi	CFS1501	76	87	-	-	5 1/2 inch disk	120	12000
DeWalt	DW421	83	88	-	-	5 inch disk	240	12000
Black and Decker	FS540	87	89	-	-	4 1/2 by 5 1/2 inch	216	13000
Bosch	1295DVS	86	89	-	-	5 inch disk	264	12000
DeWalt	DW411	87	91	-	-	4 1/2 by 5 1/2 inch	240	13500
Ryobi	RS2418	86	91	-	-	5 inch disk	288	12500
Ridgid	R2500	87	92	-	-	4 1/2 x 5 1/2 inch	288	14000
Porter Cable	340	90	92	-	-	4 1/2 x 5 1/2 inch	240	14000
Ryobi	RS280VS	89	92	-	-	5 inch disk	336	12000

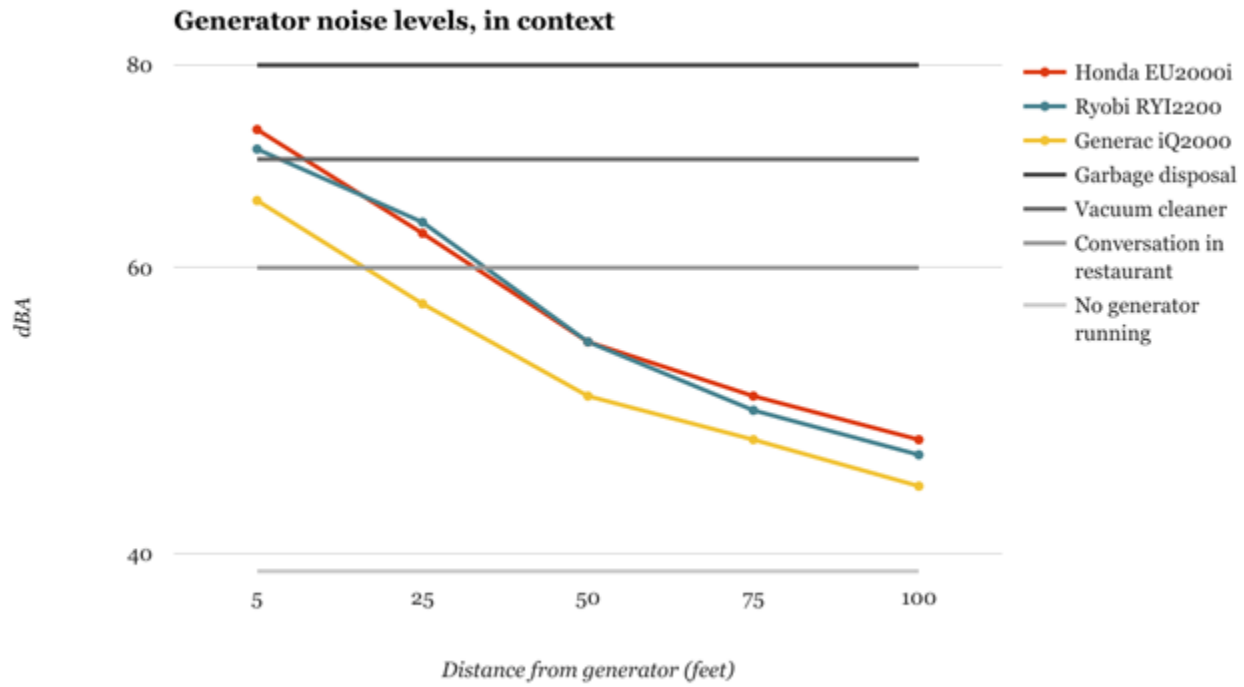
Porter Cable	333	88	92	-	-	5 inch disk	288	12000
Black and Decker	MS700G	84	94	-	-	4 1/4 x 6 1/2 inch	168	10500
Hitachi	SV12SG	91	95	-	-	4 1/2 x 5 1/2 inch	204	14000
Makita	B04552	93	97	-	-	4 1/2 x 5 1/2 inch sheet	192	14000

Reciprocating Saw		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Stroke Length	Watts	SPM
DeWalt	DW309K	102	98	15.9	30.6	1 1/4 inch	1416	2900
Milwaukee	6519-22	104	99	23.7	25.6	1 1/8 inch	1200	2800
Milwaukee	6509-22	104	99	22.0	32.6	3/4 inch	1200	2800
Milwaukee	6524-21	104	96	27.2	32.7	3/4 inch	900	3000
Ryobi	RJ161V	105	105	25.9	37.3	1 3/16 inch	780	2500
Porter Cable	9741	105	101	27.3	38.7	1 1/8 inch	1080	2600
Porter Cable	9750	107	103	36.0	50.3	1 1/4 inch	1380	2900
Hitachi	CR13V	107	98	32.7	45.0	1 1/8 inch	1200	2800
DeWalt	DW308M	107	96	22.1	22.3	3/4 inch	1140	2800
Porter Cable	9747	108	100	31.5	38.2	1 1/4 inch	1380	2600
Milwaukee	6537-22	109	101	19.7	23.3	1 1/4 inch	1200	3200
Bosch	RS5	109	98	33.3	43.5	1 1/8 inch	1080	2700
Makita	JR3030T	111	96	27.8	28.4	1 3/32 inch	960	2600
Milwaukee	6521-21	112	100	8.4	14.6	1 1/4 inch	1200	3200

Screw Driver		Load	Unload	Vibrations			Rated	Rated
Manufacturer	Model	SWL	SWLA	Accel	Accel	Technical	Elec.	Speed
Brand Name	Number	dBA	dBA	m/s^2	m/s^2	Tool Bit Size	Watts	RPM
DeWalt	DW268	91	90	4.5	11.5	1/4 inch hex drive	780	2500
DeWalt	DW257	90	91	4.4	8.6	1/4 inch hex drive	744	2500
Hitachi	W6V3	85	92	6.7	11.1	1/4 inch hex drive	768	4000
DeWalt	DW272	88	93	6.1	11.0	1/4 inch hex drive	756	4000

Appendix 4

Measured Portable Generator Noise in Context (Wirecutter 2018):



Generators were reportedly tested at varying distances in a rural field using a sound meter that measured in A-weighted decibels (dBA). Generator noise was compared against a baseline with no generator running (shown above; the background, or ambient noise level).

Image credit, with data from Wirecutter.com:

Smirniotis, M. The Best Portable Generator, Updated March 9, 2018. Accessed April 12, 2018. https://thewirecutter.com/reviews/best-portable-generator.

As the nation's principal conservation agency, the Department of the Interior has 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 historical 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. April 2018. **Printed on re*cycled paper.***