

National Park Service
U.S. Department of the Interior

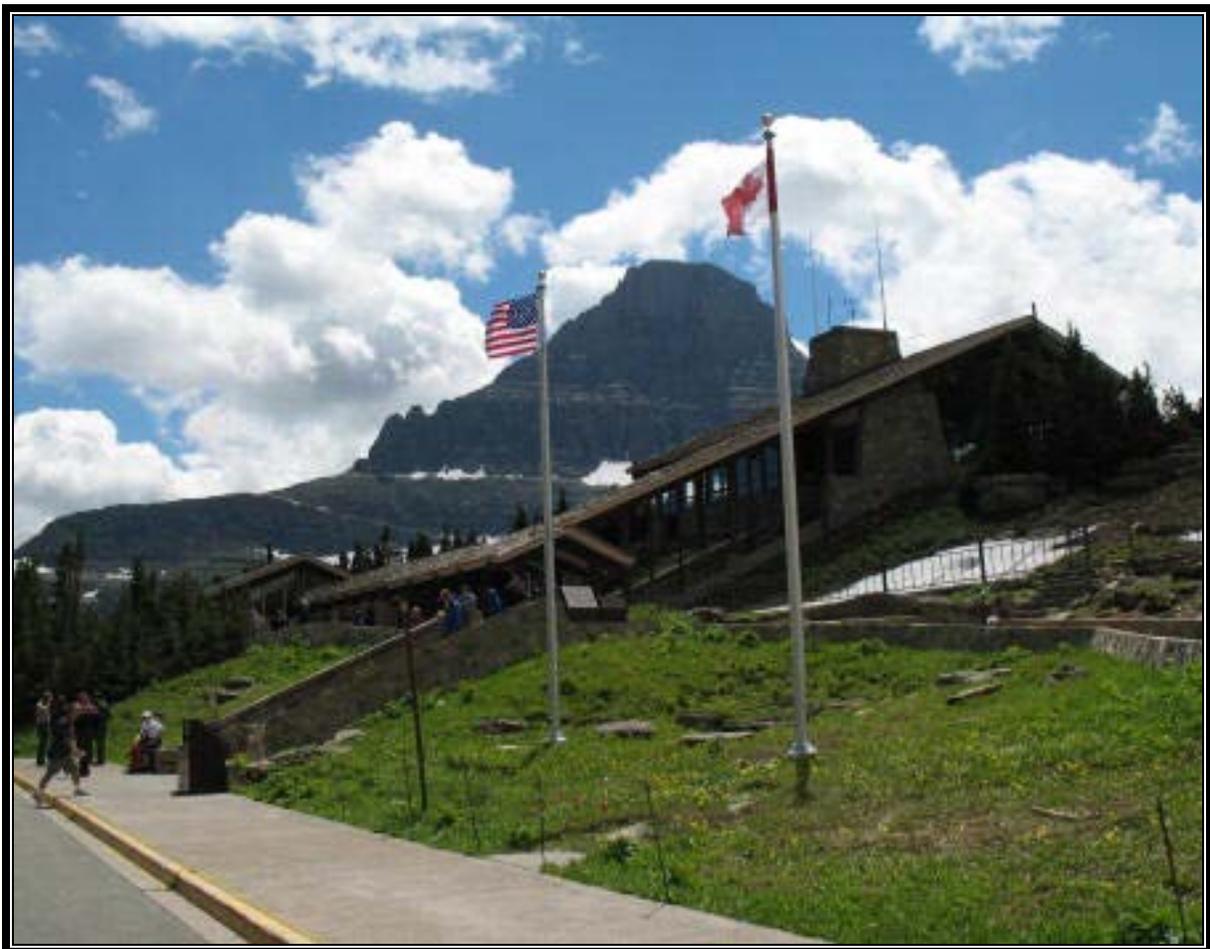
Glacier National Park
Waterton-Glacier International Peace Park
Montana



Logan Pass Improvements Plan

Environmental Assessment

February 9, 2009



Logan Pass Visitor Center (photo: http://www.glacienationalpark.name/logan_pass/)

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Environmental Assessment

Logan Pass Improvement Plan

Glacier National Park • Montana

SUMMARY

Glacier National Park proposes to address a number of issues at Logan Pass that would include constructing a new accessible restroom at Logan Pass; increasing the capacity and making resource reduction improvements to the existing restroom; constructing a new shuttle stop; and providing additional power for the operation at Logan Pass. While some of these actions were analyzed in the *Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement (GTSR FEIS)* (NPS 2003), the location and scope of improvements has changed from what was described and other actions such as providing additional electricity have been added, necessitating the need for a new environmental analysis.

Logan Pass is located at the crest of the Continental Divide along the Going-to-the-Sun Road (GTSR). As one of the more popular destinations in Glacier National Park, Logan Pass (elev. 6,646 ft.) offers visitors hiking opportunities, spectacular views, wildlife-viewing opportunities, a visitor center, and an experience that will last a lifetime.

The shuttle bus service, that was established to mitigate the impacts of the GTSR road rehabilitation project, began operation in July 2007. It includes three bus routes, two of which serve Logan Pass as an east-west transfer station from the St. Mary Visitor Center to the Apgar Transit Center. The shuttle bus service resulted in a 20% decrease in road traffic the first year and transported over 1000 visitors a day. In 2008, the service experienced about a 20% decrease in riders but buses operated fewer hours per day and fewer days (due to snow). Though not all shuttle riders stop at Logan Pass, the Visitor Center has experienced an increase in visitor use. Restroom capacity, condition and accessibility were issues prior to the shuttle system and have become more critical since the shuttle system began. The Visitor Center is powered by an outdated propane fueled thermo-generator system that is at risk of permanent failure. A replacement energy source as well as additional energy is required for visitor services, park operations, security, communications and park transportation.

The proposal increases the existing restroom capacity and provides more accessible restrooms that can also be used in the shoulder season. It relocates and improves the shuttle stop for visitors that choose to use the system and replaces the outdated thermo-generators with more energy efficient propane generators. Glacier National Park explored installation of a renewable energy system at Logan Pass and considered fuel cells, wind, solar and micro-hydro as renewable energy sources. This EA evaluates micro-hydro, solar and more efficient generators.

The EA evaluates a no action alternative and three alternatives that would provide additional energy, and restroom and shuttle stop improvements. Improvements to the existing restrooms, construction of a new restroom and new shuttle stop are considered as common to all energy alternatives. The park thoroughly analyzed several alternatives for each restroom and shuttle stop actions internally (see section "Impact Topics Dismissed from Further Analysis"). A no action alternative is being evaluated only to provide a comparison for the impact analysis even though it does not achieve the decision made as a result of the 2003 *Going-to-the-Sun Road Rehabilitations Plan/FEIS*.

Resource specialists evaluated the following impact topics: cultural resources; soils; vegetation; wildlife; threatened, endangered, and species of concern; water resources; visitor use and experience; visual resources and health and safety.

This environmental assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework. It 1) analyzes a reasonable range of alternatives to meet the purpose and need of the proposal, 2) evaluates potential issues and impacts to resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. There are two historic structures, the Going-to-the-Sun Road and the Logan Pass Visitor Center, located in the area of potential effect for this project. Both would experience minor, long-term and adverse impacts from the proposed improvements in the preferred alternative. New impacts to soils would be minor, adverse, and long-term as a result of increased soil compaction and loss of normal soil function in a previously disturbed site. While much of the disturbances to vegetation in the Logan Pass area have been mitigated through revegetation and hand-pulling weeds and reducing water draw off the stream might benefit plants, there remains a permanent loss of vegetation over a small area, therefore minor, adverse, and long-term impacts are expected from proposed actions of the preferred alternative. The preferred alternative would impact less than ¼ acre of wildlife habitat. This area lies in the immediate vicinity of the Logan Pass parking area, an area that has already impacted wildlife resources; therefore, the park would expect negligible impact to occur from actions proposed in the preferred alternative. Proposed improvements at Logan Pass would have negligible to minor additional impacts to the grizzly bears, westslope cutthroat trout, wolverines, white-tailed ptarmigan or western toads beyond what is already occurring at Logan Pass. The removal of sinks and replacement of the existing toilets with low-flush toilets would reduce the amount of water being withdrawn from the stream system at Logan Pass; having minor, long-term adverse impacts to water quantity. Water would continue to be stored in a 10,000 gallon tank and wastewater would continue to be transported to a different basin from the original; having minor, short and long-term, adverse impacts to water quality. Visitor Use and Experience would experience minor to moderate, negative short-term impacts during construction but would experience long-term beneficial impacts from the proposed improvements at Logan Pass. The preferred alternative would have moderate, long-term, site-specific and adverse impacts to visual resources primarily to the loss of alpine vegetation and the presence of newly constructed restroom and shuttle stop improvements. The NPS is committed to providing a safe and healthful work site and reducing the risks (as best possible) to the visitor. This implementation of the preferred alternative would carry out this commitment by making improvements at Logan Pass.

HOW TO COMMENT

Comments on this environmental assessment can be provided directly through the Park's planning website (<http://parkplanning.nps.gov/parkHome.cfm?parkId=61>) by selecting this project. Or write to: Superintendent, Attn: *Logan Pass EA*, PO Box 128 Glacier National Park West Glacier, Montana 59936. This environmental assessment will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – might be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review and we try to accommodate such requests, we cannot guarantee that we will be able to do so. We will always make submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

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Purpose and Need

Introduction

Glacier National Park (Glacier, GNP or the park) is located on the Canadian border in the northwestern section of Montana. The park is in the northern Rocky Mountains, and contains the rugged mountains of the Continental Divide. Together with Canada's Waterton Lakes National Park, it forms the Waterton-Glacier International Peace Park, which is listed as a World Heritage Site and an International Biosphere Reserve. Outstanding natural and cultural resources are found in both parks.

Glacier National Park is an investment in the heritage of America. Its primary mission is the preservation of natural and cultural resources, ensuring that current and future generations have the opportunity to experience, enjoy, and understand the legacy of Waterton-Glacier International Peace Park.

The purpose of Glacier National Park is to:

- preserve and protect natural and cultural resources unimpaired for future generations (1916 Organic Act);
- provide opportunities to experience, understand, appreciate, and enjoy Glacier National Park consistent with the preservation of resources in a state of nature (1910 legislation establishing Glacier National Park); and
- celebrate the on-going peace, friendship, and goodwill among nations, recognizing the need for cooperation in a world of shared resources (1932 International Peace Park legislation).

The significance of Glacier National Park is explained relative to its natural and cultural heritage:

- Glacier's scenery dramatically illustrates an exceptionally long geological history and the many geological processes associated with mountain building and glaciations;
- Glacier offers relatively-accessible, spectacular scenery and an increasingly rare primitive wilderness experience;
- Glacier is at the core of the "Crown of the Continent" ecosystem, one of the most ecologically intact areas remaining in the temperate regions of the world;
- Glacier's cultural resources chronicle the history of human activities (prehistoric people, Native Americans, early explorers, railroad development, and modern use and visitation) and show that people have long placed high value on the area's natural features; and
- Waterton-Glacier is the world's first international peace park.

Background

In November 2003, GNP issued a Record of Decision to rehabilitate the Going-to-the-Sun Road (GTSR) according to the 2003 *Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement (GTSR FEIS)*. The National Park Service selected the preferred alternative known as the Shared Use with Extended Rehabilitation Season Alternative (Shared Use).

The *GTSR FEIS* identified management methods to minimize construction/rehabilitation

impacts on visitor use and access to the GTSR. One of the management strategies was the implementation of a shuttle bus service for visitors. The shuttle bus service includes three bus routes, two of which serve Logan Pass. One route travels between Logan Pass and St. Mary Visitor Center to the east and the second route travels between Logan Pass and the Apgar Transit Center near the west entrance of the park. Logan Pass is the transfer point between the two routes for visitors using shuttle buses to traverse the road.

In July 2007, the park began operation of the shuttle bus system on the GTSR. The shuttle bus service allowed visitors to complete loop hikes without needing two cars, travel along the GTSR without driving a personal vehicle and easily access many of the popular destination points, such as Logan Pass. Though park officials knew the shuttle system would likely be a success, they did not anticipate all of the additional support services required, specifically at Logan Pass. The temporary shuttle stops became confusing and crowded as visitors waited for the next shuttle bus to arrive. At times, over one hundred people would be waiting.

The project would also address the existing shortfall in restroom capacity and accessibility at Logan Pass and provide an upgraded and improved experience for visitors using the restrooms. In addition, the existing power system needs to be replaced by a renewable power source that would accommodate the additional energy needs associated with the shuttle bus system (see Table 1). Additional power would not be used to improve commercial services, such as food or beverage provisions. And while park officials knew additional energy sources would be needed to support a new radio system and security communications, alternatives had not been developed until recently. A number of alternatives were considered, but only one restroom and one shuttle stop alternative was carried all the way through analysis. The others are discussed under “Alternatives Dismissed from Further Consideration.” Three alternatives were developed to analyze solar, micro-hydroelectric (micro-hydro), and more efficient propane generators.

Purpose and Need

The project is needed to meet the following objectives:

- Provide improved, upgraded restrooms that would include: increased visitor capacity, shoulder season use and reduced water and energy use.
- Formalize and provide a less congested and confusing shuttle stop.
- Install a more energy efficient power system that would minimize the dependence on fossil fuels and support additional electrical needs for shuttle and communication (see table 1).
- Minimize impacts to natural and cultural resources.

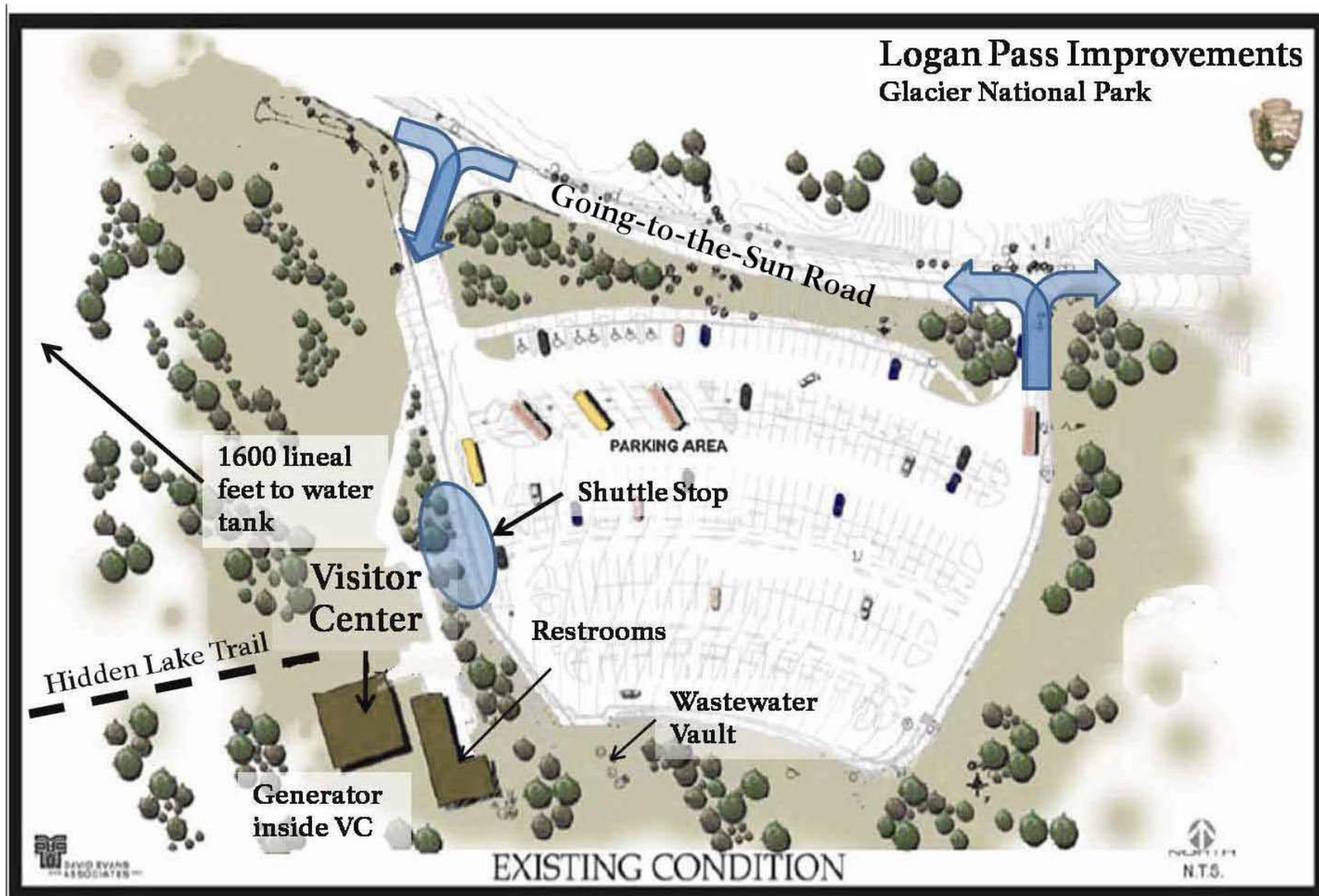


Figure 1. Existing Condition of Logan Pass developed area

Table 1. Electric Load Estimation from the Power Alternatives Study for Logan Pass Visitor Center (CTA 2007)

Loads	Qty	Volts	Amps	Watts (Qty x Volts x Amps)		Hours used	Watt Hours	
				AC	DC		AC	DC
Park Operations Radio Repeaters – Standby Power	2	12	0.25		6	21.6	0	130
Park Operations Radio Repeaters – Receive/Transmit Power	2	12	8		192	2.4	0	461
ITS Radio Repeater – Standby Power	2	12	0.25		6	21.6	0	130
ITS Radio Repeater – Receive/Transmit Power	2	12	8		192	2.4	0	461
Equipment Room Lighting	1	12	2.1		25	2	0	50
CCTV Camera-Stardot Technologies NetC Model XL	2	12	.5		12	13	0	156
Comfort Station Lighting	6	12	0.917		66	2	0	132
Drinking Water Chlorinator	1				50	6	0	300
Weather Station Equipment	1				50	6	0	300
Cash Registers	2	120	1.4	336		8	2688	0
Misc. Additional	1	120	2	240		2	480	0
Total				576	599		3168	2120
Future Data and Satellite Phone Equipment								
Tachyon IDU	1	120	1.15	138		24	3312	0
Cisco PIX 501 Firewall	1	120	0.125	15		24	360	0
Linksys 8-port switch	1	120	0.06	7		24	173	0
Cisco 7912G IP phone	1	120	0.0767	9		24	221	0
AC Total Connected Watts				745		AC Average Daily Load	7234	
DC Total Connected Watts					599	DC Average Daily Load		2120
							Total Daily Load	9353

Relationship to Other Plans and Policies

Current plans and policy that pertain to this proposal include the *Going-to-the-Sun Road Rehabilitation Plan/ Final Environmental Impact Statement* (NPS 2003), the *Glacier National Park General Management Plan* (NPS 1999) and the *2006 Management Policies* (NPS 2006).

Following is more information on how this proposal meets the goals and objectives of these plans and policies:

- This project is consistent with the *GTSR Rehabilitation Plan* because it identified Logan Pass as one of the primary transfer points for the shuttle bus system and identified the need for shoulder season restrooms.
- This project is consistent with the 1999 *General Management Plan* because it called for rehabilitation of the GTSR while minimizing impacts on natural resources, visitors and the local economy. The actions analyzed in this EA would implement that decision while minimizing impacts.

- The project is consistent with the goals and objectives of the 2006 *National Park Service Management Policies* (NPS 2006) that state that the Service has an obligation to... promote leadership in environmental stewardship under Section 1.8 and use of sustainable energy design under Section 9.1 *Park Facilities, General*. Constructing new facilities and improving existing ones that reduce energy use and conserve water and conversion of a system to an alternative energy source are consistent.

Appropriate Use

Sections 1.4 and 1.5 of *Management Policies* (2006) direct that the National Park Service must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use might be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

Section 8.1.2 Of *Management Policies* (2006), *Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total costs to the service; and
- whether the public interest will be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it. More information on the definition of unacceptable impacts as cited in §1.4.7.1 of *Management Policies* (2006) can be found in the Affected Environment and Environmental Consequences section.

The park reviewed several alternatives to construct a new shuttle stop, improve restrooms and increase energy production at Logan Pass while not creating unacceptable impacts to natural and historic resources and park values. The proposed management action is consistent with the park's general management plan and other related park plans. With this in mind, the NPS finds that constructing a shuttle stop at the northwestern entrance, improving existing restrooms and adding new accessible shoulder season restrooms, and replacing existing propane generator with two more efficient generators are acceptable uses at Glacier National Park.

Public Scoping

Scoping is an early and internal and public process to determine the breadth of environmental issues and alternatives to be addressed in an environmental assessment. Glacier National Park conducted both internal scoping with NPS staff and external scoping with the public and interested and affected groups and agencies. Scoping produced potential alternatives and determined the issues, cumulative actions, what resources would be affected and identified the relationship, if any, of the preferred alternative to other planning efforts in the park.

Public scoping began with a press release on March 12, 2008. Scoping brochures were sent to people on the park's environmental assessment mailing list that included members of the public

along with federal, state and tribal agencies. The scoping brochure was also placed on the National Park Service's Planning Internet site. Public scoping was completed April 14, 2008.

In accordance with 36 CFR800.8, Glacier National Park also notified the Montana State Historic Preservation Office (SHPO) the Confederated Salish and Kootenai Tribes and the Blackfeet Business Council of the project. Neither the state nor the tribes responded during the scoping period. Subsequent conversations with the State Historic Preservation Office have not identified concerns that might result in a finding of adverse effect for the project.

During the 30-day public scoping period, the park received thirteen comments. Concerns over the impact to visual resources were raised in almost all the letters. The commenters were concerned that new development at Logan Pass would compromise the natural beauty of the area; therefore, visual resource was added to the list of impact topics to be analyzed. The majority of the letters also identified impacts to visitor use and experience as a concern. Concerns raised the need for shade while waiting for the shuttle bus, general comfort in regards to restroom facilities and drinking water availability, interpretive information and visual obstructions. Funding sources and sustainability of the funding were also mentioned in two of the comment letters. One commenter raised a concern about protecting alpine natural resources from both short- and long-term impacts caused by increased visitation at the pass. All these concerns (visual resource, visitor use and experience) are included in this environmental assessment (EA) by impact topic. After public review of the EA and consideration of the comments received, the NPS will decide whether to issue a finding of no significant impact which will conclude the NEPA process or a notice of intent to prepare an environmental impact statement.

Impact Topics Retained for Further Analysis

Issues and concerns were identified by the public, other federal and state agencies and specialists in the National Park Service. Impact topics are identified by determining what resources could be affected by the range of alternatives analyzed. If during scoping and further investigation, resource effects remain unknown or are at the minor to moderate level of intensity, or there is potential for significant impact, then that resource topic is further analyzed.

The following impact topics were also identified based on federal laws, regulations, orders, and *NPS Management Policies* (NPS 2006). A brief rationale for the selection of each impact topic is given below.

Historic Structures and Cultural Landscapes

Within the area of potential effect of the project are the Going-to-the-Sun Road Historic District (24GL0136 and 24FH0161) and the Logan Pass Visitor Center (24GL1151). The Going-to-the-Sun Road was listed in the National Register of Historic Places in 1983 and designated a National Historic Landmark in 1997. The Logan Pass Visitor Center was listed in the National Register of Historic Places in 2008. Both of these properties could be affected by the alternatives.

Soils

The NPS preserves the soil resources of parks and protects those resources by preventing unnatural erosion, physical removal, or contamination (NPS 2006). Soil disturbance would likely occur during implementation of all alternatives; therefore, impacts to soil resources are analyzed in this EA.

Vegetation

The NPS strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants (NPS

2006). Some of the sites under consideration for the restroom and shuttle stop locations are vegetated. Therefore, impacts to vegetation resources are analyzed in this EA. The sites would also be susceptible to noxious weed establishment and spread.

Wildlife

The NPS protects native wildlife as an integral component of natural ecosystems. Wildlife frequent the Logan Pass area and occupy the areas being evaluated and therefore might be affected by this project, therefore impacts to wildlife are analyzed in this EA.

Threatened and Endangered Species and Species of Concern

The NPS protects and attempts to recover all native species that are listed under the Endangered Species Act of 1973. Both the *Management Policies* (2006) and *Director's Order 77: Natural Resources Management Guidelines* require the NPS to examine and minimize the impacts of projects on federal candidate species as well as federally listed threatened, endangered, and candidate, and state listed rare, declining, and sensitive species.

Federally Listed Species

Grizzly Bear (*Ursus arctos horribilis*) – Federally Threatened. Glacier National Park was placed into grizzly bear management “situations” in accordance with the *Grizzly Bear Recovery Plan* (USFWS 1993). Over 1 million acres of the park (proposed wilderness) are established as Management Situation 1, in which management decisions would favor the needs of the grizzly bear when grizzly habitat and other land-use values compete, and grizzly-human conflicts would be resolved in favor of grizzlies, unless a bear is determined to be a nuisance. The remainder of the park, which is developed front-country, is established as Management Situation 3, in which grizzly habitat maintenance and improvement are not the highest management considerations, grizzly bear presence would be actively discouraged, and any grizzly involved in a grizzly-human conflict would be controlled.

Species of Concern

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) have been found in Upper McDonald Creek and its tributaries including Logan Creek. The project may affect the westslope cutthroat trout.

Wolverines (*Gulo gulo*) are wide-ranging carnivores that might travel through the area and probably make only temporary and sporadic use of the area; it is unlikely that denning habitat is near the considered alternative locations because of human activity during the denning period.

White-tailed ptarmigan (*Lagopus leucurus*) is commonly found year-round in alpine areas of the park, including Logan Pass.

Western toads (*Bufo boreas*), also known as boreal toads, are mainly terrestrial and very mobile, and consequently sometimes difficult to detect during field surveys. Adults may also show a seasonal shift to nocturnal behavior or take refuge from hot, dry conditions by burrowing in the ground litter or inside rodent holes. Serious declines of this species throughout portions of its southern range are cause for concern for its status in other regions. Very little is known about the distribution and status of this species in the park. However, toads have been observed at Logan Pass in a past studies; therefore the project may affect western toads.

Water Resources

NPS policies require protection of water quality/quantity in accordance with the Clean Water Act. The purpose of the Clean Water Act is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The US Army Corps of Engineers (COE) has been

charged with evaluating federal actions that result in potential degradation of waters of the United States and issuing permits for actions consistent with the Clean Water Act. The US Environmental Protection Agency also has responsibility for oversight and review of permits and actions, which affect waters of the United States. Currently, the park's water supply at Logan Pass is supplied from the headwaters of Logan Creek. The creek is part of the McDonald Creek drainage and eventually flows into the Flathead River System. Water is extracted for operational purposes at the Logan Pass Visitor Center from Logan Creek. The wastewater is then transported to the other side of the Continental Divide at the St. Mary Wastewater Treatment Plant; causing an interbasin transfer of water. The proposed renewable energy actions and restroom improvements would continue this action and could further impact water resources in the park; therefore water quality/quantity is analyzed in this EA.

Visitor Use and Experience

As one of the more popular destinations in Glacier National Park, Logan Pass offers visitors hiking opportunities, spectacular views, wildlife viewing opportunities, a visitor center with interpretive information, and an experience that will last a lifetime. In order to keep construction activities to a minimum, the new structures would be prefabricated and installed in the later part of the season. Visitors at Logan Pass would view construction activities of the new restroom building and might experience a slight disruption by the activities proposed in this project. Even though disruptions might be slight, actions might coincide with a first-and-only visit to the park and therefore visitor use and experience could be impacted. The *NPS Management Policies (2006)* and *Director's Order #42: Accessibility for Visitors with Disabilities in National Park Service Programs and Services* state all reasonable efforts will be undertaken to make NPS facilities, programs, and services accessible to and usable by all people, including those with disabilities. The proposed actions would take into account accessibility to all visitors, visitor use and visitor experience therefore this topic is analyzed in this EA.

Visual Resources

Visual Resources might be impacted by the new restroom building and shuttle stop and solar power. New construction would be designed to have minimal (or less) impact to visual resources, however since new construction is proposed, visual resources is analyzed in this EA.

Health and Safety

The *NPS Management Policies (2006)* states the safety and health of all people are core service values. Public health is addressed in *Director's Order 83 Public Health and Vector-borne and Zoonotic Disease* and employee health is addressed in *Director's Order 50 B Occupational Health and Safety Program*. These policies address risk recognition and early prevention for a safe work and recreational environment. The NPS is committed to eliminating and reducing health and safety risks when they are identified. All action alternatives would improve public health and safety.

Impact Topics Dismissed from Further Analysis

Some impact topics have been dismissed from further consideration, as listed below. During internal scoping, the park's interdisciplinary team conducted a preliminary analysis of resources to determine the context, duration, and intensity of effects that the proposal may have on those resources. If the magnitude of effects was determined to be at the negligible or minor level, there is no potential for significant impact and further impact analysis is unnecessary, therefore the resource is dismissed as an impact topic. If however, during internal scoping and further investigation, resource effects still remain unknown, or are more at the minor to moderate level of intensity, and the potential for significant impacts is likely, then the analysis of that resource as an impact topic is carried forward.

For purposes of this section, an impact of negligible intensity is one that is “at the lowest levels of detection, barely perceptible, and not measurable.” An impact of minor intensity is one that is “measurable or perceptible, but is slight, localized, and would result in a limited alteration or a limited area.” The rationale for dismissing these specific topics is stated for each resource.

Air Quality

The Clean Air Act provides for special protection of air quality and air resources in all National Park Service units. Section 118 of the Clean Air Act requires parks to meet all federal, state, and local air pollution standards. Glacier is classified as a mandatory Class I area under the Clean Air Act, where emissions of particulate matter and sulfur dioxide are to be restricted. Air quality is considered good in Glacier National Park. There are no metropolitan areas within 125 miles of the park, and no regional smog typical of highly populated areas with a high amount of vehicle traffic. Small equipment would be used for a brief time to install an alternative energy system and conduct site work for new restroom and shuttle stop. Construction would be temporary and mostly would occur within existing structures or in the case of the new restroom it would be constructed off site and assembled on site. Air quality will not be measurably affected by the alternatives.

Threatened and Endangered Species and Species of Concern

The NPS protects and attempts to recover all native species that are listed under the Endangered Species Act of 1973. Both the Management Policies (2006) and Director’s Order 77 (Natural Resources Management Guidelines) require the NPS to examine and minimize the impacts of projects on federal candidate species as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species.

Gray Wolf (*Canis lupus*.) Gray wolves, a federally listed endangered species (as of July 28, 2008; status pending litigation), are not known to occupy the Going-to-the-Sun Road corridor, which includes Logan Pass. Though prey species are abundant and the quality of habitat is suitable in the McDonald Valley, the high level of human use and associated development might limit wolf activity in this area. Wolves tend to avoid humans and areas near high use roads (Logan Pass and the GTSR), especially when people are present (Mech 1989). The actions proposed in this environmental assessment are not expected to effect the gray wolf populations in the park.

Canada Lynx (*Lynx canadensis*). The Canada lynx is a federally listed threatened species. A preliminary map of lynx habitat in the park defined moist conifer forest above 4,000 feet elevation as the most likely areas supporting lynx (Logan Pass is at 6,646 feet). Canada lynx habitat is generally described as climax boreal forest with a dense undercover of thickets and windfalls (Ruediger et al. 2000). Lynx often prefer advanced successional stages of forests and dense conifer stands for denning and foraging respectively. Large amounts of woody debris and minimal human disturbance are important to denning sites (Brittell et al. 1989). Though little is known about lynx habitat use in the park and these criteria are general in nature, the amount of development and human presence in the project area (Logan Pass Visitor Center and Parking lot) makes it unlikely that lynx frequent the area. No effects on Canada lynx are anticipated.

Bull Trout (*Salvelinus confluentus*). Bull trout is listed as a threatened species under the Endangered Species Act and is also a “Species of Special Concern” for Montana. Although bull trout can be found in Lower McDonald Creek and Lake McDonald, no bull trout have been observed by park biologists in Upper McDonald Creek above McDonald Falls, nor have they been observed in Logan Creek. No effects on

bull trout are anticipated.

While present in Flathead County, there are no known locations of the threatened **Spalding's catchfly** (*Silene spaldingii*) or **water howellia** (*Howellia aquatilis*) within GNP; consequently, there would be no effect to Spalding's catchfly or water howellia from the proposed project. However, if locations of listed plant species become known within the vicinity of proposed activities, the plants would be avoided.

Species of Concern. These alternatives are not expected to have any impact on the following sensitive species as they have not been documented in the project area or no impacts on these species are anticipated. **Fishers** (*Martes pennanti*) more than likely do not use the Logan Pass area as their preferred habitat includes riparian/forest ecotones with a woody debris component in low to mid-elevation areas that do not accumulate large amounts of snow. Both **Ruffed grouse** (*Bonasa umbellus*) and **spruce grouse** (*Falci pennis canadensis*) are not well documented in the project area, though they might occur there in low numbers, and are not likely to be affected by the project. The **calliope hummingbird** (*Stellula calliope*) might occur during the summer nesting season in riparian areas near the project, but would be far enough from the project area that there would be no impact on the species. A variety of raptors migrate over Logan Pass during the spring and fall; among these migrants might be an occasional **peregrine falcon** (*Falco peregrines*) and **bald eagle** (*Haliaeetus leucocephalus*); the project would not interfere with migration or migration patterns because of the timing of the project and there would be no aerial operations. **Golden eagles** (*Aquila chrysaetos*) might nest and forage in the Logan Pass area. The project would begin in the fall when eagles are not in a critical time period (except migration).

Fisheries

No effects are anticipated on other fish species as the park's fisheries biologist believes that the reach of Logan Creek is fish-less. The stream channel considered for the water source is small (about 1 km in total length from its headwaters downstream to Oberlin Falls) and is isolated from the downstream reaches of Logan Creek by Oberlin Falls, an impassable upstream fish passage barrier. In addition, extreme winter habitat conditions likely exist in this section of stream (i.e. maintenance of flowing water over the winter appears questionable), making over-winter fish survival difficult at best.

Wetlands

The definition of wetlands under the Clean Water Act is "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." *Executive Order 11990 Protection of Wetlands* requires federal agencies to avoid, where possible, adversely impacting wetlands. Further, *Section 404 of the Clean Water Act* authorizes the USACE to prohibit or regulate the discharge of dredged material, fill material, or excavation within US waters. NPS policies for wetlands as stated in *2006 Management Policies* and *Director's Orders 77-1 Wetlands Protection* strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In accordance with DO 77-1, the potential adverse impacts of proposed actions must be addressed in a separate Statement of Findings document. There are no wetlands within the project area, therefore impacts to wetlands were not given further detailed analysis and a Statement of Findings was not prepared.

Floodplains

Executive Order 11988 Floodplain Management requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The

NPS is guided by the *2006 Management Policies* and *Director's Order 77-2 Floodplain Management*, which provides guidance on how to implement *Executive Order 11988*. The service will strive to preserve floodplain values and minimize hazardous floodplain conditions. According to *Director's Order 77-2*, the impacts of proposed actions within the 100-year floodplain must be addressed in a separate Statement of Findings document. There are no floodplains associated within the project area, therefore this topic was eliminated from further study and a Statement of Findings was not prepared.

Socioeconomic Resources

Socioeconomic resources would not be changed by the preferred alternative as the road construction and long term maintenance operation would continue as planned, therefore, socioeconomic resources would not be affected and are dismissed from further analysis.

Archeological Resources

Although some archaeological resources have been found in the vicinity of the pass, intensive archaeological surveys conducted in 1978 (Guthrie 1978) and 1994 (Reeves 1996) failed to find resources in the area of the visitor center. Only a small amount of previously undisturbed ground would be affected by the proposed project and the probability of discovering archeological resources is highly unlikely. However, if cultural resources are discovered during construction, the project would be halted until the resources can be evaluated by an archaeologist. Neither the Blackfeet Tribal Historic Preservation Officer, nor the Confederated Salish and Kootenai Tribal Historic Preservation Department expressed concerns during scoping for the project; therefore this topic was dismissed from further consideration.

Ethnographic Resources

Ethnographic resources are defined by the NPS as any "site, structure, object, landscape, or natural resource with traditional cultural meaning and values to associated peoples and other resource users" (NPS 2004). In 2001, Drs. Brian Reeves and Sandra Peacock, under contract to the NPS, completed an ethnographic overview of the park (Reeves and Peacock 2001). This document focuses on the traditional ethno-historical association with, and ethnological knowledge of, the native peoples whose traditional territory included Glacier National Park. The report does have some limitations. Blackfeet elders actively participated in the project; information on the Kootenai is primarily from secondary sources. Native Americans sometimes used Logan Pass when travelling over the mountains to hunt bison. The Kootenai name for the pass is "Packs-Pulled-Up".

The proposed actions are not expected to impact ethnographic resources. Neither the Blackfeet Tribal Historic Preservation Officer, nor the Confederated Salish and Kootenai Tribal Historic Preservation Department raised concerns about the proposed project during scoping for this project. Nor were concerns raised during consultation meetings in November 2006; therefore this topic was dismissed from further evaluation. However, Glacier National Park recognizes that the tribes hold a body of knowledge that might result in the identification of ethnographic resources in the area in the future. If ethnographic resources are identified in the future, consultation will occur in accordance with federal legislation and regulations and NPS policy.

Museum Collections

Museum objects include prehistoric and historic objects, artifacts, and works of art, archival documents, and natural history specimens that are part of museum collections (National Park Service, Cultural Resource Management Guidelines, Directors Order 28, 1997).

Currently, the Logan Pass Visitor Center exhibits hold a small number of objects that are part of the Glacier National Park museum collection. The proposed project would not impact the museum objects. Therefore, this impact topic was dismissed from further analysis.

Prime and Unique Farmlands

The *Farmland Protection Policy Act of 1981*, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agriculture uses. Prime and unique farmlands are not located within GNP(NPS 1999).

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. Disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the *Environmental Protection Agency's Environmental Justice Guidance* (1998) would not occur from improvements made at Logan Pass. Therefore, environmental justice was dismissed from further analysis.

Natural Soundscape

In accordance with NPS 2006 *Management Policies* and Director's Order #47, *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park units (NPS 2006). Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NOS units as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas. The potential effects associated with the proposed actions would not generate permanent, appreciable noises within the soundscape of Logan Pass. The noise produced from the generators would be mitigated by housing them within a box. The noise is not expected to last longer than a few minutes and would not be audible in the visitor center. Therefore, impacts on natural soundscape values would be minor or less and are dismissed from further analysis.

Lightscape

In accordance with 2006 *Management Policies*, the NPS strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human caused light (NPS 2006). Glacier National Park strives to limit the use of artificial outdoor lighting to that which is necessary for basic safety requirements and to ensure that all outdoor lighting is shielded to the maximum extent possible, to keep light on the intended subject and out of the night sky. The proposed action would not add lights to the outside of the visitor center or on the new restrooms or in the parking lot. The additional power generated would not be used for lighting, either inside or outside buildings at Logan Pass. Construction would likely only occur during the day, if construction activity occurred at night it would only be temporary and would not be long-term. Therefore, impacts to lightscales would be negligible and temporary and therefore was dismissed as an impact topic.

Alternatives Considered

Between April and November 2008, an interdisciplinary team of Glacier National Park employees and contractors considered the issues and developed alternatives. Three alternatives were looked at for the shuttle stop, five alternatives were considered to generate additional electricity, and four alternatives were considered to address the restroom issues. Of these, two of the shuttle stop alternatives, two of the renewable energy alternatives and three of the restroom alternatives were dismissed from further consideration for reasons described later in this document.

Alternatives Carried Forward

Alternative A – No Action Alternative

Under this alternative, the existing propane fueled thermo-generator system would remain until they failed due to their age. At this time they are only operating at 9% efficiency. The existing restrooms just below the visitor center would remain in operation with no improvements or increase in capacity. Currently there are five urinals, three toilets, including one accessible stall in the men's restroom; ten toilets, including one accessible stall in the women's restroom; and one family restroom, which is not accessible. There are four sinks in each restroom. Visitors requiring accessible restrooms would continue to use these via the accessible path from the parking lot. Restrooms would continue to close down in early fall.

The shuttle stop would continue to be located directly in front of the visitor center.

The water system would remain above the visitor center (see figure 2). A perforated pipe would continue to be anchored in bedrock at 6,813' elevation in the Logan Creek inlet. A four-inch cast iron pipe from the collection basin would continue to transport the water approximately 680 feet through a pipe, to a chlorination system for treatment, and then to a 10,000-gallon above ground tank located at an elevation of 6,758 feet. Water would continue to be provided to the restrooms for the toilets and sinks. The used water would continue to empty into a wastewater vault that is pumped twice a day except during peak season when it is pumped 4 times a day. Water would also continue to be directed to a janitor's sink and a drinking fountain. Groundwater would continue to seep into the wastewater vault, contributing to the number of times pumping is required. The wastewater would continue to be taken down to the St. Mary Wastewater Treatment System on the east side of the continental divide.

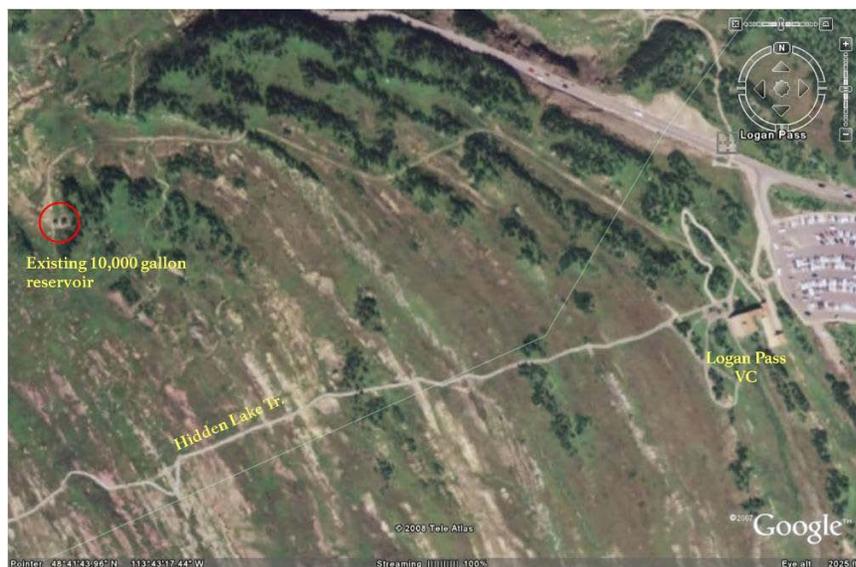


Figure 2. Micro-hydroelectric vicinity map**Alternative B – Provide new Propane Generator/shuttle stop/new vault toilets and rehabilitate existing restroom (Preferred)**

Under this alternative, the existing restrooms would be remodeled. The men's restroom would have five urinals (one that would be accessible) and five toilets with stalls (two would be accessible). The women's restroom would have twelve stalls (two would be accessible). Each restroom would be partitioned into two sections to allow half of the restroom to remain open while the other half is being cleaned. The family restroom would be made accessible. The existing sinks would be removed to further reduce water use and hand sanitizer would be provided. The sewer line would be repaired to prevent groundwater from leaking into the wastewater vault. Two drinking fountains would be installed outside the restrooms that include a fixture to fill water bottles. The water supply system and chlorination system would remain as described in the no action alternative. Four to eight gallons per minute per day would continue to be withdrawn from Logan Creek for the restrooms and for drinking water.

A new four to six unit restroom building would be constructed adjacent to the parking lot (see figure 3). To reduce impacts to visitors from construction activities the building would be prefabricated off site, disassembled and transported to Logan Pass where it would be reassembled during low visitor use times and before snow closes the GTSR (in the fall). A peat-filter and fan would be installed to filter odor. A solar panel mounted on the southern-most aspect of the building would provide energy for the fan. The new restroom building would be constructed on top of the existing wastewater vault which would permit the waste from the new restrooms to go into the existing vault. The new building would be similar in style to the visitor center; in that materials and design would complement the surrounding landscape.

The shuttle bus stop would be located along the western curb of the existing west parking lot entrance (see figure 3). Seating would be provided to accommodate shuttle users waiting for a bus. Accessible ramps would be installed along the sidewalk or grading the entire curb to parking lot level for optimal access. A portion of alpine vegetation that had been planted as part of a restoration project would be removed near the west entrance.

The existing inefficient and outdated propane fueled thermo-generators would be replaced by two energy efficient, propane fueled generators connected to a bank of batteries. This would increase the power capacity at Logan Pass to accommodate a weather station, the new radio system, the shuttle bus communication system and interior electrical needs in the visitor center. Exterior lights are not installed at Logan Pass and would not be added due to night sky concerns. The generators would charge a bank of batteries to supply the visitor center's energy needs. The generators would only run when the batteries' energy supply dropped below a certain level and they would remain on until the batteries were fully charged. The generators would be located on the exterior of the visitor center in a sound minimizing box (see figure 2). To provide power for the radio system and weather station during the winter months and for the spring plowing operation, solar panels would be installed on the inside of the visitor center windows after the GTSR is closed to vehicles in the late fall.

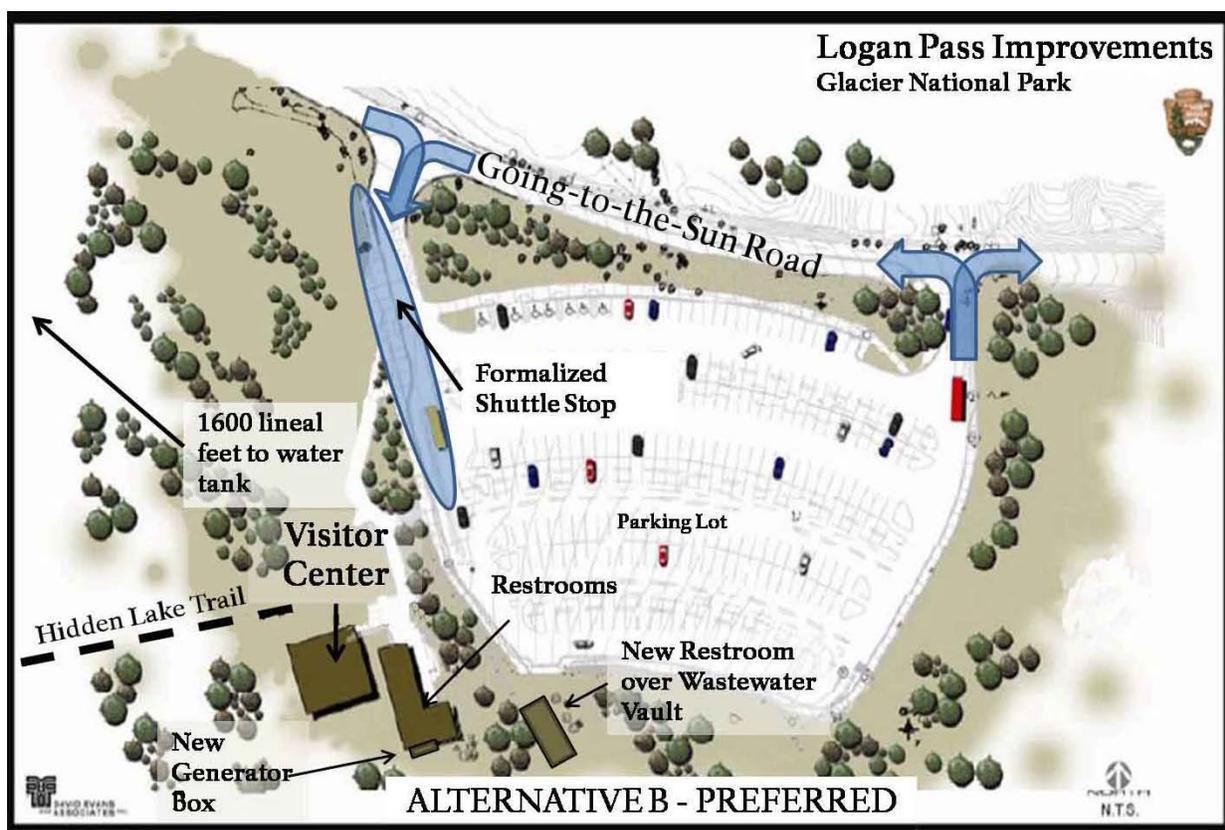


Figure 3. Alternative B conceptual drawing of the preferred alternative.

Alternative C – Micro-hydroelectric (micro-hydro) system with a backup generator

Under this alternative the actions proposed for the restrooms and shuttle stop would remain as described in Alternative B; however, the existing outdated and inefficient propane fueled thermo-generator system would be replaced by a micro-hydro system with a backup propane fueled generator and changes would be made to the chlorination and water system.

The micro-hydro system would generate power for about 16 hours a day during the summer and would use a small photovoltaic system (solar panel) to charge the batteries for operation of the weather station during the winter. The system would consist of a valve-controlled connection to the water source, a hydroelectric turbine, a discharge piping system and all the electrical components, e.g. the panel, charge controller, wiring, etc. The penstock for the micro-hydro turbine would utilize the existing 6-inch water pipe. A building approximately 100 square feet would be constructed nearby to house the micro-hydro turbine. This structure would be as low profile as possible. It would likely be concrete with a hatch for entry. This structure would be the only visible evidence of this electrical system and would be painted or stained to blend with the surroundings.

A new perforated pipe would be added into the stream to replace the old pipe. The existing water tank would be retained as a backup and for fire protection if needed. An additional 55 feet of pipe would be added to bypass the tank and increase the water pressure going into the turbine which would provide more power. Water would leave this area and flow in a 3,200-foot long, six-inch cast iron pipe to the Logan Pass VC (6,677 feet). The system would use 150 gallons of water per minute in addition to the 4-8 gallons per minute per day that would continue to be withdrawn for the restrooms and drinking water. However, the 150 gallons would then be directed back into the source stream channel, approximately 1300 feet downstream from the

diversion site. The chlorination system would be relocated to the visitor center to avoid chlorinating the water used by the micro-hydro.

Alternative D – Photovoltaic (solar) with a backup generator

Under this alternative solar energy would be the main source to provide energy year round and the actions proposed for the restrooms and shuttle stop would remain as described in Alternative B. The existing propane fueled thermo-generator system would be replaced by an array of photovoltaic (solar) modules and a more efficient propane fueled generator backup.

The solar panels are constructed of crystalline silicon photocells, which would convert solar energy to electricity. When the panels are circuited together (called modules), they provide electrical voltage and current within a specified range. The modules would be mounted in an array south of the visitor center and positioned to acquire sunlight (see figure 4). The park considered several options: roof mount, ground mount, and pole mount. A solar assessment determined the best location for the panels would be southeast of the visitor center (CTA 2007). Three modules each 11 feet by 16 feet in size would be required to provide the necessary power and would be mounted in an array a minimum of eight feet above the ground (see figure 5).

The backup generator would consist of an engine generator set with a propane fuel source. It would be equipped with appropriate sound attenuation enclosure to minimize noise pollution and would be located in an equipment room along with the balance of plant equipment for visitor center.

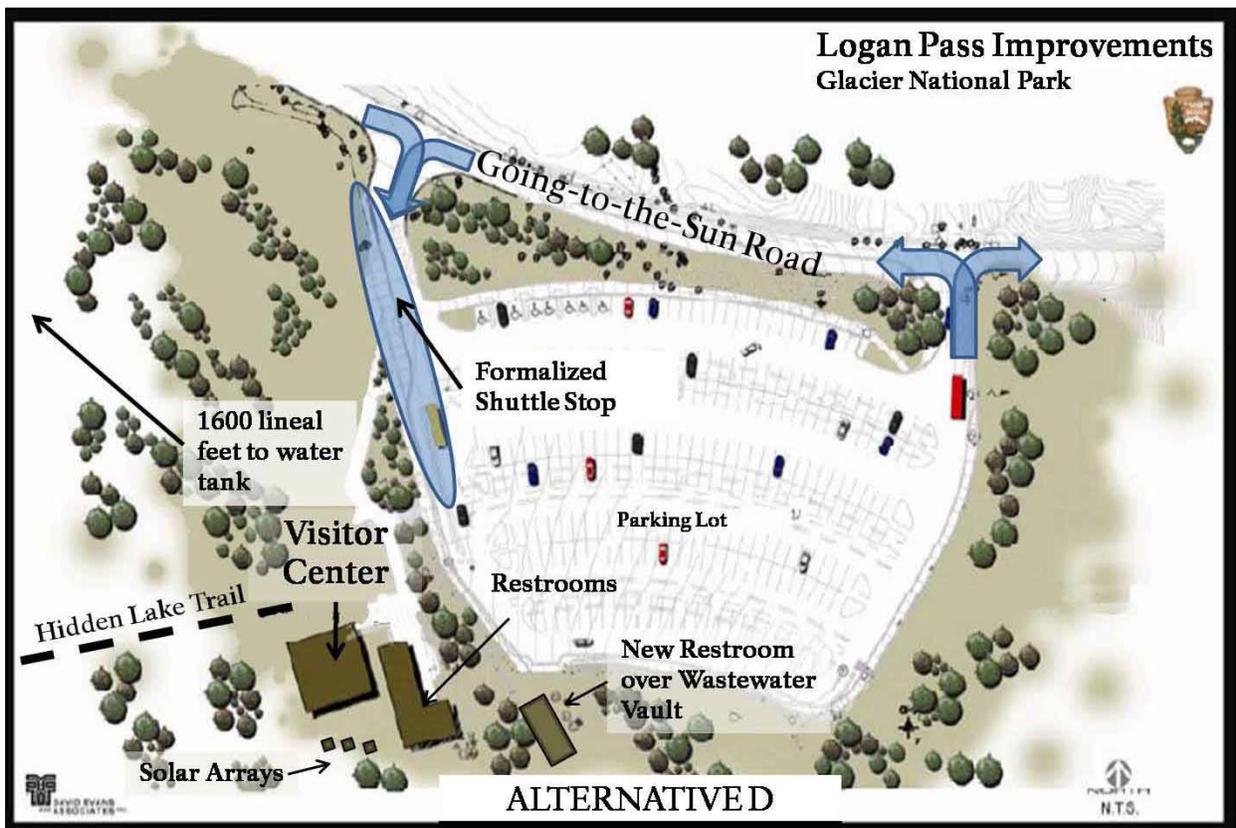


Figure 4. Conceptual layout of solar alternative (DEA 2008)

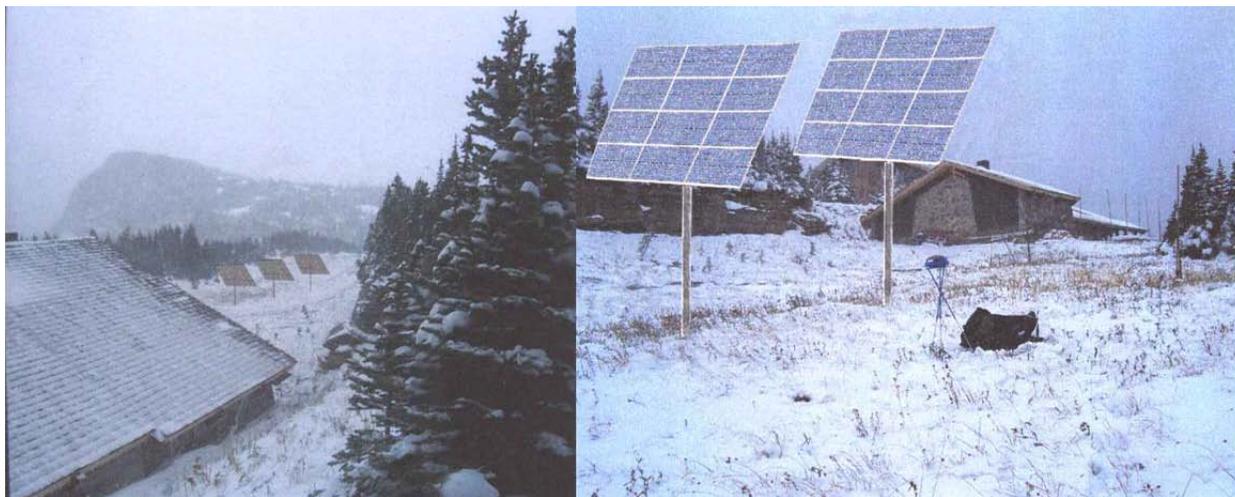


Figure 5. Altered photograph showing concept of solar arrays as seen above the Logan Pass VC (CTA 2007)

Mitigation Measures

The following mitigation measures as appropriate would be taken to protect natural resources at each site:

Historic Structures and Cultural Landscapes

- Follow the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to ensure the project design is compatible with the historic architectural characteristics of the Going-to-the-Sun Road and the Logan Pass Visitor Center.

Soils

- Salvage all excess soil during construction for use in restoration.
- Salvage vegetated mats prior to disturbance for use in restoration. These reestablish quickly and help prevent post-construction erosion.
- Aerate and replant any ground surface temporarily disturbed during construction.

Vegetation

- Implement Best Management Practices to prevent wind erosion.
 - Disturbance to vegetation and ground would be avoided as much as possible and be contained to as small of footprint as possible while meeting project objectives.
- Use natural design features to minimize visual impacts and to aid in creating suitable site conditions for revegetation.
- Use existing sod to revegetate any ground temporarily disturbed during the construction process or existing disturbed ground in need of recovery.
- Complete a restoration analysis to decide if revegetation is necessary throughout the life of the project. If it is determined to be necessary the following mitigation measures would apply.
 - Apply soil amendments, mulches, organic matter and other measures as appropriate to facilitate revegetation.
 - Utilize native species from genetic stocks originating in the park for revegetation seeding and planting efforts. Plant species density, abundance, and diversity would be restored as nearly as possible to prior conditions for non-woody species.

- Monitor to evaluate vegetation cover and develop contingency and maintenance plans if vegetation cover is not similar to original ground cover.
- Prepare a vegetation management plan for the entire project.
- Conduct aggressive noxious weed control measures and control noxious weed populations in the vicinity of project area to minimize transport of noxious weeds to other locations along the GTSR.
- Inspect construction vehicles to prevent the import of noxious weeds from tires and mud on the vehicles and equipment.
- Use periodic inspections and spot controls to prevent noxious weed establishment. If noxious weeds invade an area, an integrated noxious weed management process to selectively combine management techniques to control the particular noxious weed species would be used.
- Due to the sensitive and relatively pristine nature of vegetation at this site, invasive non-noxious weeds such as dandelions will also be aggressively treated along with measures to prevent establishment.

Wildlife

- No food garbage or items that would be considered attractants to wildlife would be stored on site.
- Equipment would be inspected for hydraulic fluid, antifreeze and oil leaks prior to use at staging and stockpiling sites, and materials would be kept on site for clean up of any motor vehicle or heavy equipment fluid spills that might occur (such fluid spills are potential unnatural attractants to wildlife species including mountain goats, bighorn sheep and mule deer).
- Contractors would be expected to read and comply with the recommendations in the provided handbook: “Bear Safety, Site Sanitation and Other Requirements while working in Glacier National Park: a handbook for construction contractors”.

Threatened and Endangered Species and Species of Concern

- Implement measures to reduce potential for bear-human conflicts. Require construction personnel to adhere to park regulations concerning food storage and refuse management.
- Enforce regulations that prohibit feeding of wildlife and that require proper food storage.
- Provide adequate portable restrooms for construction workers to eliminate human waste as a wildlife attractant at construction sites.
- Follow conservation measures of the GTSR rehabilitation for construction workers/contract employees.

Visitor Experience

- Construction would occur during low visitor periods
- Prefabricate new restroom to reduce construction time at Logan Pass

Visual Resources

- New construction would be designed to emulate existing structures and blend into the natural scenery and topography

Alternatives Considered and Dismissed

Shuttle Stop Alternatives Eliminated

Island Construction at Entrance of Parking Lot

An alternative was considered that would have located all new development near the northwest corner of the existing parking lot (see figure 6).

Shuttle bus access would be separated from private vehicles and tour buses. Shuttle buses would enter through the existing west entrance of the parking lot and use a dedicated shuttle bus loading area. Shuttle buses would exit at a newly developed intersection midway between the existing west entrance and east exit points to the parking lot. A new pedestrian plaza would be built between the shuttle bus area and the parking lot. Passenger shelters and the restroom building would be located on the plaza, which would connect to the sidewalks and pedestrian ramp leading to the visitor center. This alternative was eliminated from further study due to the visual intrusion on the scenery, potential loss of critical parking spaces for visitors and concession buses and the potential adverse effect on the historic Logan Pass Visitor Center.



Figure 6. Island Construction concept drawing (DEA 2008).

Shuttle Stop at Southern End of Parking Lot

Shuttle bus loading would occur along the southern edge of the parking area (see figure 7).

A new island would be provided between the parking lot and the shuttle bus loading area. In order to comply with the Architectural Barriers Act Accessibility Standard (ABAAS), the entire parking lot would have to be re-graded from the north end to the south end to provide accessibility to the shuttle stop. This alternative would also require the removal of the historic stone retaining wall. This alternative was eliminated from further study due to the impacts associated with re-grading the entire parking lot and loss of the historic stone retaining wall.

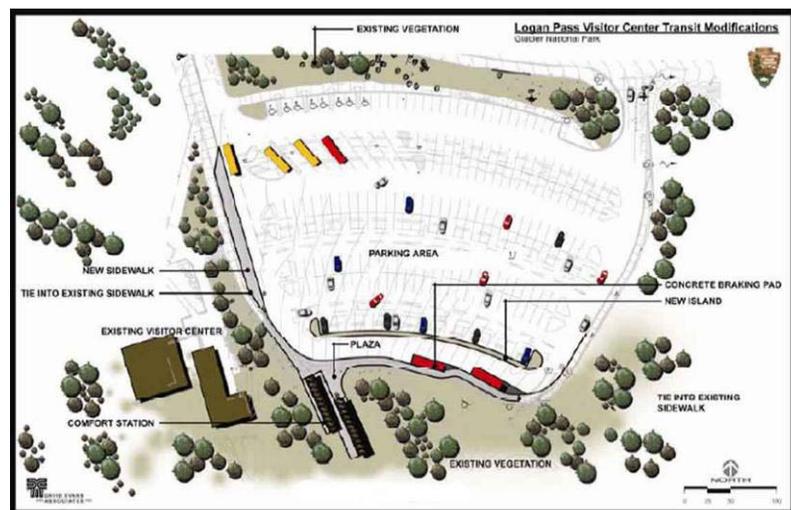
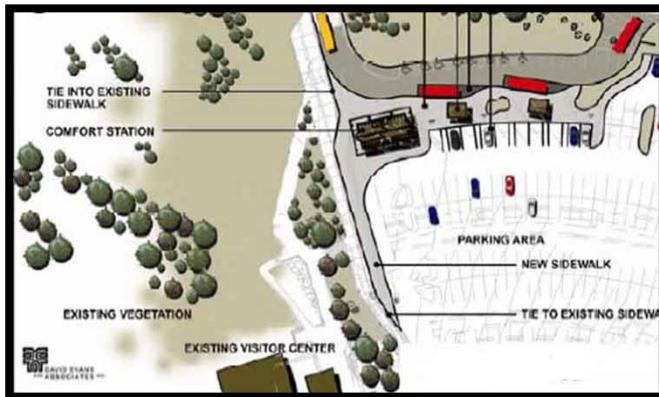


Figure 7. Southern-end of Parking Lot Construction concept drawing (DEA 2008).

Restroom Alternatives Eliminated

Restroom on Island Construction of Parking Lot

An alternative was considered that would have incorporated the restroom with the island construction for the shuttle stop (see figure 8).



The park considered constructing a 24-vault restroom building at this location. The restroom building in the visitor center would have been removed and the only restrooms that would have been available would be at the island location. The park determined the impacts to visual and cultural resources would have been too substantial to continue further analysis. The restroom would take away from the natural views as visitors approached Logan Pass from the west side of the park.

Figure 8. Restroom on Island Construction (DEA 2008).

Mission 66 Visitor Centers at destination locations, such as Logan

Pass, were sited carefully to take advantage of and highlight natural views (Allaback 2000). The proposed restroom site would significantly diminish visitor center views of the Garden Wall; the view is especially important as visitors exit the building where the view is framed by posts and the gabled roof. The Garden Wall view also is the scenic view provided visitors as they ascend and descend the open sided stairway from the restroom level to the main building. The long shed roofed stairway roof closes most other views and directs the eye in the direction of the Garden Wall.

The restroom would be constructed in a style similar to the visitor center; however, it would alter the character the historic visitor center, significantly diminish the integrity of the building to the extent that it might not be eligible for listing in the National Register of Historic Places any longer.

Restroom at Southern End of Parking Lot

An alternative was considered that would have located the new 24-vault restroom building at the southwest end of the parking lot and remove the existing restrooms (see figure 9).

The restroom building would be designed as a “waterless” operation with non-flushing, vault toilets. However, they do involve vaults that must have water in them. After further evaluation, the park determined the amount of water

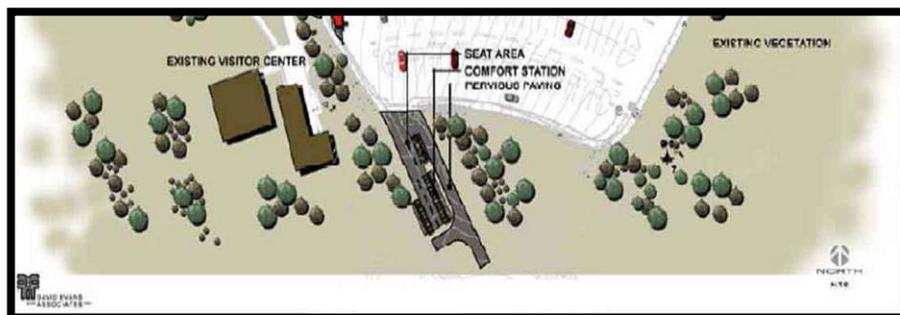


Figure 9. Southern-end of parking lot concept drawing (DEA 2008).

necessary for the vault toilets to function properly would exceed the amount of water currently being used by the flushing toilets. Approximately one foot of water is needed in the vault in the vault at all times in order to clean more easily, each vault is seven feet by five feet therefore to fill with one foot of water it would require over 200 gallons of water per vault. The park was also

concerned and could not guarantee that the toilets would not have an odor at different times depending on wind conditions and other weather factors. This was considered too great a risk to take at this highly visited and significant location. Therefore this alternative was dismissed due to the increased water use and potential for odor.

Restroom Construction North of the Visitor Center

An alternative was considered that would have constructed a 20 to 24-vault restroom building north of the visitor center, west of the parking lot (see figure 10). The existing restrooms in the visitor center would have been removed. The park determined the impacts to visual and cultural resources would have been too substantial to continue further analysis. The restroom would take away from the natural views as visitors approached Logan Pass from the east and west sides of the park. Once in the parking lot, whether in a personal vehicle or shuttle bus, the views Mount Clements would be obstructed by the newly constructed restroom. A portion of the fragile alpine vegetation would be removed and replaced by the restroom and bus shelters, causing a permanent negative impact to vegetation.

Mission 66 Visitor Centers at destination locations, such as Logan Pass, were sited carefully to take advantage of and highlight natural views (Allaback 2000). The proposed site of the restroom would significantly diminish visitor center views of the Garden Wall; the view is especially important as visitors exit the building where the view is framed by posts and the gabled roof. The Garden Wall view also is the scenic view provided visitors as they ascend and descend the open sided stairway from the restroom level to the main building. The long shed roofed stairway roof closes most other views and directs the eye in the direction of the Garden Wall.

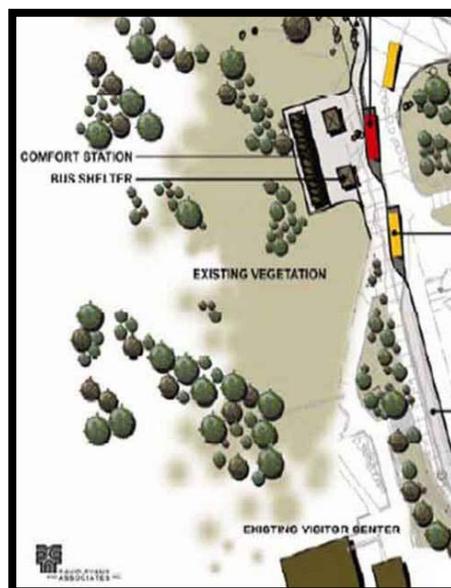


Figure 10. Restroom Constructed North of the Visitor Center (DEA 2008).

Renewable Energy Alternatives Eliminated

Fuel Cell

A fuel cell system was considered that would generate electricity by electron flow associated with forming the hydrogen and oxygen bond. A supply of pure hydrogen, provided by propane, is passed through the fuel cell producing electricity with only heat and water vapor as byproducts.

Pollution reduction is the main purpose for utilizing the fuel cell. However, compared to micro-hydro, wind and solar, fuel cells are extremely inefficient in producing energy and would require a constant supply of fuel (which is not available at Logan Pass) therefore this alternative was eliminated from further study.

Wind Turbine with Backup Generator

Installation of wind turbines was considered. It was determined that wind generated electricity would have significant adverse impacts on wildlife, historic structures and visual resources at Logan Pass. The tower(s) would be the highest structures at the pass causing adverse impacts to visual resources, the historic visitor center and potential harm to avian and other airborne wildlife. In order to optimize efficiency levels, everything within 300 feet of the tower(s) would need to be at least 20 feet lower. Wind turbine technology has made several improvements in

regards to noise generation but some noise would be generated. A complete wind study to quantify the wind resource at Logan Pass was not initiated because of the adverse impacts associated with wind turbines for this particular site; therefore, this alternative was eliminated from further study.

Alternative Summaries

Table 2 summarizes the major components of the four alternatives, and compares the ability of these alternatives to meet the project objectives (as identified in the Purpose and Need). As shown, the no action alternative only achieves one of the project objectives while the Preferred Alternative achieves all the project objectives.

Table 2. Alternative summary and extent to which each alternative meets project objectives

Objectives	Alternative A - No Action	Alternative B - Preferred	Alternative C – Micro-hydro	Alternative D - Solar
Provide improved, upgraded restrooms that would include: increased visitor capacity, shoulder season use and reduced water and energy use.	No. A new restroom would not be constructed. The existing restrooms would continue to operate in its existing condition.	Yes. The proposed actions would increase visitor capacity and allow use in the shoulder season. And the removal of sinks and sewer line improvements would reduce water use.	Same as the preferred alternative.	Same as the preferred alternative.
Formalize and provide a less congested and confusing shuttle stop	No. A formalized shuttle stop would not be constructed. Temporary signs would continue to direct visitors to shuttle buses.	Yes. The shuttle stop would be formalized and designed to reduce congestion and confusion at the shuttle stop.	Same as the preferred alternative.	Same as the preferred alternative.
Install a more energy efficient power system that would reduce the dependence on fossil fuels and support additional power needs for shuttle and communication	No. The existing energy system would not be improved or changed. It is outdated and does not produce energy efficiently to support additional needs.	No, however this alternative would install more efficient generators and would use less propane than the existing generator.	Yes. The micro-hydro system would reduce the use of fossil fuels while generating additional electricity for shuttle and communication needs.	Yes. The solar arrays would reduce the use of fossil fuels and generate electricity for shuttle and communication needs.
Minimize impacts to natural and cultural resources	Yes. New disturbance or construction would not occur.	Yes. New disturbance would occur but mitigation measures would be taken to minimize impacts. This alternative would have the least amount of impacts to natural and cultural resources.	Yes. New disturbance would occur but mitigation measures would be taken to minimize impacts. This alternative would have greater disturbance to natural resources than the preferred.	Yes, for natural resources No, for cultural and visual resources due to the installation of solar arrays in the vicinity of the visitor center and the reflection of the solar panels.

Table 3 summarizes the anticipated environmental impacts for each restroom and shuttle stop alternative. Only those impact topics that have been carried forward for further analysis are included in this table. Refer to the “Affected Environment and Environmental Consequences” section for further description of the impacts.

Table 3. Summary Comparison of Impacts by Alternative for Restroom and Shuttle Stop Alternatives

Impact Topic	Alternative A No Action	Alternative B Preferred	Alternative C Micro-hydro	Alternative D Solar
Historic Structures and Cultural Landscapes	Negligible Section 106: No Adverse Effect	Minor, long-term and adverse Section 106: No Adverse Effect	Minor, long-term and adverse Section 106: No Adverse Effect	Minor, long-term and adverse for the GTSR Moderate, long-term and adverse for the Logan Pass VC Section 106: No Adverse Effect for the GTSR Adverse Effect for the Logan Pass VC
Soils	No new disturbance therefore there would be no effect to soils	Minor, adverse, and long-term	Minor, adverse, and long-term	Minor, adverse, and long-term
Vegetation	No new disturbance therefore there would be no effect to vegetation	Minor, adverse, and long-term	Minor to moderate, adverse, and long-term	Minor to moderate, adverse, and long-term
Wildlife Species	No new impacts to wildlife beyond the current situation	Negligible, adverse and short-term during construction activities	Negligible, adverse and short-term during construction activities	Negligible, adverse and short-term during construction activities
Threatened, Endangered, and Species of Concern				
Grizzly Bear	Negligible to minor, short-term, adverse	Negligible to minor, short-term, adverse; indirect impacts on behavior, foraging patterns, and movement	Negligible to minor, short-term, adverse; indirect impacts on behavior, foraging patterns, and movement	Negligible to minor, short-term, adverse; indirect impacts on behavior, foraging patterns, and movement

Impact Topic	Alternative A No Action	Alternative B Preferred	Alternative C Micro-hydro	Alternative D Solar
Westslope Cutthroat Trout	No impacts	Minor, long-term, beneficial; drainage improvements	Negligible to minor, long-term, adverse impacts from continued use of Logan Cr.	Minor, long-term, beneficial; drainage improvements
Wolverine	No additional impacts beyond what is currently known	Minor, short-term, adverse; displacement	Minor, short-term, adverse; displacement	Minor, short-term, adverse; displacement
White-tailed Ptarmigan	No additional impacts beyond what is currently known	Negligible to minor, short-term, adverse; no habitat loss expected or displacement	Negligible to minor, short-term, adverse; no habitat loss expected or displacement	Negligible to minor, short-term, adverse; no habitat loss expected or displacement
Western Toad	No additional impacts beyond what is currently known	No additional impacts beyond what is currently known	Negligible to minor, short-term, adverse; aquatic habitat disturbance	No additional impacts beyond what is currently known
Water Resources	Minor, long-term, adverse impacts to water quantity due to drawing water off the system; water quality would remain at current level	Minor, short and long-term, beneficial impacts to water quality. Moderate, short and long-term, highly localized beneficial impacts to water quantity	Minor, short and long-term beneficial impacts to water quality. Moderate, short and long-term, but highly localized, beneficial impacts to water quantity	Minor, short and long-term beneficial impacts to water quality. Moderate, short and long-term, but highly localized, beneficial impacts to water quantity
Visitor Use and Experience	Visitors would continue to experience moderate, adverse, and long-term impacts that would be mainly localized around the visitor center and Logan Pass as a destination by not installing a new restroom and formalizing the shuttle stop	First-time visitors to Logan Pass would not perceive a change. Other visitors would experience temporary minor to moderate, adverse, short-term impacts from construction but would experience long-term beneficial impacts from the proposed new restroom and shuttle stop	Visitors would experience minor to moderate, adverse, short-term impacts from construction but would experience long-term beneficial impacts from the proposed new restroom, shuttle stop, and knowledge that the energy to operate the visitor center is coming from a renewable resource	Visitors would experience moderate, adverse, short-term impacts from construction but might experience long-term beneficial impacts from the proposed new restroom, shuttle stop, and knowledge that the energy to operate the visitor center is coming from a renewable resource

Impact Topic	Alternative A No Action	Alternative B Preferred	Alternative C Micro-hydro	Alternative D Solar
Visual Resources	No new changes to visual resources would occur	Minor to moderate, long-term, site-specific, adverse	Minor to moderate, long-term, site-specific, adverse	Minor to moderate, long-term, site-specific and wide spread, adverse
Health and Safety	No changes beyond the current situation	Minor to moderate, long-term, beneficial	Minor to moderate, long-term, beneficial	Minor to moderate, long-term, beneficial

Environmentally Preferred Alternative

The Council on Environmental Quality defines the environmentally preferred alternative as "...the alternative that will promote the national environmental policy as expressed in the National Environmental Policy Act's §101." Section 101 of the National Environmental Policy Act states that "... it is the continuing responsibility of the Federal Government to ...

- 1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- 2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- 3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- 4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
- 5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- 6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

The no action alternative (Alternative A) would meet criteria 1 – 4 evaluation but not criteria 5 and 6. Since the no action would retain the current state of the amenities at Logan Pass, it would meet criteria 1 but not to the fullest extent possible (as compared to the preferred alternative). Continued use of the water supply at the current rate would not be sustainable as the population grows and therefore not meeting criteria 5. Alternative C (micro-hydro) would meet criteria 1, 2, and 5 but not criteria 3, 4 or 6. Utilizing the available water source at Logan Pass to provide energy would seem to achieve criteria 6; however, in order to access the amount of water required to generate enough power for the visitor center and associate operations, the park would have to manipulate the natural infiltration system to create more flow. Additionally this would not meet criteria 4 and could eventually exhaust the water supply at Logan Pass which would not meet criteria 3. Global climate change could also affect the long term availability of water in this area. Alternative D (solar) would meet all the criteria except criteria 4. Preservation of resources includes their visual integrity. The solar array would adversely affect the visual aspects of the historic Logan Pass VC and pristine mountain views at the pass and surrounding areas.

The preferred alternative (Alternative B) would achieve all six criteria by improving the environment and preserving and protecting natural and cultural resources due to design details

and use of fewer resources such as water and propane. It would enhance the quality of renewable resources by preventing groundwater from seeping into the system and achieves a balance between population and resource use by accommodating increased visitation and visitor needs without significantly affecting resources.

Affected Environment and Environmental Consequences

Methodology

The effects of each alternative are assessed for direct, indirect, and cumulative effects on selected impact topics. Direct effects are impacts that are caused by the alternatives at the same time and in the same place as the action. Indirect effects are impacts caused by the alternatives that occur later in time or are farther in distance than the action. For example, construction grading might immediately result in the direct removal of vegetation and soil from a site and later result indirectly in increased erosion at the site when it rains, and to water quality off-site. Effects to historic properties listed in or eligible for listing in the National Register of Historic Places also have been described in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800.

Potential impacts are described in terms of type, spatial context, duration, and intensity.

- **Type:** impacts are either *beneficial* or *adverse*. A resource might be affected both beneficially and adversely (e.g., one wildlife species might benefit while another is harmed), however an overall impact for the resource as a whole is determined.
- **Spatial Context:** impacts are 1) *site-specific* at the location of the action, 2) *local* on a drainage- or district-wide level, 3) *widespread* throughout the park, or 4) *regional* outside of the park.
- **Duration:** impacts are *short-term* or *long-term*. The definitions for these periods depend upon the impact topic and are described in Table 3.
- **Intensity:** the impacts are *negligible*, *minor*, *moderate*, or *major*. Definitions of intensity vary by impact topic and are provided in Table 3.

Cumulative Impacts

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

Cumulative impacts were determined by combining the impacts of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects in Glacier National Park and, if applicable, the surrounding region. The following are past, present and reasonably foreseeable future actions that have and could occur in the vicinity of the project area:

Past Actions

- Opening of the GTSR in 1932 and construction of the visitor center in 1966.
- Rehabilitation of restrooms in 1985 and more recent rehabilitation of windows and floors in the 1990s.

- Construction of accessible walkway to visitor center and restrooms in 2001.

On-going Actions

- Going-to-the-Sun Road rehabilitation and mitigation (including the shuttle bus system). In 2003, the park completed an EIS on the impacts and necessary mitigation measures to rehabilitate the GTSR.
- Visitor use of the area.

Future Actions

- Continued visitation with potential increase.
- Continued rehabilitation efforts on the GTSR.
- Construction of comfort stations in or near the GTSR corridor – including new restrooms at Grizzly Point, Avalanche, and The Loop, Logan Creek, Big Bend.

Impairment of Park Resources or Values

NPS *Management Policies* (NPS 2006) require analysis of potential effects to determine whether actions would impair park resources or values. The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, actions that would adversely affect park resources and values.

These laws give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value might constitute impairment. Impairment might result from NPS activities in managing the park, from visitor activities, or from activities undertaken by concessionaires, contractors, and others operating in the park. An impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

Each alternative was analyzed to determine if impacts constituted impairment to park resources and values.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the Park Service applies a standard that offers greater assurance that impairment will not occur by avoiding unacceptable impacts. These are impacts that fall short of impairment, but are still not

acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with
 - park programs or activities, or
 - an appropriate use, or
 - the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park.
 - NPS concessioner or contractor operations or services.

In accordance with Management Policies, park managers must not allow uses that would cause unacceptable impacts to park resources. To determine if unacceptable impact could occur to the resources and values of Glacier National Park, the impacts of proposed actions in this environmental assessment were evaluated based on the above criteria. A determination on unacceptable impacts is made in the Conclusion section for each of the resource topic. Table 4 summarizes the anticipated environmental impacts for each renewable energy alternative for each impact topic.

Table 4. Impact thresholds for intensity and duration

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Historic Structures and Cultural Landscapes	Treatment is at the lowest levels of detection – barely perceptible and not measurable. For purposes of Section 106, the finding of effect would be no adverse effect.	Treatment would affect the character defining features of a National Register of Historic Places eligible or listed property, but is in accordance with the Secretary of the Interior’s Standards. For purposes of Section 106, the finding of effect would be no adverse effect.	Treatment would alter a character defining feature(s), diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the National Register of Historic Places. For purposes of Section 106, the finding of effect would be adverse effect.	Treatment would alter a character defining feature(s) of a National Historic Landmark, diminishing the integrity of the resource to the extent that its designation is threatened. For purposes of Section 106, the finding of effect would be adverse effect.	Short-term: Effects extend only through the period of construction Long-term: Effects extend beyond the period of construction
Soils	Soil productivity or soil fertility would not be affected or the effect would be below or at the lower end of detection. Any effects to soil productivity or soil fertility would be slight and not measurable.	The effects to soil productivity or soil fertility would be detectable, but small. The area affected would be local.	The effect to soil productivity or soil fertility would be readily apparent. Effects would result in a change in soils over a relatively wide area or multiple locations.	The effect on soil productivity or soil fertility would be readily apparent and would substantially change the character of soils over a large area.	Short-term: After implementation, would recover in less than 3 years. Long-term: After implementation, would take more than 3 years to recover or effects would be permanent.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Vegetation	Vegetation would not be affected or the changes would be so slight that they would not be of any measurable or perceptible consequence to the species' population.	Some individual native plants would be affected over a relatively small area, but the effects would be localized, and would be of little consequence to the species' population.	Some individual native plants would be affected over a relatively wide area or multiple sites and would be readily noticeable. A sizeable segment of a species' population could be affected.	A considerable effect on native plant populations would occur over a relatively large area.	<p>Short-term: After implementation, would recover in less than 3 years.</p> <p>Long-term: After implementation, would take more than 3 years to recover or effects would be permanent.</p>
Wildlife	Effects would be at or below the level of detection and the changes would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population.	Effects on wildlife species would be detectable, although the effects would be localized and would be small and of little consequence to the species' population.	Effects on wildlife species would be readily detectable and widespread, with consequences at the population level.	Effects on wildlife resources would be obvious and would have substantial consequences to species populations in the region.	<p>Short-term: After implementation, would recover in less than 1 year.</p> <p>Long-term: After implementation, would take more than 1 year to recover or effects would be permanent.</p>

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Threatened, Endangered, and Species of Concern	The alternative would affect an individual of a listed species or its critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. Negligible effect would equate with a “no effect” determination in U.S. Fish and Wildlife Service terms.	An individual(s) of a listed species or its critical habitat would be affected, but the change would be small. Minor effect would equate with a “may affect, not likely to adversely affect” determination for the species in U.S. Fish and Wildlife Service terms and would require informal consultation.	An individual or population of a listed species, or its critical habitat would be noticeably affected. The effect could have some long-term consequence to individuals, populations, or habitat. Moderate effect would equate with a “may affect” determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of “likely...” or “not likely to adversely affect” the species and would require either informal or formal consultation.	An individual or population of a listed species, or its critical habitat, would be noticeably affected with a vital consequence to the individual, population, or habitat. Major effect would equate with a “may affect, likely to adversely affect” or “not likely to adversely affect” determination in U.S. Fish and Wildlife Service terms and would require formal consultation.	Short-term: After implementation, would recover in less than 1 year. Long-term: After implementation, would take more than 1 year to recover or effects would be permanent.
Water Quality/Quantity	Water quality/quantity would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight and not measurable.	Changes in water quality/quantity would be measurable, although the changes would be small and the effects would be localized.	Changes in water quality/quantity would be measurable and would be noticeable on a widespread scale.	Changes in water quality/quantity would be readily measurable, would have substantial consequences, and would be noticed on a regional scale.	Short-term: After implementation, recovery would take less than one year. Long-term: After implementation, recovery would take longer than one year or effects would be permanent.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Visitor Use and Experience	Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.	Changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.	Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative.	Changes in visitor use and/or experience would be readily apparent and have important consequences. The visitor would be aware of the effects associated with the alternative.	Short-term: Occurs only during project implementation or one month. Long-term: Occurs for more than one month or is permanent.
Visual Resources	Effects would not result in any perceptible changes to existing viewsheds.	Effects would result in slightly detectable changes to a viewshed or in a small area or would introduce a compatible human-made feature to an existing developed area.	Effects would be readily apparent and would change the character of visual resources in an area.	Effects would be highly noticeable or would change the character of visual resources by adding human-made features into a mostly undeveloped area or by removing most human-made features from a developed area.	Short-term: Would be temporary and removable. Long-term: Would be continual or permanent.
Health and Safety	Public health and safety would not be affected, or the effects would not be noticeable.	Effects would be detectable, but would not have an appreciable effect on public health and safety.	Effects would be readily apparent and would result in a substantial change in public health and safety in a manner noticeable to staff and public.	Effects would be readily apparent, would result in a substantial change in public health and safety in a manner noticeable to staff and the public, and would be substantially different from existing conditions.	Short-term: After implementation, would recover in less than 1 year. Long-term: After implementation, would be permanent.

Historic Structures and Cultural Landscapes

AFFECTED ENVIRONMENT

Glacier National Park is home to a wide array of significant cultural resources. The National Historic Preservation Act defines five cultural resource property types: districts, sites, buildings, structures, and objects. Resources within these property types include archeological resources, cultural landscapes, structures, ethnographic resources, and museum objects. As of 2008, 375 archeological sites, 371 historic buildings and structures (listed in or determined eligible for listing in the National Register of Historic Places), and one cultural landscape have been documented within the park. Five buildings and the one structure, the Going-to-the-Sun Road, also are designated National Historic Landmarks; the highest recognition a historic property can receive. The park has prepared an ethnographic overview documenting the importance of the park's landscape and natural features and resources to the Blackfoot and Confederated Salish and Kootenai tribes.

The National Historic Preservation Act (NHPA) of 1966, as amended and its implementing regulations (36 CFR § 800) require federal agencies, such as the NPS, to identify potentially significant cultural resources within the area of potential effect (APE) of an agency's proposed undertaking and to consider the effects of the undertaking on cultural resources before taking any action. The APE includes the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of a cultural resource.

The NHPA and its implementing regulations, require that the NPS consult with the State Historic Preservation Office (SHPO), Tribal Historic Preservation Offices (THPO), and other interested parties to identify cultural resources within the APE, assess the undertakings effects, and seek ways to avoid, minimize, or mitigate any adverse effects on cultural resources.

The NPS has initiated consultation with the Montana SHPO, the Blackfoot Tribal Historic Preservation Office, and the Confederated Salish and Kootenai Tribes Historic Preservation Department. Scoping letters were sent to each party, and no specific issues of concern have yet been identified. The Montana SHPO has reviewed schematic drawings for Alternative B.

Historic Structures

Two historic structures, the Going-to-the-Sun Road and the Logan Pass Visitor Center are located in the APE for this project.

Going-to-the-Sun Road

The historic significance of the Going-to-the-Sun Road (24GL0136 and 24FH0161) has been well recognized by the federal government and others. The road was listed in the National Register of Historic Places in 1983; it was designated a National Historic Civil Engineering Landmark in 1985; it was documented by the Historic American Engineering Record (HAER) in 1990; and in 1997 it was designated a National Historic Landmark by the Secretary of the Interior. The latter distinction is the most noteworthy and affords the GTSR and its component features the highest possible level of federal protection. The GTSR is considered significant for its history, its landscape design, and engineering. As an early example of a major national park roadway the GTSR represents a pioneering federal attempt to design and construct an automobile road that both harmonized with its environment and showcased its natural surroundings. These design philosophies, as embodied in the GTSR, became a model for future parkway projects to follow. The engineering and landscape architecture techniques used in the GTSR further reflected this design philosophy, featuring well-crafted stonework and gently curving walls that blended perfectly with the spectacular natural setting. Both the National Register and National Historic Landmark nominations include the length of the road from the foot of Lake McDonald to the park boundary at St. Mary. Important individual structures that are part of the road (primarily bridges and tunnels) are listed as contributing to the significance

of the GTSR. The closest contributing structure to the proposed project is the East Side Tunnel.

Logan Pass Visitor Center

The Logan Pass Visitor Center (25GL1151) was listed in the National Register of Historic Places in 2008. Located where the GTSR crosses the Continental Divide, the visitor center was built to provide visitor orientation to the high country of the park. The two-level building was designed between 1960 and 1962 and was built between 1963 and 1966 as part of the “Mission 66” program of the National Park Service. As part of an effort by the NPS to upgrade the national park system to meet growing visitor needs in the post-World War II era, the Mission 66 program focused on construction of headquarter buildings, employee housing, maintenance/utility areas, entrance stations, comfort stations, museum exhibits, roads, parking lots, campgrounds, concession buildings, and the newly conceived concept of visitor centers. The Logan Pass Visitor Center was built at the same time as the Cyclorama Visitor Center at Gettysburg National Historical Park, the Quarry Visitor Center at Dinosaur National Park, and the Administration and Visitor Center at Rocky Mountain National Park. All were designed to combine administrative activities, museum space for exhibits on the park’s natural and cultural resources, and public restrooms in one building. The Logan Pass Visitor Center was designed to reflect the chalet theme used throughout the park. Buff colored limestone and green, red, and pink argillite were used to match the surrounding stone outcrops along the road and near the site. The upper section of the building was positioned near the top of a natural bench to provide the best views of mountain peaks and valleys as well as the GTSR as it descends from the summit. The lower section of the building was built into the slope and was designed as the restroom. In 1985, the lower section was altered to increase the size of the restrooms and an “Administration and First Aid” room was added. The visitor center parking lot is not included within the area nominated to the National Register. The parking lot was first constructed at the pass as part of the completion of the road in 1933. The parking lot was re-designed as part of the visitor center construction project, and was reconstructed in 1995-96.

Cultural Landscapes

The NPS defines a cultural landscape as “a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein associated with a historic event, activity, or person, or that exhibits other cultural or aesthetic values” (NPS 2003).

Two of the criteria establishing the road’s significance, as a National Historic Landmark, are associated with cultural landscape characteristics: its association with the American Park movement and as an exceptionally valuable example of American landscape architecture.

The Going-to-the-Sun Road Cultural Landscape Report (RTI 2002) documented the following key cultural landscape characteristics of the road.

For those approaching Logan Pass from the east or west, those characteristics relevant to this project include:

Roadway Qualities and Features

- Narrow roadway (22 feet or less), with extremely heavy curvature and restricted visibility,
- Steady six percent grade up to Logan Pass, and
- Extensive historic stonework along much of the west approach segment, including retaining walls, guard walls, and culvert headwalls.

Visual/Experiential Qualities and Features

- Exceptional long-range scenic vistas (including views of the Logan Pass area),
- Frequent views of specific scenic and cultural resources (including Logan Pass), and
- Visitor attractions (including Logan Pass).

IMPACT ANALYSIS

METHODOLOGY

In this environmental assessment, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are not intended, however, to comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA). The Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), require a level of documentation for findings of effect sufficient to understand its basis, i.e. design development drawings for building modifications, which are not available at this time. This EA will not complete the requirements of Section 106, but will begin the consultation process. As such, the park is coordinating consultation under Section 106 which includes public participation, State Historic Preservation Office and Tribal Historic Preservation Office consultation, and the identification of historic properties requirements. Findings of effect, however, will be made after the SHPO reviews construction drawings, which may occur after the EA process. A preliminary Section 106 finding of effect is included in the impact analysis sections under the preferred alternative for cultural resource topics.

The preliminary finding of effect was made in accordance with the Advisory Council on Historic Preservation's regulations. Effects to historic properties were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either adverse effect or no adverse effect must also be made for affected National Register eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's Conservation Planning, Environmental Impact Analysis and Decision-making (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 might be mitigated, the effect remains adverse.

Negligible: Treatment is at the lowest levels of detection – barely perceptible and not measurable. For purposes of Section 106, the finding of effect would be no adverse effect.

Minor: Treatment would affect the character defining features of a National Register of Historic Places eligible or listed property, but is in accordance with the Secretary

of the Interior's Standards. For purposes of Section 106, the finding of effect would be no adverse effect.

Moderate: Treatment would alter a character defining features(s), diminishing the integrity of the resource to the extent that it is no longer eligible for listing in the National Register of Historic Places. For purposes of Section 106, the finding of effect would be adverse effect.

Major: Treatment would alter a character defining feature(s) of a National Historic Landmark, diminishing the integrity of the resource to the extent that its designation is threatened. For purposes of Section 106, the finding of effect would be adverse effect.

Short-term: Effects extended only through the period of the project.

Long-term: Effects extended beyond the period of the project.

IMPACTS OF ALTERNATIVE A – NO ACTION ALTERNATIVE

Alternative A would result in no changes to current operations and no construction of new buildings or alteration of existing buildings. This alternative would have no effect on the National Historic Landmark Going-to-the-Sun Road or the National Register-listed Logan Pass Visitor Center.

Section 106: Alternative A would not meet the definition of a federal action as defined in 36CFR800.16(y). It would not have the potential to cause effects on historic properties and there would be no obligations under Section 106.

Cumulative Impacts of the No Action Alternative

Of the projects identified for consideration of cumulative impacts, several have had or may have detectable impacts on cultural resources. The GTSR/FEIS identified the preferred rehabilitation alternative as having negligible to moderate short-term adverse and long-term beneficial impacts to cultural resources (NPS 2003). These impacts included changes in the historic setting caused by construction activities and rehabilitation work meeting the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 67). The GTSR/FEIS recognized the potential for adverse impacts resulting from the construction of modern visitor use improvements at several locations within the road corridor. All rehabilitation work and new improvements are being undertaken in conformance with the Secretary's Standards in order to avoid adverse impacts.

Overall cumulative impacts on cultural resources under Alternative A would be negligible to moderate long-term localized and adverse to beneficial. However, Alternative A does not contribute to these impacts as no new activities are proposed.

Conclusion

Alternative A would result in no changes to current operations and no construction of new buildings or alteration of existing buildings. Therefore, no impacts to historic structures or cultural landscapes are expected. Cumulative impacts would range from negligible to moderate, long-term, and adverse to beneficial. However, Alternative A does not contribute to these impacts as no new activities are proposed.

Because the no action alternative would not result in major adverse impacts to cultural resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* or other relevant NPS planning documents, there would be no impairment of park cultural resource values related to this alternative. The no action alternative also would make a negligible

contribution to cumulative impacts on cultural resources in the project area, however overall cumulative impacts would be negligible to moderate, long-term localized and adverse to beneficial even without contributions from the no action alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

IMPACT ANALYSIS OF ALTERNATIVE B - PREFERRED

This alternative would use siting and the natural topography of the area to lessen the visual impacts on the Going-to-the-Sun Road and the Logan Pass Visitor Center from construction of the new restroom (see figure 11). The proposed location of the new restroom was first disturbed during construction of the first comfort station at the pass in 1931 when it served as the site of the



Figure 11. Alternative B-Photo-simulation showing proposed restroom building as seen from north side of the parking lot. Photo imaging by Barker-Rinker-Seacat Architects.

septic tank. A natural, vegetated hummock to the east of the restroom site rises to about six feet. The proposed site is between 350 and 400 feet from the Going-to-the-Sun Road at its closest location and largely screened from view by the hummock as visitors approach the pass from the

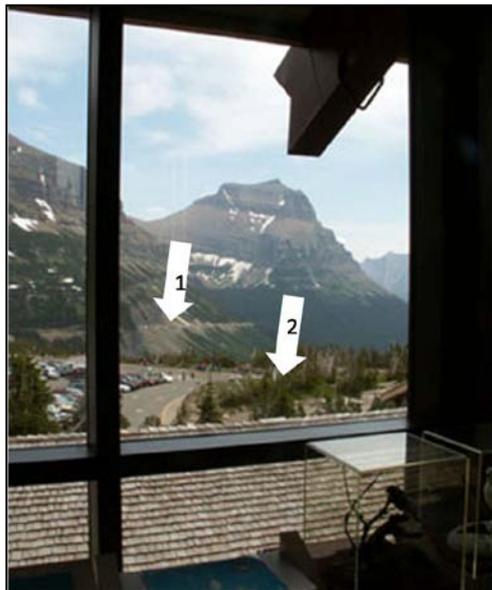


Photo 1. View from Logan Pass Visitor Center showing Alternative B proposed restroom building site (arrow number 2) and Going-to-the-Sun Road (arrow number 1). The roof of the existing restroom is below arrow number 2.

The new restroom building would be most visible from the road as it parallels the parking lot and from the entrance to the parking lot, but the foreground view from these locations is generally of automobiles and buses. The site is approximately 30 feet below the finished floor level of the visitor center and 20 feet below the finished floor level of the existing restroom terrace. The roof of the restroom building would be visible from some of the visitor center windows (see photo 1), but the gable roof design and wood shingle roofing are compatible with the historic view from these windows which overlook the roof of the lower restroom building. The new restroom building would be in the viewscape of the Logan Pass Visitor Center from some locations both within the parking lot and from the Going-to-the-Sun Road, but would not obstruct or interrupt direct views of the building.

The new restroom building would be designed to meet the Secretary of the Interior's Standards for the Treatment of Historic Properties. Exterior walls of stone, wood siding and the gable roof covered with wood shingles would be compatible with the visitor center's historic materials. The park's early consultation with the Montana SHPO regarding the restroom building has resulted in a preliminary determination that the design meets the Secretary's Standards.

The proposed rehabilitation of the Visitor Center's current restrooms would not result in action that would affect significant interior spaces or historic fabric; the spaces were remodeled in 1985. No changes would be visible from the exterior.

Relocating the shuttle stop along the existing west parking lot entrance and along the west edge of the parking lot, and relocate existing seating and signs that would be low profile and similar to features that already exist at the site (see photo 2) would change the view of the historic



Photo 2. View from entrance to Logan Pass Visitor parking lot near intersection with GTSR showing Visitor Center and Alternative B proposed shuttle stop site (arrow).

visitor center and cultural landscape as one enters the location.

Updating the existing energy supply system with two new propane fueled generators and a battery bank and storing the generators in a new shelter of compatible materials with the visitor center would not be immediately visible to visitors. The solar panels that would be hung inside the Logan Pass Visitor Center, after the visitor center closes, to charge the batteries during early to mid winter (before the windows are completely covered with snow) would not affect the historic

resources or cultural landscape as they are temporary and would not be visible during the peak visitor season.

Overall Alternative B would result in visual impacts to the visitor center and Going-to-the-Sun Road, but would not obstruct or interrupt important views. The two new buildings would be designed to be compatible with the historic architectural characteristics of the visitor center. Impacts would be minor, long-term, and adverse.

Section 106: For purposes of Section 106, the finding of effect would be no adverse effect.

Cumulative Impacts of Alternative B

Of the projects identified for consideration of cumulative impacts, several have had or would have detectable impacts on historic structures and cultural landscapes. The GTSR/FEIS identified the rehabilitation as having negligible to moderate short-term adverse and long-term beneficial impacts to cultural resources (NPS 2003). These impacts included changes in the historic setting caused by construction activities and rehabilitation work meeting the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 67). The GTSR/FEIS recognized the potential for adverse impacts resulting from the construction of modern visitor use improvements at several locations within the road corridor. All rehabilitation work and new improvements are being undertaken in conformance with the Secretary's Standards in order to avoid adverse impacts. Alternative B would be in conformance with the Secretary's Standards.

Overall, cumulative impacts, when considering actions proposed in Alternative B, on historic structures and cultural landscapes would be moderate, long-term, and adverse.

Conclusion

Alternative B would result in minor, long-term, and adverse impacts due to visual impacts on the Logan Pass Visitor Center and Going-to-the-Sun Road, but would not obstruct or interrupt important views. Actions proposed in Alternative B combined with past, on-going and future actions would have a minor, long-term, and adverse cumulative impact on historic structures

and cultural landscapes.

Because Alternative B would not result in major adverse impacts to cultural resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* or other relevant NPS planning documents, there would be no impairment of park cultural resource values related to this alternative. Alternative B also would make a negligible contribution to cumulative impacts on cultural resources in the project area. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from the proposed remodeling the existing restroom, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred alternative).

The new building to house the turbine for the micro-hydro system would be small (approximately 6' x 8'), constructed away from the visitor center and hidden from view by trees from the road and the visitor center. All the other components of the micro-hydro system are already in place and would not require modifications that would have an effect on the National Register-listed Logan Pass Visitor Center or the Historic Landmark Going-to-the-Sun Road. The impacts of Alternative C would be the same as alternative B: minor, long-term and adverse.

Section 106: For purposes of Section 106, the finding of effect would be no adverse effect.

Cumulative Impacts of Alternative C – Micro-hydro

Of the projects identified for consideration of cumulative impacts, several have had or would have detectable impacts on historic structures and cultural landscapes. The GTSR/FEIS identified the rehabilitation as having negligible to moderate short-term adverse and long-term beneficial impacts to cultural resources (NPS 2003). These impacts included changes in the historic setting caused by construction activities and rehabilitation work meeting the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 67). The GTSR/FEIS recognized the potential for adverse impacts resulting from the construction of modern visitor use improvements at several locations within the Road corridor if the projects did not meet the Secretary's Standards. Alternative C would be designed to meet the Secretary's Standards.

Overall cumulative impacts, when Alternative C is considered, on historic structures and cultural landscapes, would be minor, long-term, and adverse.

Conclusion

Alternative C would result in minor, long-term, and adverse impacts due to visual impacts on the Logan Pass Visitor Center and Going-to-the-Sun Road, but would not obstruct or interrupt important views. Actions proposed in Alternative C combined with past, on-going and future actions would have a minor, long-term, and adverse cumulative impact on historic structures and cultural landscapes.

The proposed project work would be designed to meet the Secretary of the Interior's Standards for the Treatment of Historic Properties Alternative C and therefore would not have major adverse impacts on cultural resources whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would

be no impairment of park historic and cultural resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

The photovoltaic system would require three solar panels (11 feet by 16 feet) to obtain the necessary power level required for operations at Logan Pass. The panels would be mounted on 8 foot poles situated southeast of the visitor center. The panel arrays would potentially be visible from the Going-to-the-Sun Road when approaching the pass from the east side of the park and would be highly from the visitor center. This alternative would result in minor, long-term and adverse impacts to the Going-to-the-Sun Road and moderate, long-term and adverse impacts to the Logan Pass Visitor Center.

Section 106: Alternative D meets the criteria of adverse effect defined in 36 CFR Part 800. The alternative introduces visual elements within the setting of the Going-to-the-Sun Road, but they would not obscure important views or radically change the road's appearance. The finding of effect would not be adverse. However, the alternative introduces visual elements into views from the Logan Pass Visitor Center that would diminish the integrity of the building's significant historic features. The finding of effect would be adverse.

Cumulative Impacts of Alternative D – Solar

Of the projects identified for consideration of cumulative impacts, several have had or would have detectable impacts on historic structures and cultural landscapes. The GTSR/FEIS identified the rehabilitation as having negligible to moderate short-term adverse and long-term beneficial impacts to cultural resources (NPS 2003). These impacts included changes in the historic setting caused by construction activities and rehabilitation work meeting the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 67). The EIS recognized the potential for adverse impacts resulting from the construction of modern visitor use improvements at several locations within the Road corridor if the projects did not meet the Secretary's Standards. Alternative D would not meet the Secretary's Standards.

Overall cumulative impacts, when Alternative D is considered, on historic structures and cultural landscapes, would be moderate, long-term, and adverse.

Conclusion

Alternative D would result in moderate, long-term, and adverse impacts due to the introduction of visual elements into views from the Logan Pass Visitor Center that diminish the integrity of the building's significant historic features. Actions proposed in Alternative D combined with past, on-going and future actions would have moderate, long-term, and adverse cumulative impact on historic structures.

Alternative D would not have major adverse impacts on cultural resources whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park historic and cultural resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies 2006* (NPS 2006).

Soils

AFFECTED ENVIRONMENT

Logan Pass is along the GTSR at the crest of the Continental Divide. The Helena Formation is the dominant parent material at Logan Pass. Dolomite, silicates, limestone, fossilized Precambrian algae known as stromatolites, and an igneous diorite sill combine to form the Helena Formation. In 2001, Dutton et al. prepared an inventory of the soils of GNP; the following is from their report. The parent material at Logan Pass is dominated by limestone residuum and colluvium with loam textures and increasing rock content with depth. The surface is a loamy mixture of volcanic ash-rich wind deposits and the underlying soil. The rocks are angular and predominantly limestone with minor amounts of quartzite and argillite.

The Alpine Meadow Limestone soils are found on mountain slopes and cirque basins such as at Logan Pass. The soil is deep to moderately deep, well drained and formed in rocky and loamy residuum or colluvium mixed with ash-rich wind deposits. The surface layer is loam with 0-25% gravels. The subsoil is very gravelly to extremely gravelly loam. Rocks are angular limestone gravels with occasional cobbles and stones. Water holding capacity is moderate due to the loamy texture and high rock content. Soil depth varies within this mapping unit from shallow to deep but the upper soil profile has relatively similar characteristics. The limestone soils generally have vegetation which reflects slightly drier conditions than on adjacent quartzite and argillite soils. Plants, especially trees, are shorter and have lower coverage. Vegetation is dominated by alpine forbs, grasses, sedges, and rushes (see vegetation section for specific species). Scattered stunted trees and shrubs occur, usually where the surface soil has higher rock content. Erosion potential is moderate, but might range from low to high depending on the soil texture, slope, disturbance, and the amount of anchoring rock present. Productivity and revegetation potential is generally low to moderate due to the low moisture and nutrient holding capacity, presence of rocks, and the harsh climate at higher elevations.

Soils through most of the project area, with the exception of the area just west of the parking lot, have been previously disturbed and compacted. In the mid 1990s a soil mix was created, pasteurized and imported to the parking lot island, road shoulders, and along the utility corridor southwest of the parking lot.

IMPACT ANALYSIS

METHODOLOGY

The affected environment for soils is limited to Logan Pass.

- Negligible:* Soil productivity or soil fertility would not be affected or the effect would be below or at the lower end of detection. Any effects to soil productivity or soil fertility would be slight and not measurable.
- Minor:* The effects to soil productivity or soil fertility would be detectable, but small. The area affected would be local.
- Moderate:* The effect to soil productivity or soil fertility would be readily apparent. Effects would result in a change in soils over a relatively wide area or multiple locations.
- Major:* The effect on soil productivity or soil fertility would be readily apparent and would substantially change the character of soils over a large area.
- Short-term:* After implementation, would recover in less than 3 years.
- Long-term:* After implementation, would take more than 3 years to recover or effects would be permanent.

IMPACT ANALYSIS OF THE ALTERNATIVE A – NO ACTION

Alternative A would result in no changes to current operations and no construction of new buildings or alteration of existing buildings. There would be no new impacts to soils as a result of the no action alternative.

Cumulative Impacts of the No Action Alternative

Soils surrounding the Logan Pass Visitor Center have been disturbed a number of times over the years, most recently with construction of an accessible walkway in 2000 and expansion of the parking lot in the mid 1990s. Soils were also disturbed in creating a utility line to a water storage tank and installing vaults for the restrooms. In restoring the site in the mid 1990s, a pasteurized soil was mixed and imported to the site (parking lot island, road shoulders, and utility corridor) to prevent introduction of invasive weeds into this sensitive habitat.

Construction of a boardwalk in the 1970s greatly reduced the level of trampling that had occurred in the area. With the exception of soils permanently removed from productivity under hardened surfaces, through careful restoration and mitigation, adverse soil impacts have been kept to a minor level. As GTSR improvements at Logan Pass were recently conducted in the mid 1990s, minimal disturbance of the road shoulders are expected during Phase VIII of construction. Therefore, the cumulative impact to soils resulting from Alternative A, the no action alternative, in combination with past, present, and future actions is expected to be minor, adverse, and long-term.

Conclusion

No new disturbance to soils both as a direct and indirect result of the no action alternative is expected; therefore, there would be no effect to soils as a result of Alternative A. In combination with past, present, and future actions would be minor, adverse, and long-term as a result of increased soil compaction and loss of normal soil function in a previously disturbed site.

Because the no action alternative would not result in major adverse impacts to soil resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park soil resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

Construction activities degrade productivity and alter the natural state of the soil resource within the immediate footprint of new structures, pavement, or formalized parking areas. Soils surrounding construction sites might be compacted and top soil might be degraded or disturbed. Such disturbance would be expected from updating the existing restroom. Soil disturbance associated with the repair of the sewer line (approximately 100 feet) would occur.

Construction of a new restroom building south of the parking lot would result in permanent hardening of 400 ft² of soil. The existing wastewater vault would be used for the new restrooms resulting in no new disturbance.

The shuttle stop construction would disturb approximately 0.1 acre (4400 ft²) of previously disturbed soils. The soil disturbance would occur near the west parking lot entrance in order to extend the sidewalk. Generally construction activities extend beyond the intended area. Most of the construction would be completed from the parking lot and would not extend into the area surrounding the proposed shuttle stop.

Replacing the thermo-generators would not result in impacts to soil other than general construction compaction already mentioned in association with the restroom remodel. To mitigate the impact, any ground surface temporarily disturbed during construction would be aerated and replanted to reduce compaction and prevent erosion. In addition, all top soil disturbed during the construction process would be salvaged, stored, and utilized in future restoration projects at Logan Pass and during Phase VIII of the GTSR rehabilitation. Any other construction activities would occur on existing hardened surfaces and would not further impact any soils. The resulting impact of Alternative B on soils would be minor, adverse, and long-term.

Cumulative Impacts of Alternative B

Cumulative impacts to soils under Alternative B would be similar to those described in Alternative A. Therefore, the cumulative impact to soils resulting from Alternative B in combination with past, present, and future actions is expected to be minor, adverse, and long-term.

Conclusion

While much of the disturbed soils in the Logan Pass area have been mitigated, there remains a permanent loss of soil function and productivity over a small area due to direct, indirect and cumulative impacts of Alternative B in conjunction with past, present and future actions to soils that would be minor, adverse, and long-term due to excavation and hardening of a previously undisturbed soil area in the proposed restroom location.

Because Alternative B would not result in major adverse impacts to soil resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park soil resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

The greatest impacts to soils from the installation of a micro-hydro system would result from the installation of a new infiltration system and the possibility the infiltration system might need yearly or biennial maintenance. Installation of new infiltration would require transporting supplies by ground (approximately 0.40 miles) or by helicopter. A piece of construction equipment or several people would be necessary to transport supplies by ground for installation and maintenance which would eventually lead to compaction of soils along the way. The system would also include a new structure (about 6' x 8') to house the turbine. This would result in permanent hardening of soil. Trenching for the power cable from the turbine house to the visitor center would also have impacts to soils. The resulting impact of Alternative C on soils would be minor, long-term and adverse.

Cumulative Impacts of Alternative C

Cumulative impacts to soils would be the same as those described in Alternative A. Thus, the cumulative impact to soils resulting from Alternative C in combination with past, present, and future actions is expected to be minor, adverse, and long-term.

Conclusion

As in Alternative B, the direct, indirect and cumulative impacts to soils of Alternative C in

combination with past, present, and future actions would be minor, adverse, and long-term. The impact of Alternative C is slightly greater than that in Alternative B due to the excavation for the new infiltration system and the structure to house the turbine, and additional maintenance needs.

Because Alternative C would not result in major adverse impacts to soil resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park soil resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

Pole mounted arrays of solar panels would be installed south of the visitor center which would have negligible to minor impacts on soils due to new disturbance and compaction of soils between the parking lot and arrays. Construction activities degrade productivity and alter the natural state of the soil resource within the immediate footprint of new structures, pavement, or formalized parking areas. The soils surrounding the pole mounted sites would be compacted and top soil would be degraded and/or disturbed. To mitigate the impact, any ground surface temporarily disturbed during construction would be aerated and replanted to reduce compaction and prevent erosion. Soil would also be disturbed from trenching in order to install a power cable from the solar panel arrays. The resulting impact of Alternative D on soils would be minor, adverse, and long-term.

Cumulative Impacts of Alternative D

Cumulative impacts to soils would be the same as those described in Alternative A. Thus, the cumulative impact to soils resulting from Alternative D in combination with past, present, and future actions is expected to be minor, adverse, and long-term.

Conclusion

As in Alternatives B and C, the direct, indirect and cumulative impacts to soils of Alternative D in combination with past, present, and future actions would be minor, adverse, and long-term. Impacts would be less under Alternative D than under Alternative C due in part because of the smaller area to be hardened. The impact of Alternative D is slightly greater than that in Alternative B due to the installation of pole mounts.

Because Alternative D would not result in major adverse impacts to soil resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park soil resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

Vegetation

AFFECTED ENVIRONMENT

The project area is located in the subalpine zone of the park in a mix of vegetation community types. Subalpine fir (*Abies bifolia*) and Engelmann spruce (*Picea engelmannii*) take on wind- and frost-stunted shrubby forms called krummholz with beargrass (*Xerophyllum tenax*) in the understory. Beyond these areas lie diverse alpine meadows, turf communities, wet meadows, talus slopes, and fellfields that support a number of rare plants. The meadow vegetation produces a floral display, which is one of the attractions of Logan Pass from early July when snowmelt begins exposing the ground through August. The growing season is only about six to eight weeks long due to the delayed snowmelt and early fall frosts. Most plants found at this elevation are highly specialized for survival in the alpine life zone, and if not unique to the alpine zone, are eco-typically different from closely related plants at lower elevations.

The predominant herbaceous community in the project area is the dry meadow type characterized by glacier lily (*Erythronium grandiflorum*), smooth woodrush (*Luzula glabrata* var. *hitchcockii*), wandering daisy (*Erigeron peregrinus*), and splitleaf Indian paintbrush (*Castilleja rhexifolia*). Where water accumulates in depressions on portions of rock ledges, species that prefer more moisture are found, such as rock willow (*Salix vestita*), heath (*Phyllodoce empetriformis*), and monkey flower (*Mimulus lewisii*). No rare, sensitive, threatened, or endangered plants are found in the immediate project area, based on prior surveys and park staff knowledge. The parking lot at Logan Pass is paved and void of vegetation. The primary weed present in the project vicinity is the common dandelion (*Taraxacum officinale*), while other non-native forbs and grasses have been reported in small quantities, including the noxious weed, Canada thistle (*Cirsium arvense*). See Appendix A for a partial list of species found in the project area vicinity.

Within the project area, much of the vegetation (except the site west of the parking lot) has been previously disturbed and revegetated. The utility corridor south of the parking lot and east of the visitor center was used as a temporary holding site for sod mats that were used in restoration activities. After the sod mats were removed, the area was reseeded and is currently covered with alpine bluegrass (*Poa alpina*), alpine timothy (*Phleum alpinum*), arnica (*Arnica* spp.) and a variety of other forbs and grasses.

IMPACT ANALYSIS

METHODOLOGY

The methodology used to analyze the potential impacts on vegetation is an analysis of expected changes to the vegetation under the different alternatives. Changes in surface disturbance and vegetation productivity are assessed.

- Negligible:* Vegetation would not be affected or the changes would be so slight that they would not be of any measurable or perceptible consequence to the species' population.
- Minor:* Some individual native plants would be affected over a relatively small area, but the effects would be localized, and would be of little consequence to the species' population.
- Moderate:* Some individual native plants would be affected over a relatively wide area or multiple sites and would be readily noticeable. A sizeable segment of a species' population could be affected.
- Major:* A considerable effect on native plant populations would occur over a relatively large area.

Short-term: After implementation, would recover in less than 3 years.

Long-term: After implementation, would take more than 3 years to recover or effects would be permanent.

IMPACT ANALYSIS OF ALTERNATIVE A – NO ACTION

New impacts to vegetation resulting from the no action alternative would be negligible. No vegetation would be disturbed by GNP actions but trampling of vegetation might increase if the congestion around the existing shuttle stop is not improved.

Cumulative Impacts of the No Action Alternative

Vegetation in the vicinity of the Logan Pass Visitor Center and parking lot has been disturbed and revegetated several times. The restoration process is slow, but has been fairly successful, except for an increase in non-noxious weeds, such as dandelions. The no action alternative in combination with past, present, and future actions would result in minor adverse impacts to vegetation due to removal of existing vegetation over a small area. The impacts would be long-term, because the recovery process in an alpine environment takes longer than three years, and the removal of vegetation where the new toilets would be located would be permanent.

Conclusion

New impacts to vegetation both as a direct and indirect result of the no action alternative are not expected, but in combination with past, present, and future actions would be minor, adverse, and long-term as a result of continued disturbance and revegetation efforts.

Because the no action alternative would not result in major adverse impacts to vegetation resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park vegetation resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

Updates to the existing restroom would not have impacts on vegetative resources.

The majority of the site where the new restroom would be constructed on the southern end of the parking lot has not been vegetated for the last several years. About 500 square feet of vegetation would be disturbed that has recently been revegetated with alpine bluegrass, alpine timothy, arnica, and a variety of other forbs and grasses. Overall there would be minor impacts to vegetation from the newly constructed restroom.

To construct the shuttle stop, native vegetation would be removed from approximately 0.10 acre of land surface; the area has been disturbed and revegetated before. Most of this surface area would be permanently hardened by the shuttle stop and would not require revegetation. Hours of staff and volunteer time have gone toward weeding the previously revegetated areas that were infested with dandelions. To mitigate this disturbance, sod mats of native vegetation would be removed prior to disturbance and held temporarily along the utility corridor either south or east of the parking lot. This material would be available for use in restoring disturbed areas adjacent to the construction, as well as social trails in the vicinity and past disturbances that have not revegetated well.

The renovations to the current power system are not expected to impact vegetation except from trampling associated with construction activities within the immediate footprint of new structures, pavement, or formalized parking areas. Areas of temporary disturbance might

recover as demonstrated in past projects, but would require more than three years due to the limited growing season on this site. Due to permanent loss of vegetation over approximately 0.10 acre and potential for weed infestation the impacts of Alternative B to vegetation would be adverse, minor and long-term.

Cumulative Impacts of Alternative B

Vegetation in the vicinity of the Logan Pass Visitor Center and parking lot has been disturbed and reclaimed a number of times over the years, most recently with construction of an accessible walkway in 2000 and expansion of the parking lot in the mid 1990s. Vegetation has also been impacted by a number of social trails in the vicinity. Construction of a boardwalk in the 1970s greatly reduced the level of trampling that had occurred in the area, and many social trails that lead off from the boardwalk were revegetated in the late 1990s. With the exception of vegetation permanently removed from under hardened surfaces, through careful restoration and mitigation, adverse vegetation impacts have been kept to a minor level. Since GTSR and parking lot improvements were conducted at Logan Pass in the mid-1990s, minimal disturbance of the road shoulders are expected during Phase VIII of construction. Therefore, the cumulative impact to vegetation resulting from Alternative B in combination with past, present, and future actions would be expected to be minor, adverse, and long-term.

Conclusion

While much of the disturbances to vegetation in the Logan Pass area have been mitigated through revegetation and hand-pulling weeds, and while reducing draw off the stream might benefit plants, there remains a permanent loss of vegetation over less than ¼ acre due to direct, indirect and cumulative impacts of Alternative B in conjunction with past, present and future actions to vegetation that would be minor, adverse, and long-term. Because Alternative B involves vegetation removal in a previously disturbed area for the proposed shuttle stop, the impact would be greater for this Alternative than in Alternative A.

Because Alternative B would not result in major adverse impacts to vegetation resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park vegetation resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new restroom, and the new shuttle stop would be the same as described in Alternative B (the preferred).

Construction of restroom building south of the parking lot and installation a structure to house the micro-hydro system would result in permanent hardening of land that was previously disturbed and revegetated. Vegetation would be permanently removed from the footprint of the restrooms and the paved area surrounding them. Vegetation would also be disturbed along the trench lines to install a power cable from the turbine house to the visitor center. These areas would be susceptible to weed infestation, especially common dandelion which has been a problem on the site. To mitigate this disturbance, sod mats of native vegetation would be removed prior to disturbance and held temporarily along the utility corridor south of the construction site. This material would be available for use in restoring disturbed areas over the wastewater vault, adjacent to the construction, as well as social trails in the vicinity and past disturbances that have not revegetated well.

Indirect impacts from hydrological changes would be the same as described in Alternative B. Other actions would not result in further impacts to vegetation. Due to permanent loss of no more than ½ acre of vegetation and potential for weed infestation, the impacts of Alternative C to vegetation would be adverse, minor to moderate, and long-term. Areas of temporary disturbance might recover as demonstrated in past projects, but would require more than three years due to the limited growing season on this site. But the continued maintenance of the infiltration system would become noticeable if a user trail forms.

Cumulative Impacts of Alternative C

Cumulative impacts to vegetation would be the same as those described in Alternative B. Thus, the cumulative impact to vegetation resulting from Alternative C in combination with past, present, and future actions is expected to be minor, adverse, and long-term.

Conclusion

While much of the disturbances to vegetation in the Logan Pass area have been mitigated through revegetation and hand-pulling weeds, and while reducing the amount of water drawn off the stream might benefit plants, there remains a permanent loss of vegetation over a small area due to direct, indirect and cumulative impacts of Alternative C in conjunction with past, present and future actions to vegetation that would be minor to moderate, adverse, and long-term.

Because Alternative C (micro-hydro) would not result in major adverse impacts to vegetation resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park vegetation resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

Pole mounted arrays of solar panels installed south of the visitor center would have minor impacts on vegetation due to new disturbance and trampling between the parking lot and the array site during installation. The arrays would not require much maintenance; therefore, impacts from future trampling are not expected to be substantial. The vegetation surrounding the base of the pole is not expected to return naturally. Vegetation would also be disturbed along the trench lines to install a power cable from the turbine house to the visitor center. To mitigate the impact, any ground surface temporarily disturbed during construction would be aerated and replanted. The resulting impact of installing solar panels on vegetation would be minor, adverse, and short-term. However when combined with the impacts associated with the existing restroom updates, the new restroom building, and the new shuttle stop, the resulting impacts would be minor to moderate, long-term and adverse.

Cumulative Impacts of Alternative D

Cumulative impacts to vegetation would be the same as those described in Alternative B (the preferred). Thus, the cumulative impact to vegetation resulting from Alternative D in combination with past, present, and future actions is expected to be minor to moderate, adverse, and long-term.

Conclusion

As in Alternatives B and C, the direct, indirect and cumulative impacts to vegetation of Alternative D in combination with past, present, and future actions would be minor to moderate, adverse, and long-term. Impacts would be less under Alternative D than under Alternative C due in part because of the smaller area to be accessed. The impact of Alternative D is slightly greater than that in Alternative B due to the installation of pole mounts.

Because the Alternative D (solar) would not result in major adverse impacts to vegetation resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park vegetation resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

Wildlife

AFFECTED ENVIRONMENT

Over 300 species of terrestrial wildlife occupy Glacier National Park either seasonally or year-round, and an unknown number of aquatic species inhabit park waters. Information on wildlife use of the area is largely anecdotal or based on limited surveys. Intensive, complete wildlife inventories of the area have never been attempted. However, use by large mammals and birds are fairly well documented.

The most frequently observed species at Logan Pass include mountain goats (*Oreamnos americanus*), pika (*Ochotona princeps*), hoary marmots (*Marmota caligata*), bighorn sheep (*Orvis canadensis*), wolverines (*Gulo gulo*), black and grizzly bears (*Ursus spp.*), Columbian ground squirrels (*Spermophilus columbianus*), golden-mantled ground squirrels (*Spermophilus lateralis*), voles (*Phenacomys intermedues*, *Arvicola richarsoni*), Vagrant shrews (*Sorex vagrans*) and chipmunks (*Eutamias minimus*). Other mammal species that might pass through include moose (*Alces alces*), elk (*Cervus elaphus*), mule and whitetail deer (*Odocoileus spp.*), mountain lions (*Puma concolor*), coyote (*Canis latrans*), lynx (*Lynx canadensis*), fisher (*Martes pennanti*), pine marten (*Martes americana*), and long-tailed weasels (*Mustela frenata*).

Among a variety of birds found in the area are typical subalpine species like the fox sparrow (*Passerella iliaca*) and white-crowned sparrow (*Zonotrichia leucophrys*). White-tailed ptarmigan (*Lagopus leucurus*) inhabit the Logan Pass area and might occasionally forage in or travel through the project area. Varieties of raptors migrate over Logan Pass during the spring and fall; among these migrants might be an occasional peregrine falcon (*Falco peregrinus*). The biannual raptor migration is a significant event in the park. In the McDonald Valley, over 3,000 raptors, primarily golden eagles, were observed from a single location in 1996 (Yates et al. 2001). Golden eagles (*Aquila chrysaetos*) might nest and forage in the Logan Pass area based on habitat availability.

IMPACT ANALYSIS

METHODOLOGY

The methodology used to analyze the potential impacts on wildlife is an analysis of expected changes to wildlife under the different alternatives that is or would be present on the project area. Glacier National Park wildlife databases and current research were used to determine wildlife habitat and use in the project area. Changes in behavior, movement patterns, and

disturbance are assessed. Definitions of impact levels are as follows:

- Negligible:* Effects would be at or below the level of detection and the changes would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population.
- Minor:* Effects on wildlife species would be detectable, although the effects would be local and would be small and of little consequence to the species' population.
- Moderate:* Effects on wildlife species would be readily detectable and widespread, with consequences at the population level.
- Major:* Effects on wildlife species would be obvious and would have substantial consequences to wildlife populations in the region.
- Short-term:* After implementation, would recover in less than 1 year.
- Long-term:* After implementation, would take more than 1 year to recover or effects would be permanent.

IMPACT ANALYSIS OF ALTERNATIVE A – NO ACTION

Wildlife habitat, species richness, and abundance at Logan Pass would not change under the no action alternative because no changes to Logan Pass would be made. Implementing this alternative would have negligible impacts beyond the current situation.

Cumulative Impacts of the No Action Alternative

The no action alternative would coincide with the GTSR rehabilitation activity as described in the *GTSR FEIS* (NPS 2003). The road rehabilitation project primarily causes displacement of wildlife due to the construction-related noise, lighting, and increased human activity. This results in lower habitat connectivity across the road prism. Given the limited scope of activity within the no action alternative combined with the actions of the GTSR rehabilitation project, cumulative effects would not exceed the adverse impacts already described in the *GTSR FEIS* (minor, long-term, and adverse).

Conclusion

The no action alternative would have negligible direct and indirect impacts to wildlife beyond the current situation. Combined with past, present and ongoing actions, this alternative would have minor, long-term and adverse impacts as determined in the *GTSR FEIS*. The no action alternative would neither lessen nor augment the impact determination.

Because the no action alternative would not result in major adverse impacts to wildlife resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park wildlife resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

Because construction activity associated with the new restroom and shuttle stop would be within the Logan Pass developed area, impacts to wildlife would be short-term, negligible, and within current baseline conditions. Species most likely affected would be those residing within the construction footprint, primarily Columbian ground squirrels (*Spermophilus columbianus*). Other subterranean species might be affected by the sound of the fan used in the peat-filter

system but only in the immediate (small) area around the fan. The slight loss of habitat would not be enough to influence wildlife populations at Logan Pass due to the close proximity of the land area to existing buildings and developed area. Mountain goats and bighorn sheep might be influenced by the additional activity and some construction materials might become attractants for mountain goats and bighorn sheep. This could exacerbate the existing problem wherein mountain goats and bighorn sheep frequent the parking area and seek out automotive fluid that leaked from vehicles or other attractants left behind by visitors.

Off-site impacts would be primarily those associated with the use of heavy trucks for transportation of supplies and materials. These vehicles are noisier and have greater stopping distances than ordinary passenger vehicles. Wildlife might be at greater risk of displacement or being hit by a truck. There would be no impacts to wildlife from the restroom renovations or the installation of two new generators at the Logan Pass Visitor Center.

Cumulative Impacts of Alternative B

Construction activity associated with Alternative B would coincide with the GTSR rehabilitation activity as described in the *GTSR FEIS* (NPS 2003). The road rehabilitation primarily results in wildlife impacts as a result of displacement due to construction-related noise, vehicle strike, lighting, and increased human activity. This results in lower habitat connectivity across the road prism. Given the limited scope of activity within this alternative combined with the actions of the GTSR rehabilitation project, cumulative effects would not exceed the adverse impacts assessed in the *GTSR FEIS* (minor, long-term and adverse).

Conclusion

Implementation of Alternative B would directly impact less than $\frac{1}{4}$ acre of wildlife habitat. However, this area lies immediately adjacent to the Logan Pass parking area so a certain level of impact has already occurred. Effects of the additional activity associated with Alternative B would be negligible. Wildlife would also experience a slightly heightened risk of mortality or displacement from the indirect impacts of increased construction vehicle traffic, noise, and activity. These would be additive to those impacts associated with the GTSR rehabilitation project, but would not measurably change the impact assessed in the *GTSR FEIS*.

Because Alternative B would not result in major adverse impacts to wildlife resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park wildlife resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

The installation of a micro-hydro system would expand the area of impact beyond the parking lot to the infiltration point. This disturbance would be temporary and would have minimal impacts to wildlife populations at Logan Pass. Species might be temporarily displaced during construction activities but there would not be a change to their habitat other than a new structure (approximately 6' x 8') to house the turbine. Impacts to wildlife from Alternative C would be negligible and short-term.

Cumulative Impacts of Alternative C

Cumulative impacts of the preferred alternative on wildlife species would be the same as described in Alternative B.

Conclusion

Implementation of Alternative C would directly impact less than ½ acre of wildlife habitat. However, this area lies immediately adjacent to the Logan Pass parking area so a certain level of impact has already occurred. Effects of the additional activity associated with Alternative C would be negligible. Wildlife would also experience a slightly heightened risk of mortality or displacement from the indirect impacts of increase construction vehicle traffic, noise, and activity. These would be additive to those impacts associated with the GTSR rehabilitation project, but would not measurably change the impact assessed in the *GTSR FEIS* (minor, long-term and adverse).

Because Alternative C would not result in major adverse impacts to wildlife resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park wildlife resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

The installation of a pole mounted solar panel system would have the least amount of disturbance to wildlife populations at Logan Pass. Species might be temporarily displaced during installation activities but there would be essentially no change to their habitat. Impacts to wildlife from Alternative D would be negligible and short-term.

Cumulative Impacts of Alternative D

Cumulative impacts of the preferred alternative on wildlife species would be the same as described in Alternative B.

Conclusion

Implementation of Alternative D would directly impact a negligible amount of wildlife habitat. However, this area lies immediately adjacent to the Logan Pass parking area so a certain level of impact has already occurred. Effects of the additional activity associated with Alternative D would be negligible. Wildlife would also experience a slightly heightened risk of mortality or displacement from the indirect impacts of increase construction vehicle traffic, noise, and activity. These would be additive to those impacts associated with the GTSR rehabilitation project, but would not measurably change the impact assessed in the *GTSR FEIS* (minor, long-term and adverse).

Because Alternative D would not result in major adverse impacts to wildlife resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *GMP* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park wildlife resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (NPS 2006).

Threatened, Endangered, and Species of Concern

AFFECTED ENVIRONMENT

There are five threatened species and one endangered species listed by the U.S. Fish and Wildlife Service (FWS) in Glacier National Park. While present in Flathead County, there are no known locations of the threatened Spalding's catchfly (*Silene spaldingii*) or the threatened water howellia (*Howellia aquatilis*) within GNP; consequently, there would be no effect to Spalding's catchfly or water howellia from the proposed project. However, if locations of listed plant species become known within the vicinity of the Logan Pass Visitor Center, the plants would be avoided. Actions proposed for this project would take place at the headwaters of Logan Creek (a tributary to McDonald Creek); bull trout (*Salvelinus confluentus*) have not been observed in Logan Creek. The nearest section of critical bull trout habitat is found in the lower portion of upper McDonald Creek, over 12 miles downstream from the project; critical habitat would not be impacted by actions proposed in any of the alternatives. Gray wolves (*Canis lupus*), a federally listed endangered species (as of July 28, 2008; status pending litigation), are not known to occupy the Going-to-the-Sun Road corridor, which includes Logan Pass but might pass through the area. The threatened Canada lynx (*Lynx canadensis*) has been documented in the Going-to-the-Sun Road corridor, of which the Logan Pass Improvements project site is included, but suitable habitat is not present in the project area and proposed actions are not expected to affect the lynx. The threatened grizzly bear (*Ursus arctos horribilis*) has been documented within the project area.

Glacier National Park is part of the Northern Continental Divide Ecosystem (NCDE) recovery area for the threatened grizzly bear. The NCDE is especially important for grizzly populations because it adjoins occupied grizzly bear habitat in Canada and provides important travel corridors with substantial solitude from human interactions. Until recently, precise population estimates and trends have been difficult to establish due to the lack of intensive population level research within this ecosystem and the inherent problems of counting the widely distributed and reclusive grizzly bear in the greater Glacier National Park area. Results from a study (conducted in 2004) that used non-invasively collected hair samples and DNA fingerprinting, identified 245 bears in GNP, and estimated that as many as 350 may be present in the park for some part of the year (Kendall et al. 2008).

Grizzly bear habitat is found throughout the park and ranges 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 have home ranges of 130 to 1,300 square kilometers (Claar et al. 1999). A radio-collared female grizzly, with cubs, was documented using 220 square kilometers as a home range in 1998 and 1999 in McDonald Valley (NPS files). Grizzly bear seasonal movements and habitat use are tied largely to the availability of different food sources and human use (Servheen 1983, Mace et al. 1999).

In spring, grizzly bears feed on dead ungulates and early greening herbaceous vegetation at lower elevations (Martinka 1972). During the summer, some bears move to higher elevations in search of glacier lily bulbs and other roots, berries, and army cutworm moths (*Euxoa auxiliaries*). Avalanche chutes provide an important source of herbaceous forage for grizzlies in the early summer and fall (Mace and Waller 1997). During the winter, grizzly bears hibernate in dens away from human disturbance, typically at higher elevations on steep slopes where wind and topography cause an accumulation of deep snow. The denning season in the western portion of the NCDE usually begins in early October, and females might linger near dens until late May (Mace and Waller 1997).

Logan Pass provides habitat for grizzly bears during early spring, autumn, and winter. High visitor use during the late spring and summer tends to keep grizzly bears away, but they are observed in the vicinity annually. In 2007, there were four grizzly bear sightings at Logan Pass (NPS files). No activity is planned during the winter denning season.

Species of Concern. State listed species of concern to Glacier National Park are those species that are rare, endemic, disjunctive, vulnerable to extirpation, in need of further research, or likely to become threatened, or endangered, if limiting factors are not reversed. Likewise, a species might be of concern because of characteristics that make them particularly sensitive to human activities or natural events. In addition, species of concern might also include big game, upland game birds, waterfowl, carnivores, predators, and furbearers whose populations are protected in the park but subject to hunting and trapping outside of the park.

State-listed species of concern likely to occur in the project area include the westslope cutthroat trout, wolverine, white-tailed ptarmigan, and boreal toad.

Westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) is listed as a Montana “Species of Concern” and a sensitive species by U.S. Forest Service and Bureau of Land Management. Westslope cutthroat (WCT) in the Flathead drainage might be adfluvial, fluvial, or resident. Adfluvial fish occupy lakes (e.g. Lake McDonald) and spawn in tributaries (e.g. Fish Creek, a tributary to Lake McDonald). Fluvial fish reside in rivers or large streams and utilize tributaries for spawning and rearing. All three life history forms might occur in the Lake McDonald basin. Headwater reaches of large river basins, like the Flathead, are typically dominated by resident and fluvial forms, but tributaries to lakes support adfluvial fish using these habitats for rearing as well. WCT have evolved in the cold, low-productivity waters of the park, and as such, are particularly well adapted to their habitat.

Mature adfluvial fish move into tributaries in the spring, with spawning occurring in May and June (Shepard et al. 1984). Spawning has been observed in the Blackfoot River drainage occurring as peak flows subside, on the descending limb of the hydrograph (Schmetterling 2001). They typically spawn at age four or five, from March to July at water temperatures near 10°C (Shepard et al. 1984). Resident fish complete their life history in tributaries and seldom exceed 300 mm in length. Resident westslope cutthroat males begin maturing between the ages of 2 and 4, with females maturing between age 3 and 5 (Downs et al. 1997). Downs (1995) reported a maximum age of eight years for 32 isolated headwater populations of westslope cutthroat trout in Montana.

Spawning habitat had been characterized as gravel substrates with particle sizes ranging from 2 to 75 mm, mean depths ranging from 17 to 20 cm, and mean velocities ranging from 0.3 to 0.4 m/s (Shepard et al 1984). WCT are thought to spawn mainly in small first and second order tributaries. Migratory forms might spawn in the lower reaches of streams used by resident fish. Slow water habitats (i.e. pools) are an important overwinter habitat feature for westslope cutthroat trout (Jakober et al. 1998).

In 2004, westslope cutthroat trout were identified in Logan Creek (Dux and Guy 2004) which flows into Upper McDonald Creek. Although no quantitative data are available for WCT in the McDonald Creek drainage, spawning and rearing activity likely occurs in most major tributary streams. Marnell (1988) reported the presence of both genetically pure westslope cutthroat trout (introduced into Avalanche Lake), as well as non-native Yellowstone cutthroat trout (*O.c.bouvieri*) (introduced into Hidden Lake) in the drainage. Vershuren and Marnell (1997) determined through the use of fossil zooplankton evaluation, that the westslope cutthroat trout in Avalanche Lake were likely a natural population, and were not established by stocking. The westslope cutthroat trout genetic status of McDonald Creek and its tributaries remains unknown.

Wolverine (*Gulo gulo*) is a rarely seen resident of coniferous forests and alpine meadows on both sides of the Continental Divide. The rare wolverine is innately enigmatic and makes use of large areas for dispersal, making detection difficult. They utilize a range of habitats including alpine areas, mature forests, ecotonal areas, and riparian areas. The recently completed five-year GNP Wolverine research project captured 28 wolverines and installed tracking devices in 27 wolverines which provided over 30,000 locations, and has resulted in a better understanding of population status and trends in the park (Copeland and Yates 2008, preliminary results). Home ranges, mortality, denning characteristics, dispersal and habitat information were documented. Of the wolverines observed, one female made occasional forays to Logan Pass during the study. Wolverines exhibit a distinct seasonal elevation-pattern moving to lower elevations during the winter where they search for carrion in ungulate winter ranges. The park is considered to have very high quality wolverine habitat due to its extensive alpine areas, rugged topography, remoteness, and diverse ungulate populations.

As a member of the grouse family, the **white-tailed ptarmigan** (*Lagopus leucurus*) inhabits relatively undisturbed alpine zones. It is found year round, migrating along elevation gradients, from higher breeding grounds to lower wintering grounds. Habitat conditions require moist vegetation and rocks during the summer. The height of the vegetation generally does not exceed 50 cm tall. Data suggests ptarmigan sometimes occupy patches of krummholz trees (Choate 1963 and Scott 1982). Ground-nests are found close to rocks, water and a good food source. Winter diet includes alder catkins; willow buds and twigs; and buds and needles of evergreen conifers. Spring and summer diet includes leaves, buds, and flowers of herbaceous plants, willow buds, berries, seeds and insects (Choate 1963, Braun et al. 1993). The plumage of the white-tailed ptarmigan changes from brown in summer to white in winter. Glacier National Park is included in the southern extent of the continuous range, while isolated populations continue south into northern New Mexico.

Western toads (*Bufo boreas*) were found in most of the major drainages in the park, except portions of the North and Middle Fork, Flathead River drainages. Breeding populations of western toads, also known as boreal toads, do not often live near predatory fish populations (Marnell 1997). A genetically distinct population of toads has been described in two separate surveys (Black 1967, 1970, 1971 and Marnell 1997) at Logan Pass. Variations in western toads found at Logan Pass have not been explored.

IMPACT ANALYSIS

METHODOLOGY

This section is intended to augment the impact analysis for natural systems and processes, by analyzing specific impacts of the proposed management alternatives upon federally listed threatened, endangered, and other sensitive species (species of concern). The USFWS website was consulted for the most up-to-date listing of threatened and endangered species in the park. The predicted intensity of adverse impacts is articulated according to the following criteria:

- Negligible:* The alternative would affect an individual of a listed species or its critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. Negligible effect would equate with a “no effect” determination in U.S. Fish and Wildlife Service terms.
- Minor:* An individual(s) of a listed species or its critical habitat would be affected, but the change would be small. Minor effect would equate with a “may affect, not likely to adversely affect” determination for the species in U.S. Fish and Wildlife Service terms and would require informal consultation.

- Moderate:* An individual or population of a listed species, or its critical habitat would be noticeably affected. The effect could have some long-term consequence to individuals, populations, or habitat. Moderate effect would equate with a “may affect” determination in U.S. Fish and Wildlife Service terms and would be accompanied by a statement of “not likely to adversely affect” the species and would require either informal or formal consultation.
- Major:* An individual or population of a listed species, or its critical habitat, would be noticeably affected with a vital consequence to the individual, population, or habitat. Major effect would equate with a “may affect, likely to adversely affect” or “not likely to adversely affect” determination in U.S. Fish and Wildlife Service terms and would require formal consultation.
- Short-term:* After implementation, would recover in less than 1 year.
- Long-term:* After implementation, would take more than 1 year to recover or effects would be permanent.

IMPACT ANALYSIS OF ALTERNATIVE A – NO ACTION ALTERNATIVE

There would be no direct loss of grizzly bear habitat as a result of the no action alternative. Actions associated with park operations and visitor use would continue to displace individual bears from the Logan Pass area. Fortunately, grizzly bear habitat is available throughout GNP and the bear(s) would be displaced to suitable habitat. Grizzly bears generally avoid areas of human activity, such as the pass, but the presence of attractants (namely food/garbage and petroleum products) increase habituation of bears and might result in the removal or death of a bear. As a result, this alternative would have negligible to minor impacts on the grizzly bear.

Species of Concern.

Westslope cutthroat trout are present in the Logan Creek drainage, but we assume that they are not present in the immediate project area. This assumption is based on the location of the proposed diversion site (the extreme headwaters of Logan Creek at Logan Pass), the small amount of physical habitat available in the proposed project area from the headwaters of the proposed water source downstream to Oberlin Falls (an impassable upstream fish passage barrier located approximately 1 kilometer downstream from the headwaters), and the extreme winter habitat conditions that would exist in this section of stream (assuming the stream maintains flow over the course of the winter, which is uncertain at best). Under these assumptions, there would be no impacts to westslope cutthroat trout. Western toads have been observed at Logan Pass near the visitor center (Black 1967, 1970, 1971 and Marnell 1997); however, under the no action alternative there would be no expected impacts to its habitat or population since no new actions are proposed.

Wolverines and white-tailed ptarmigan have been observed at Logan Pass. Population estimates are limited for both species and further research would be needed to accurately evaluate the impacts to these species. For the interest of this analysis, this alternative would not have additional impacts.

Cumulative Impacts of the No Action Alternative

The no action alternative would coincide with the GTSR rehabilitation activity as described in the *GTSR FEIS* (NPS 2003). Impacts from road rehabilitation to threatened species and terrestrial species of concern (wolverine, ptarmigan) are primarily displacement due to construction-related noise, lighting, and increased human activity resulting in lower habitat connectivity across the road prism. Drainage improvements would eventually be beneficial to the aquatic species of concern even though temporary disturbance to aquatic habitat is expected along the GTSR. Given the limited scope of activity within the no action alternative combined with the actions of the GTSR rehabilitation project, cumulative effects would not

exceed the impacts already described in the *GTSR FEIS*:

- Grizzly bear – minor to moderate, short-term, adverse; indirect impacts on behavior, foraging patterns, and movement
- Westslope cutthroat trout – minor, long-term, beneficial; drainage improvements
- Wolverine – minor, short-term, adverse; displacement
- White-tailed ptarmigan – negligible to minor, short-term, adverse; no habitat loss expected, displacement
- Western toad – negligible to minor, short-term, adverse; aquatic habitat disturbance

Conclusion

Since no new actions are proposed under this alternative, there would not be additional impacts to the grizzly bear, westslope cutthroat trout, wolverine, white-tailed ptarmigan or western toad beyond what is already occurring at Logan Pass. In combination with past, present, and future actions (mainly related to the GTSR rehabilitation project) impacts would range from negligible to moderate, short-term adverse for the grizzly bear, wolverine, white-tailed ptarmigan or western toad based on displacement and disturbance of the species, no habitat loss is expected. Cumulative impacts for westslope cutthroat trout would be minor, long-term, and beneficial due to the drainage improvements from the GTSR rehabilitation.

Because the no action alternative would not result in major adverse impacts to threatened, endangered or species of concern resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park threatened, endangered or species of concern resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

There would be no direct loss of grizzly bear habitat as a result of the preferred alternative. Actions associated with park operations and visitor use would continue to displace individual bears from the Logan Pass area. The chance of displacing a grizzly bear would increase during construction of the shuttle stop and the new restroom. Fortunately, grizzly bear habitat is available throughout GNP and the bear(s) would be displaced to suitable habitat. Actions related to the remodel of the existing restroom and the installation of the new, more efficient generators would not be expected to increase disturbance to grizzly bears beyond the existing conditions at Logan Pass. Grizzly bears generally avoid areas of human activity, such as the pass, but the presence of attractants (namely food/garbage and petroleum products) increases habituation of bears and might result in the removal or death of a bear. Actions proposed would not be expected to increase impacts beyond what is already occurring at Logan Pass.

Indirect impacts from construction related traffic on the Going-to-the-Sun Road would include the increased chance of a vehicle-bear collision and displacement of bears during a time (late fall) when traffic on the road normally decreases. This impact would extend along the entire Going-to-the-Sun Road corridor. As a result, this alternative would have negligible to minor, short-term and adverse impacts on grizzly bears.

Species of Concern.

The preferred alternative would not substantially change the water consumption/use at Logan Pass for the existing circumstances. Westslope cutthroat trout are present in the Logan Creek drainage downstream of the project, but we assume they are not present in the immediate

project area. This assumption is based on the location of the proposed diversion site (the extreme headwaters of Logan Creek at Logan Pass), the small amount of physical habitat available in the proposed project area from the headwaters of the proposed water source downstream to Oberlin Falls (an impassable upstream fish passage barrier located approximately 1 kilometer downstream from the headwaters), and the extreme winter habitat conditions that would exist in this section of stream (assuming the stream maintains flow over the course of the winter, which is uncertain at best). Under these assumptions, there would be no impacts to westslope cutthroat trout from the actions proposed in the preferred alternative.

Western toads have been observed at Logan Pass near the visitor center (Black 1967, 1970, 1971 and Marnell 1997); however, under the preferred alternative there would be no expected impacts to its habitat or population since actions are proposed would not occur directly in toad habitat.

Wolverines and white-tailed ptarmigan have been observed at Logan Pass. Population estimates are limited for both species and further research would be needed to accurately evaluate the impacts to these species. Displacement concerns for both wolverines and white-tailed ptarmigan would be increased by these proposed construction activities.

Cumulative Impacts of Alternative B

Cumulative impacts to threatened species and species of concern under Alternative B would be similar to those described in Alternative A.

- Grizzly bear – minor to moderate, short-term, adverse; indirect impacts on behavior, foraging patterns, and movement
- Westslope cutthroat trout – minor, long-term, beneficial; drainage improvements
- Wolverine – minor, short-term, adverse; displacement
- White-tailed ptarmigan – negligible to minor, short-term, adverse; no habitat loss expected, displacement
- Western toad – negligible to minor, short-term, adverse; aquatic habitat disturbance

Conclusion

The actions proposed under this alternative would not have additional impacts to the grizzly bear, westslope cutthroat trout, wolverine, white-tailed ptarmigan or western toad beyond what is already occurring at Logan Pass. In combination with past, present, and future actions (mainly related to the GTSR rehabilitation project) impacts would range from negligible to moderate, short-term adverse for the grizzly bear, wolverine, white-tailed ptarmigan or western toad based on displacement and disturbance of the species, no habitat loss is expected.

Cumulative impacts for westslope cutthroat trout would be minor, long-term, and beneficial due to the drainage improvements from the GTSR rehabilitation.

Because the preferred alternative would not result in major adverse impacts to threatened, endangered or species of concern resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *GMP Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park threatened, endangered or species of concern resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be similar as described in Alternative B (the preferred) with additional impacts from construction activities that would include ground movement that might disturb or destroy ground-nests of the white-tailed ptarmigan.

Grizzly bear habitat would not be diminished from actions proposed to install a micro-hydro system at Logan Pass; however, the direct area of impact would be greater than in the no action and preferred alternatives (less than ½ acre). Impacts of this alternative would be negligible to minor, short-term to long-term and adverse.

Species of Concern.

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

The micro-hydro generation system would not impact the wolverine beyond impacts described in alternative B. There would be a greater possibility ground-nests of white-tailed ptarmigan might be disturbed or destroyed by trampling or construction equipment during construction and maintenance of the micro-hydro system because a larger area (less than ½ acre) of ptarmigan habitat would be impacted. Western toads have been observed in the vicinity of Logan Pass but have not been extensively studied in the park. Actions proposed for the micro-hydro system are not expected to change the function of the water system or promote changes to toad habitat in the vicinity of Logan Pass. Westslope cutthroat trout are present in the Logan Creek drainage, but assumingly they are not present in the immediate project area. This assumption is based on the location of the proposed diversion site (the extreme headwaters of Logan Creek at Logan Pass), the small amount of physical habitat available in the proposed project area from the headwaters of the proposed water source downstream to Oberlin Falls (an impassable upstream fish passage barrier located approximately one kilometer downstream from the headwaters), and the extreme winter habitat conditions that would exist in this section of stream (assuming the stream maintains flow over the course of the winter, which is uncertain at best). Under these assumptions, there would be negligible to minor, long-term, adverse impacts to westslope cutthroat trout from the actions proposed in this alternative.

Cumulative Impacts of Alternative C

Cumulative impacts to threatened species and species of concern under Alternative C would be similar to those described in Alternative A.

- Grizzly bear – moderate, short-term, adverse; indirect impacts on behavior, foraging patterns, and movement
- Westslope cutthroat trout – minor, long-term, beneficial; drainage improvements
- Wolverine – minor, short-term, adverse; displacement
- White-tailed ptarmigan – negligible to minor, short-term, adverse; no habitat loss expected, displacement
- Western toad – negligible to minor, short-term, adverse; aquatic habitat disturbance

Conclusion

The actions proposed under this alternative would not have additional impacts to the grizzly bear, westslope cutthroat trout, wolverine, white-tailed ptarmigan or western toad beyond what is already occurring at Logan Pass. In combination with past, present, and future actions (mainly related to the GTSR rehabilitation project) impacts would range from negligible to moderate, short-term adverse for the grizzly bear, wolverine, white-tailed ptarmigan or western toad based on displacement and disturbance of the species, no habitat loss is expected.

Cumulative impacts for westslope cutthroat trout would be minor, long-term, and beneficial

due to the drainage improvements from the GTSR rehabilitation.

Because Alternative C would not result in major adverse impacts to threatened, endangered or species of concern resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park threatened, endangered or species of concern resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be similar as described in Alternative B (the preferred) with additional impacts from construction activities that would include ground movement that might disturb or destroy ground-nests of the white-tailed ptarmigan.

The actions proposed to install a pole mounted array of solar panels near the visitor center would not cause additional impacts to the grizzly bear. The panels would be installed at heights sufficient to prevent wildlife related damage; therefore, would not require fencing. This alternative would have negligible to minor, short-term, and adverse impacts to grizzly bears.

Species of Concern.

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

Installation of solar panels would have less of an impact than the micro-hydro alternative because the area of impact would be contained to the developed area of Logan Pass, similar to the preferred. However, the panels would be installed in the alpine meadow south of the visitor center which might be inhabited by the white-tailed ptarmigan. Installation and periodic maintenance would possibly disrupt feeding, temporarily displace the bird, and disturb nesting sites.

Cumulative Impacts of Alternative D

Cumulative impacts to threatened species and species of concern under Alternative D would be similar to those described in Alternative A.

- Grizzly bear – moderate, short-term, adverse; indirect impacts on behavior, foraging patterns, and movement
- Westslope cutthroat trout – minor, long-term, beneficial; drainage improvements
- Wolverine – minor, short-term, adverse; displacement
- White-tailed ptarmigan – negligible to minor, short-term, adverse; no habitat loss expected, displacement
- Western toad – negligible to minor, short-term, adverse; aquatic habitat disturbance

Conclusion

The actions proposed under this alternative would not have additional impacts to the grizzly bear, westslope cutthroat trout, wolverine, white-tailed ptarmigan or western toad beyond what is already occurring at Logan Pass. In combination with past, present, and future actions (mainly related to the GTSR rehabilitation project) impacts would range from negligible to moderate, short-term adverse for the grizzly bear, wolverine, white-tailed ptarmigan or western toad based on displacement and disturbance of the species, no habitat loss is expected. Cumulative impacts for westslope cutthroat trout would be minor, long-term, and beneficial

due to the drainage improvements from the GTSR rehabilitation.

Because Alternative D would not result in major adverse impacts to threatened, endangered or species of concern resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park threatened, endangered or species of concern resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

Water Resources

AFFECTED ENVIRONMENT

The majority of the precipitation in GNP is accumulated during the winter months from November to March. Maritime Pacific air masses bring high amounts of snowfall to both sides of the Continental Divide. West Glacier receives about 30 inches of precipitation annually, with average snowfall along the Continental Divide ranging from 800 to 1,000 inches or 100 inches of precipitation. The pristine waters of GNP, often referred to as the Crown of the Continent, flow within 2500 km of perennial streams or are held in over 650 lakes and divided between three watersheds within the park. The triple divide is located about seven miles south of St. Mary Lake. Streams west of the Continental Divide drain to the Columbia River Basin and the Pacific Ocean, while streams east of the Continental Divide flow to either the Saskatchewan River and ultimately Hudson Bay or the Missouri River, ultimately draining into the Gulf of Mexico via the Mississippi River. Logan Creek is located west of the Continental Divide and is part of the McDonald Creek watershed, which drains into the Middle Fork of the Flathead River near West Glacier and ultimately into Pacific Ocean via the Columbia River.

During spring runoff, high water velocities transport sediment and woody debris, and stream turbidity increases. The rock flour produced by the erosive action of glaciers contributes to the milky color of streams and the aqua blue and green shades present in lakes. Thunderstorms generate short, intense periods of runoff and high gradient drainages and avalanche chutes often carry large volumes of debris and sediment.

A water quality monitoring program conducted between 1984 and 1990 provides an indication of the baseline water quality in the Going-to-the-Sun Road corridor (Ellis et al 1992). The study included chemical, physical, and biological sampling of Lake McDonald and St. Mary Lake, as well as other frontcountry and backcountry lakes. Both Lake McDonald and St. Mary Lake were determined to have extremely good water quality with no measurable pollutants. Dissolved solids were present due to the low dissolution rates of the bedrock and both lakes are very low in nutrients and productivity because of low phosphorus. Recent evidence (Western Airborne Contaminants Assessment Project) of atmospheric deposition, the primary pathway for pesticides and other contaminants to reach high elevations, is a growing concern for water quality in the park (Landers et al. 2008). Mast et al. (2006) detected pesticides in low concentrations from snow samples taken at a variety of elevations throughout the park during 2002 and 2003 winters.

The water use classification for the streams in GNP is A-1 (Montana Water Quality Act ARM 17.30.608). The A-1 classification denotes high quality water suitable for drinking and culinary food processing following conventional treatment, bathing, swimming, and recreation, growth and propagation of salmonid fishes and aquatic life, waterfowl, furbearers, and agricultural and industrial water supplies (Montana Water Quality Act ARM 17.30.622).

IMPACT ANALYSIS

METHODOLOGY

Water quality and quantity are vulnerable to both natural disturbances and man-caused disturbances. Potential effects from actions proposed in this document are based on the capturing of glacial melt from the infiltration gallery and routed through piping and a turbine to create energy for the Logan Pass VC and communication system.

- Negligible:* Water quality/quantity would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight and not measurable.
- Minor:* Changes in water quality/quantity would be measurable, although the changes would be small and the effects would be localized.
- Moderate:* Changes in water quality/quantity would be measurable and would be noticeable on a widespread scale.
- Major:* Changes in water quality/quantity would be readily measurable, would have substantial consequences, and would be noticed on a regional scale.
- Short-term:* After implementation, would recover in less than 1 year.
- Long-term:* After implementation, would take more than 1 year to recover or effects would be permanent.

IMPACT ANALYSIS OF ALTERNATIVE A – NO ACTION

Under the no action alternative, the infiltration gallery taking water from the upper-most reaches of Logan Creek to supply the visitor center with water for drinking and restrooms would continue to operate as it has in the past. Currently 4-8 gallons per minute are used, up to 12,000 gallons per day from Logan Creek. This wastewater is pumped from the 20,000-gallon vault at Logan Pass and transported to the St. Mary Wastewater Treatment Plant. The existing vault system at the visitor center is pumped 2-4 times per day, depending on the amount of use, although the wastewater vault is generally not entirely full. Under this alternative, the continued water withdrawal from Logan Creek for use in the visitor center would result in continued minor, long-term, and adverse impacts to water quantity in Logan Creek. Water quality would remain the same as current conditions at Logan Pass since water would still be treated and wastewater would be transported to the St. Mary Wastewater Treatment Plant.

Cumulative Impacts of the No Action Alternative

The no action alternative would have negligible, short and long-term cumulative impacts to water quality/quantity. Other cumulative factors influencing water quality/quantity in the Logan Creek watershed include repair and maintenance activities associated with the Going-to-the-Sun Road, as well as periodic dredging of the lower Logan Creek channel for flood control at GTSR. The no action alternative would not add meaningfully to any water quality/quantify issues associated with other ongoing actions. There will be some minor consumptive use of water from the same diversion source for a single drinking fountain; however we anticipate this use, combined with the proposed micro-hydro development, would not result in any more than minor, short and long-term cumulative impacts.

Conclusion

The no action alternative would have minor, long-term, and adverse impacts to water quantity in Logan Creek due to the continued water withdrawal from the infiltration gallery for use in the visitor center. No additional impacts to water quality would result from this alternative. Continued actions under this alternative, combined with past, on-going, and future actions would not result in result in any more than minor, short and long-term impacts.

Because the no action alternative would not result in major adverse impacts to water resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park water resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

Removal of the sinks and replacement of the existing toilets with low-flush toilets would be expected to reduce the amount of water being withdrawn from the stream system; however, fluctuations in use by visitors cannot be predicted. Water is currently being withdrawn from the stream and stored in a 10,000 gallon tank for drinking, as well as for cleaning and the flush toilets at the Logan Pass Visitor Center. This alternative would also install two drinking fountains which would result in minimal water consumption by visitors.

The new vault restroom would be located over the existing wastewater vault and thus not use any additional water out of Logan Creek. Pumping operations would proceed at the current level (2-4 per day and would continue to deposit the wastewater on the east side of the Continental Divide, removing water from the original drainage. The proposed new shuttle stop and installation of new generators would not impact water resources.

The preferred alternative would have no more than minor, short and long-term impacts to water quality. Water quality would remain largely unaffected even though the water withdrawn from the stream channel would continue to be stored in an above ground tank and transported to another basin. There would be no change to the chemical composition of the water (in the natural system), and little or no additional sediment (suspended or otherwise) is anticipated to be generated by the project. Water withdrawal would not influence the frequency of bankfull (channel forming flows) or the transport of sediment by the stream due to the timing of use (largely after spring runoff due to access timing to the Logan Pass area. The impact would be short-term due to the seasonal use of the area (approximately 4 months of the year, with about half of that time at what would be expected to be base-flow conditions in the stream channel), but the use is expected to be annual so it has a long-term or permanent component as well.

Cumulative Impacts of Alternative B

This alternative would have negligible short and long-term cumulative impacts to water quality/quantity. Other cumulative factors influencing water quality/quantity in the Logan Creek watershed include rehabilitation and maintenance activities associated with the GTSR as well as periodic dredging of the lower Logan Creek channel for flood control at GTSR. This alternative would not add meaningfully to any water quality/quantity issues associated with other ongoing actions. There will be some minor consumptive use of water from the same diversion source for two drinking fountains, however, it is anticipated this use, combined with the proposed micro-hydro development would not result in any more than minor short and long-term cumulative impacts.

Conclusion

The preferred alternative would have minor, long-term, and adverse impacts to water quantity in Logan Creek due to the continued water withdrawal from the infiltration gallery for use in the visitor center. Continued actions under this alternative, combined with past, on-going, and future actions would not result in more than minor, short and long-term impacts.

Because Alternative B would not result in major adverse impacts to water quality/quantity

resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park water resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new vault restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

This alternative would have no more than minor, short and long-term impacts to water quality. Water quality would remain largely unaffected because the water withdrawn from the stream channel would be piped underground in an existing water withdrawal and conveyance system and not exposed to solar radiation that could potentially warm the water. There would be no change to the chemical composition of the water, and little or no additional sediment (suspended or otherwise) is anticipated to be generated by the project. Water withdrawal would not influence the frequency of bankfull (channel forming flows) or the transport of sediment by the stream due to the timing of use (largely after spring runoff due to access timing to the Logan Pass area). Water would continue to be stored, but only used in the event of a fire or if stream levels dropped to the point where power was not being generated. This would minimize any opportunity for the water to warm as it passes through the system. The impact would be short-term due to the seasonal use of the area (approximately 4 months of the year, with about half of that time at what would be expected to be base-flow conditions in the stream channel), but the use is expected to be annual so it has a long-term or permanent component as well.

Impacts on water quantity would likely be moderate, short and long-term, but highly localized. The proposed water withdrawal system indicates a target use of approximately 0.5 ft³/second (150 gallons/minute in addition to the 4-8 gallons per minute withdrawn for the toilets and drinking water fountains.) in a continuous flow-through system. However, during low base flow periods of late summer and early fall, this could represent a significant proportion of the water in the channel at the diversion location. Some of this impact would be mitigated by changes in existing water uses at the visitor center. In addition, the proposed water withdrawal would have very localized impacts because most of the water would be returned to the original channel approximately 1300 ft (400 m) downstream from the initial diversion point.

Cumulative Impacts of Alternative C

This alternative would have negligible short and long-term cumulative impacts to water quality/quantity. Other cumulative factors influencing water quality/quantity in the Logan Creek watershed include repair and maintenance activities associated with the GTSR as well as periodic dredging of the lower Logan Creek channel for flood control at GTSR. This alternative would not add meaningfully to any water quality/quantity issues associated with other ongoing actions. There would be some minor consumptive use of water from the same diversion source for a two drinking fountains, however, it is anticipated this use, combined with the proposed micro-hydro development would not result in any more than minor, short and long-term cumulative impacts.

Conclusion

Direct, indirect, and cumulative impacts would be the same as those described for Alternative B. Because Alternative C would not result in major adverse impacts to water resources, whose

conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park water resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

The installation of a pole-mounted photovoltaic solar panel array would not directly impact water resources. Utilizing the sun as the renewable energy source for operations at Logan Pass indirectly benefits water resources by not obstructing the natural flow and dynamics of the infiltration gallery. However, under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

Cumulative Impacts of the Alternative D

Alternative D would have negligible, short and long-term cumulative impacts to water quality/quantity. Other cumulative factors influencing water quality/quantity in the Logan Creek watershed include rehabilitation and maintenance activities associated with the Going-to-the-Sun Road, as well as periodic dredging of the lower Logan Creek channel for flood control at GTSR. This alternative would not add meaningfully to any water quality/quantity issues associated with other ongoing actions. There would be some minor consumptive use of water from the same diversion source for drinking fountains and low flush toilets; however we anticipate this use, combined with the proposed micro-hydro development, would not result in any more than minor, short and long-term cumulative impacts.

Conclusion

Alternative D would have negative, long-term, minor adverse impacts to water quantity in Logan Creek due to the continued water withdrawal from Logan Creek for use in the visitor center; however the solar energy system would not be associated with that determination, as it would not impact water resources. Continued actions under this alternative, combined with past, on-going, and future actions would not result in any more than minor, short and long-term impacts.

Because Alternative D would not result in major adverse impacts to water resources, whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park water resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

Visitor Use and Experience

AFFECTED ENVIRONMENT

On average, 1.9 million visitors enjoy the natural beauty of the park each year (based on the last 10 years, NPS files); in 2007, GNP experienced 2,083,329 visitors. As the only access road through the park, the historic Going-to-the-Sun Road (GTSR) plays an important role for

visitor enjoyment and park access. The 2003 *GTSR FEIS* assessed impacts that might occur to visitor use and experience as part of the rehabilitation project. Construction traffic on the road affects visitors' experience, as construction delays can be long and frequent. The summer of 2007 marked the initiation of the free shuttle system that transported visitors across the GTSR. The system was a component of the mitigation measures developed for rehabilitation efforts for the GTSR. As a result, the park noted a 20% decrease in vehicle traffic and transported over 1000 people per day to popular destinations such as Logan Pass during the first year of operation. In 2008, the service experienced about a 20% decrease in riders but buses operated fewer hours per day and fewer days (due to snow). Though not all shuttle riders stop at Logan Pass, the Visitor Center has experienced an increase in visitor use as Logan Pass is a popular destination point for visitors because of the visitor center, its location on the Continental Divide, its spectacular scenery and the many trails that depart from this location.

IMPACT ANALYSIS

METHODOLOGY

Potential impacts to visitors associated with travel through the park was evaluated based on staff knowledge of visitor travel patterns and use levels and previous analysis in the *Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement*, April 2003.

- Negligible:* Visitors would not be affected, or the changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
- Minor:* Changes in visitor use and/or experience detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
- Moderate:* Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative.
- Major:* Changes in visitor use and/or experience would be readily apparent and have important consequences. The visitor would be aware of the effects associated with the alternative.
- Short-term:* Occurs only during project implementation or one month.
- Long-term:* Occurs for more than one month or is permanent.

IMPACTS OF ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the no action alternative, no new impacts would occur to visitors because conditions would remain as they currently exist. Visitors would continue to be affected by congestion at the temporary shuttle stop, outdated restroom and interrupted during cleanings of the restroom. People with disabilities would continue to have access to restrooms and the visitor center. The temporary shuttle stop would maintain the existing accessible ramps. By not installing a new restroom and formalizing the shuttle stop visitor would experience (minor), adverse, and long-term impacts that would be mainly localized around the visitor center and Logan Pass as a destination.

Cumulative Impacts of the No Action Alternative

Since 1933, visitors to GNP have made Logan Pass one of their places to visit in the Park. In 1966, the Logan Pass Visitor Center opened and provided visitors with interpretive and education opportunities, as well as restrooms and a place to get out of the weather. Rehabilitation of the Going-to-the-Sun Road and general maintenance is prominent in the visitors' experience. The park implemented mitigation measures to lessen the impacts

associated with construction and maintenance activities by up-to-date posting of construction activities and occurrence, providing a shuttle service, and various educational opportunities. The no action alternative combined with past, ongoing, and future actions would have a cumulative effect of minor, beneficial, long-term as rehabilitation and maintenance are part of upkeep and park operations; as well as short-term adverse because of the unavoidable intrusive nature of construction activities along the road and elsewhere in the park.

Conclusion

The no action alternative would not include any improvements or new construction at Logan Pass; there would continue to be minor to moderate, adverse, and long-term impacts mainly localized around the visitor center. Cumulatively the no action alternative would have minor, beneficial, long-term as rehabilitation and maintenance are part of upkeep and park operations; as well as short-term adverse because of the unavoidable intrusive nature of construction activities with past, ongoing, and future impacts.

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

Under this alternative the location of the new restroom and shuttle stop would have visual impacts that, to some, might be adverse. However, improvements provided by the new restroom building would increase the restroom capacity, provide additional accessible restrooms, and provide a more efficient and less confusing shuttle stop with more accessible ramps at Logan Pass. During the construction period, a minimal amount of visitors would be displaced as construction vehicles pass in and out of the parking lot and accessing the visitor center and Hidden Lake Trail would be more difficult than if construction activity was not present. The visitor center usually closes the last week in September but the closing date is also dependant on road construction and weather, therefore, the visitor center may not be concurrently open during construction activities.

Upon completion of the project, returning visitors would be able to identify the location of the new restrooms and shuttle stop. Some visitors might notice the improvements made to the existing restroom, but the new generator system would more than likely go unnoticed. These could be both beneficial and adverse, depending on how visitor needs and preferences. Some visitors might just use the restroom and never venture beyond the developed area of Logan Pass. Some visitors might expect minimal development in such a pristine park. Frequent visitors and returning visitors would have a changed experience from past visits due to the new restroom, rehabilitated restrooms and new shuttle stop. People with disabilities would have more restrooms available with the existing restroom remodel and the construction of a new restroom. The alpine meadow next to the west entrance would be reduced 0.1 acre. Alpine meadows are an attraction for many visitors in GNP; although the alpine meadow next to the west entrance would be reduced, alpine meadows would still be available for viewing within the vicinity of the parking lot and the visitor center. First-time visitors to Logan Pass would not perceive a change. Returning visitors with disabilities would notice more accessible ramp along the front sidewalk; providing them with more options for approaching the visitor center and restrooms. Visitors would experience minor to moderate, adverse, short-term impacts from construction but might experience long-term beneficial impacts from the proposed new restroom and shuttle stop (disregarding the visual impacts – see Visual Resources section).

Cumulative Impacts of Alternative B

Cumulative impacts would be similar to the no action alternative in that minor, beneficial, long-term impacts would be a result of rehabilitation and maintenance since they are part of upkeep and park operations; as well as short-term adverse because of the unavoidable intrusive nature of construction activities along the road and elsewhere in the park. However, minor to moderate, short-term adverse impacts would be greater under the preferred alternative with the

additional proposed construction activities near the visitor center and renovations of the visitor center restrooms. Minor long-term, beneficial impacts would be heightened by the additional restrooms that would be provided at the visitor center and off season, as well as a more efficient and less confusing shuttle stop.

Conclusion

Visitors would experience minor to moderate, negative, short-term impacts from construction but would experience long-term beneficial impacts from the proposed new restroom and shuttle stop. Cumulatively the preferred alternative would have minor, beneficial, long-term as rehabilitation and maintenance are part of upkeep and park operations; as well as short-term adverse because of the unavoidable intrusive nature of construction activities with past, ongoing, and future impacts.

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

The installation of a micro-hydro system might add some beneficial impacts to the visitors' experience in knowing the energy used to operate the visitor center is from a renewable resource and not increasing carbon emissions. The construction period for the micro-hydro system would occur around the same time as the other proposed activities and would not be expected to impact visitor experience beyond what was already described for the new restroom, shuttle stop and restroom updates. Visitors would experience minor to moderate, negative, short-term impacts from construction but would experience long-term beneficial impacts from the proposed new restroom, shuttle stop, and knowledge that the energy to operate the visitor center is coming from a renewable resource (disregarding the visual impacts – see Visual Resources section).

Cumulative Impacts of Alternative C

Cumulative impacts would be similar to those described in the preferred alternative (Alternative B): minor, beneficial, long-term impacts would be a result of rehabilitation and maintenance since they are part of upkeep and park operations; as well as short-term adverse because of the unavoidable intrusive nature of construction activities along the road and elsewhere in the park. Minor to moderate, short-term adverse impacts would be similar to the preferred alternative with the additional proposed construction activities for the micro-hydro system in the vicinity of the visitor center. Minor long-term, beneficial impacts from the additional restrooms that would be provided at the visitor center and during the shoulder season; as well as a more efficient and less confusing shuttle stop and an efficient, renewable energy source would be expected.

Conclusion

Visitors would experience minor to moderate, negative, short-term impacts from construction but would experience long-term beneficial impacts from the new restroom, shuttle stop, and knowledge that the energy to operate the visitor center is coming from a renewable resource (disregarding the visual impacts – see Visual Resources section). Minor, beneficial, long-term impacts would be a result of rehabilitation and maintenance since they are part of upkeep and park operations; as well as short-term adverse because of the unavoidable intrusive nature of construction activities along the road and elsewhere in the park.

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

The construction that would be required to install the pole mounted photovoltaic arrays would not cause additional impacts to visitors. Unmistakably the visitor would be able to physically see the pole mounted arrays from the parking lot, visitor center, and nearby surrounding area (see Visual Resource section). Visitor may experience concern over the visual obstruction and the presence of an artificial structure in a pristine environment or reassurance the park is using an efficient, renewable energy source to power operations at the visitor center. Either way the change would be readily apparent, whether considering first-time, return or frequent visitors, which leads to moderate, beneficial or adverse, long-term impacts.

Cumulative Impacts of Alternative D

Under the solar alternative, cumulative impacts would be similar as described for the preferred alternative with the possibility of additional adverse impacts from the visual obstruction and the presence of an artificial structure from the pole mounted panel arrays. The proposed actions would not increase cumulative impacts beyond the level of minor, beneficial, long-term. Impacts would be a result of rehabilitation and maintenance since they are part of upkeep and park operations; as well as short-term adverse because of the unavoidable intrusive nature of construction activities along the road and elsewhere in the park.

Conclusion

Visitors would experience moderate, adverse, short-term impacts from construction but would experience long-term beneficial impacts from the new restroom, shuttle stop, and knowledge that the energy to operate the visitor center is coming from a renewable resource.

Visual Resources

AFFECTED ENVIRONMENT

The majority of park visitors make the drive up to Logan Pass to enjoy spectacular views and vistas of glacial carved peaks and valleys from the GTSR, at the visitor center, upon entering the parking lot, and along trails at the pass. The steep, rocky and unique mountainous features of Mt. Clements and Mt. Reynolds form the visual backdrop of the visitor center. The visitor center with the associated stairway and the surrounding alpine vegetation provide dominant foreground views. The design of the visitor center roof angles, colors and materials complement the surrounding landscape.

Middle ground views of the project area include the Logan Pass Visitor Center, the visitor center parking lot, and in the distance, the upper slopes/peaks of the Continental Divide. Middle ground topography is variable, as it extends into the steep slopes of the Rocky Mountains. The linear and color contrasts between the developed areas, and the steepening slopes of the pristine alpine vegetation and exposed rock are both high, and contribute to high scenic quality. The visitor center building is more or less perched on a natural shelf above the parking lot. The parking lot is generally filled to capacity with vehicles and buses. Consequently vehicles and buses are recognized as frequent factors for viewshed of the visitor center and the middle ground landscape. Other factors associated with the existing development at the pass are flagpoles and radio antennas. Alpine meadow vegetation blooms on the slope below the visitor center, and alpine wildflowers frequently greet visitors accessing the building from the parking lot.

Background views from the perspective of the project area are of the rugged, snow-capped peaks, crags, cliffs and glacier-carved basins of the Rocky Mountains that for the interior of the

park. As expected, the topography is highly variable and diverse, ranging from vertical rock cliffs through steeply sloped mountain peaks to broad relatively horizontal, snowy ridges. The forms, lines, colors, and textures of the background views are complex, bold and sharp. The contrasts are strong and the scenic quality is very high.

The distant rugged mountain panoramas of Logan Pass and alpine meadows form the predominant viewshed. Lights are not present at the pass, and at night, the buildings do not dominate views from other critical viewpoints or trails in the area.

IMPACT ANALYSIS

METHODOLOGY

The methodology used to analyze visual impacts was a contrast analysis to compare existing condition of vegetation, soil, and the existing visitor center structure color, shape, and size with actions that could alter those conditions under the proposed alternatives. The analysis also included a qualitative analysis of proposed construction on the scenery.

This impact description also uses viewpoint analysis as seen from the north part of the parking area viewing towards the Logan Pass Visitor Center. The primary viewpoint considers the point of view of visitors entering the parking lot from both the east and west side parking lot entrances. Viewpoint analysis was also considered as seen from the nearby Highline Trail, but dropped from further consideration due to screened views of the project area. A viewshed analysis was completed in GIS for the solar panel reflection impacts parkwide. Acknowledging solar panels are designed to absorb light, the park still assumed the maximum distance possible for light reflection from the solar panel base off a mirror reflection distance (which is designed to reflect) due to lack of information. This assumption generated a parkwide analysis because the distance of reflection for mirrors is approximately 20 miles. The park was unable to ground truth the areas identified by the viewshed analysis since the project area was not accessible during the environmental analysis period. However, park staff is familiar enough with the project area (and the park) to eliminate several areas identified by the viewshed analysis that seem unreasonable. The viewshed analysis also assumed a 360 degree view of the solar panels when in reality the solar reflection would be limited to southern or southwestern angles and inclination of the panel.

Potential impacts to visual resources associated with constructing a new restroom building, energy supply source, and shuttle stop at Logan Pass were based on the following ratings.

- Negligible:* Effects would not result in any perceptible changes to existing viewsheds.
- Minor:* Effects would result in slightly detectable changes to a viewshed or in a small area or would introduce a compatible human-made feature to an existing developed area.
- Moderate:* Effects would be readily apparent and would change the character of visual resources in an area.
- Major:* Effects would be highly noticeable or would change the character of visual resources by adding human-made features into a mostly undeveloped area or by removing most human-made features from a developed area.
- Short-term:* Would be temporary and removable.
- Long-term:* Would be continual or permanent.

IMPACTS OF ALTERNATIVE A – NO ACTION ALTERNATIVE

Under the no action alternative, there would be no new impacts to visual resources because there would be no changes to or construction involving the Logan Pass Visitor Center or the

parking lot. Using existing services to accommodate the new shuttle system would increase traffic congestion in the vicinity of the visitor center. However, heavy traffic around the visitor center and the parking lot is a current condition and the impacts would be localized at the visitor center. The visual resources would not be perceptibly changed and therefore the no action alternative would have negligible impacts on visual resources.

Cumulative Impacts of the No Action Alternative

The impacts of past, ongoing and future construction activities as part of the GTSR rehabilitation would be minor as analyzed in the GTSR/FEIS (NPS 2003), as the visual impacts would be localized along the road and the short-term presence of construction vehicles and activities along the roadway would introduce compatible features (i.e. more vehicles and movement on an existing road) into the viewshed. Cumulative impacts would remain as minor, long-term, site-specific and adverse; this alternative would not add to this level of impact.

Conclusion

There would be no new changes in visual resources under the no action alternative. Minor, site-specific, cumulative impacts to the visitor center would be produced by foreseeable future GTSR construction, but the changes would be consistent with the existing scenic resources around the visitor center.

Because the no action alternative would not result in major adverse impacts to visual resources whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment or park visual resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

Under this alternative, the new restroom and shuttle stop would not be very apparent from the road, trails and parking lot at Logan Pass and would slightly detract from the views of the Continental Divide, Mt. Clements, and Mt. Reynolds viewshed. The restroom would be located at the southern end of the parking lot in an area already disturbed from actions related to (and previously analyzed in) the *GTSR Rehabilitation Plan FEIS*. This location is partially screened from views behind a low lying rock ledge and is several feet below the visitor center. Combined with topographic screening, the proposed location would be to the side of the viewshed. The proposed shuttle stop would involve the removal of some of the alpine vegetation at the west entrance. Visitors enjoy the view of alpine flowers when in bloom and alpine vegetation throughout the visitor season. The proposed shuttle stop would also station the shuttle buses along the western sidewalk and partially obstruct the views of the remaining alpine meadow adjacent to the visitor center when buses are loading and unloading passengers. This would be temporary, but continuous, as shuttle buses rotate on a schedule during the day.

The proposed renovations to the existing restroom and energy supply system would not have readily apparent impacts to visual resources at Logan Pass. An additional structure to house the two generators would be situated off the south end of the visitor center and would be contained in a box that would blend in with the style and structure (see Cultural and Historic section) and would only be visible from behind the visitor center.

Short-term, minor impacts would occur during construction; however, the new features would be constructed of materials similar to those used for the visitor center and the structure would be consistent in color and texture with the existing visitor center. Overall, impacts to visual

resources as a result of actions proposed in this alternative would be minor to moderate, long-term, site-specific and adverse primarily due to the newly constructed restroom, shuttle stop improvements, and loss of alpine vegetation.

Cumulative Impacts of Alternative B

Impacts to the Logan Pass Visitor Center, in conjunction with past, ongoing, and future actions, would be minor as the viewshed would be altered in the vicinity of the visitor center. The visitor center is already a developed area with buildings and a parking lot. The proposed development would not create perceptible changes or contrasts beyond the project area. Compared to the no action alternative, actions proposed in this alternative would be more adverse in the short and long-term. During construction of the new restroom building and the shuttle stop there would be an increase in construction traffic for a short-time during low visitor-use and the viewshed would be temporarily obstructed. Long-term visual impacts would be from a new structure at Logan Pass that obstructs the view of the immediate alpine meadows behind it.

The cumulative impacts of past, ongoing and future construction activities as part of the GTSR rehabilitation project, combined with actions proposed in this alternative, would be minor to moderate (NPS 2003), as the visual impacts would be localized along the roadway, and the short-term presence of construction vehicles and activities along the roadway would introduce compatible features (i.e., more vehicles and movement on an existing roadway) into the viewshed. Cumulative impacts would be minor to moderate, long-term, localized and adverse.

Conclusion

The main factors associated with visual impacts for this alternative would be the location of the new restroom and shuttle stop improvements as they would obstruct the immediate views near the Logan Pass Visitor Center. This would result in moderate, long-term, localized and adverse impacts to visual resources at Logan Pass. When combined with past, ongoing, and future impacts, proposed actions of Alternative B would result in minor to moderate, short and long-term localized, adverse impacts. The GTSR rehabilitation project has added, and will continue to add, short-term visual impacts through increased traffic and congestion along the road. However, these impacts alone are minor as they are compatible with the existing features.

Because this alternative would not result in major adverse impacts to visual resources whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park visual resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

Visual impacts from the micro-hydro system would include the addition of the turbine house to the existing water system. The location of the turbine house would not be visible from the visitor center or the GTSR; however, it would be visible from the Mt. Oberlin climbing route. To mitigate this impact the turbine house would be partially underground, set back from the route, and screened by trees (on three sides) concealing it by the surrounding vegetation and topography. This would result in negligible to minor impacts to visual resource; however, when combined with the new restroom and shuttle stop the impacts for this alternative would be minor to moderate, long-term, site-specific and adverse.

Cumulative Impacts of Alternative C

Cumulative impacts of Alternative C would be similar to those identified in Alternative B (the preferred); minor to moderate, long-term and adverse. The construction of a turbine house would not increase the impacts beyond those thresholds but would have additional impacts.

Conclusion

The main factors associated with visual impacts for this alternative would be the location of the restroom and shuttle stop as they would obstruct the immediate views near the Logan Pass Visitor Center. This would result in moderate, long-term, localized and adverse impacts to visual resources at Logan Pass. When combined with past, ongoing, and future impacts, proposed actions of Alternative C would result in minor to moderate, short and long-term localized, adverse impacts. The GTSR rehabilitation project has added, and will continue to add, short-term visual impacts through increased traffic and congestion along the road. However, these impacts alone are minor as they are compatible with the existing features.

Because Alternative C would not result in major adverse impacts to visual resources whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park visual resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, and the new shuttle stop would be the same as described in Alternative B (the preferred).

A viewshed analysis was completed in GIS by the park to get a general sense of how visible the reflection of the solar panel arrays would be from proposed location. Due to lack of information on the distance of visible reflection from solar panels the park assumed the greatest distance possible (the visible distance of reflection from a mirror is 20 miles); which is park-wide (see map 2). The analysis was also not able to isolate reflection to the probable orientation of the arrays; which would be primarily south-facing. Therefore, the analysis was completed for 360 degrees around the array causing several northern locations to be identified that would not be impacted since the arrays would be facing to the south. This analysis would only include the area represented in the immediate vicinity of the Logan Pass Visitor Center and associated trails as well as the GTSR (see map 3). The proposed location of the solar panels would be visible from several locations throughout the greater Logan Pass area based on a viewshed analysis. As visitors approach the pass on the GTSR from the east side, there would be two long sections of road where the solar panels might be visible. Hikers on the Hidden Lake Trail could observe the reflection and the solar panels. Though the panels would be visible from several points in the Logan Pass area, they would not change the character of the visual resources at Logan Pass since they would be located near the developed area of the visitor center and parking lot.

Additionally, the top of the array would be over 20 feet high (they would be mounted at a minimum of 8 feet and the panel height would be about 16 feet), well above the stunted alpine vegetation established at Logan Pass. The panels, themselves, would be visible from the western edge of the parking lot, visitor center, and possibly the Hidden Lake Trail. This would be an artificial change to the natural viewshed in a small area of Logan Pass. Impacts from the installation of solar arrays would be minor to moderate, adverse, long-term, site-specific and widespread.

Cumulative Impacts of Alternative D

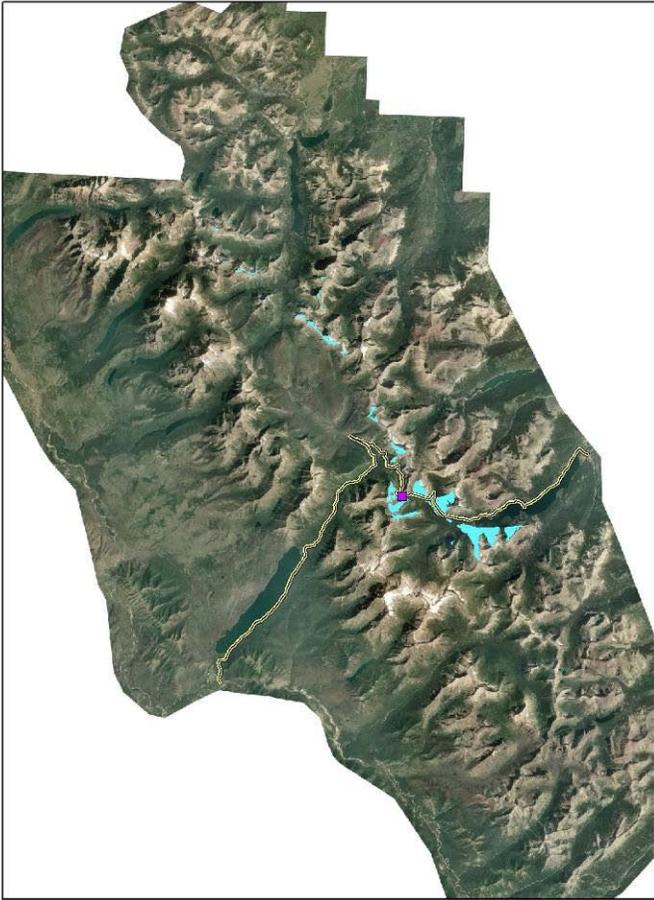
Cumulative impacts of Alternative D would be similar to those identified in Alternative B minor to moderate, long-term and adverse. The installation of solar arrays would not increase the impacts beyond those thresholds but would have additional impacts.

Conclusion

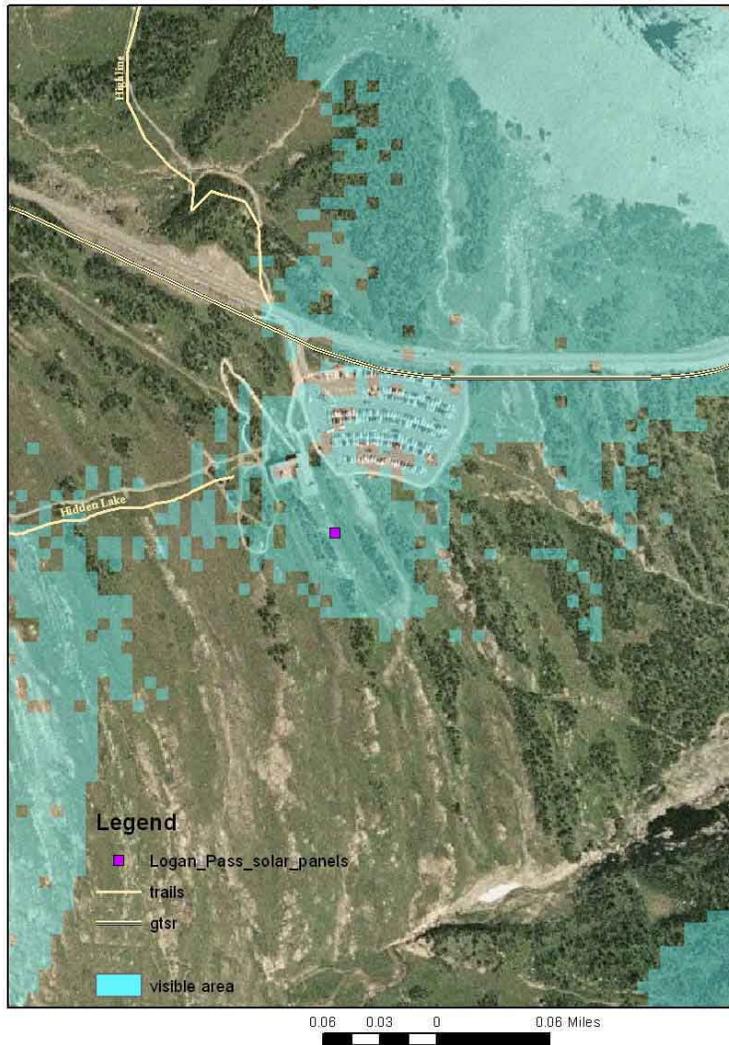
Factors associated with visual impacts for this alternative would be the location of the new restroom and shuttle stop as they would obstruct the immediate views near the Logan Pass Visitor Center. The reflection of the solar panel arrays would have additional widespread impacts throughout GNP based on a viewshed analysis. Acknowledging solar panels are designed to absorb light, the park still assumed the maximum distance possible for light reflection from the solar panel base off a mirror reflection distance (which is designed to reflect) due to lack of information. This assumption generated a parkwide analysis because the distance of reflection for mirrors is approximately 20 miles. The park was unable to ground truth the areas identified by the viewshed analysis since the project area was not accessible during the environmental analysis period. However, park staff is familiar enough with the project area (and the park) to eliminate several areas identified by the viewshed analysis that seem unreasonable. The viewshed analysis also assumed a 360 degree view of the solar panels when in reality the solar reflection would be limited to southern or southwestern angles and inclination of the panel. Impacts from Alternative D would be minor to moderate, long-term, site-specific and adverse to visual resources at Logan Pass.

When combined with past, ongoing, and future impacts, proposed actions of Alternative D would result in minor to moderate, short and long-term localized, adverse impacts. The GTSR rehabilitation project has added, and will continue to add, short-term visual impacts through increased traffic and congestion along the road. However, these impacts alone are minor as they are compatible with the existing features.

Because Alternative D would not result in major adverse impacts to visual resources whose conservation is 1) necessary to fulfill specific purposes identified in the park's enabling legislation, 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or 3) identified as a goal in the park's *General Management Plan* (NPS 1999) or other relevant NPS planning documents, there would be no impairment of park visual resource values related to this alternative. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies 2006* (NPS 2006).



Map 1. Parkwide area assumed to be impacted by the reflection of the solar panels – see impact analysis for assumptions



Map 2. Immediate area the potential reflection of the solar panels could be seen - see impact analysis for assumptions.

Health and Safety

AFFECTED ENVIRONMENT

The NPS is committed to providing appropriate, high-quality opportunities for visitors and employees to enjoy the parks in a safe and healthful environment. Further, the NPS strives to protect human life and provide for injury-free visits. Glacier National Park has an average of 1.9 million visitors each year from around the country and the world (based on the last 10 years, NPS files). The majority of the visitors concentrate their use in developed areas around the park. Logan Pass is a world renowned landmark and is a destination point for most visitors.

IMPACT ANALYSIS

METHODOLOGY

Health and safety was assessed for the Logan Pass Improvements Project over concerns of visitor safety in the parking lot, restroom availability, and electronic systems upgrades that would facilitate emergency response, shuttle bus coordination and park operations.

- Negligible:* Public health and safety would not be affected, or the effects would not be noticeable.
- Minor:* Effects would be detectable, but would not have an appreciable effect on public health and safety.
- Moderate:* Effects would be readily apparent and would result in a substantial change in public health and safety in a manner noticeable to staff and public.
- Major:* Effects would be readily apparent, would result in a substantial change in public health and safety in a manner noticeable to staff and the public, and would be substantially different from existing conditions.
- Short-term:* After implementation, would recover in less than 1 year.
- Long-term:* After implementation, would be permanent.

IMPACT ANALYSIS OF ALTERNATIVE A – NO ACTION

Health and safety would not change under the no action alternative because no changes to Logan Pass would be made. Implementing this alternative would not have impacts beyond the current situation. Currently the existing restroom must be closed in order to accomplish janitorial tasks. Closures happen during visitor hours and there are no alternative restrooms. The temporary shuttle stop has the potential for an accident to occur because it is confusing and does not facilitate the shuttle riders' needs and imparts additional congestion to the parking area and in front of the visitor center. The existing communication system at Logan Pass is not adequate to provide service to employees and visitors during throughout the year; especially during the winter.

Cumulative Impacts of the No Action Alternative

Under the no action alternative, there would be no cumulative impacts.

Conclusion

The no action alternative would have negligible direct and indirect impacts to health and safety beyond the current situation.

IMPACT ANALYSIS OF ALTERNATIVE B – THE PREFERRED

Visitor and employee health and safety would benefit from the improvements that would occur upon implementing the preferred alternative. The project design of improvements to the existing restroom would allow the park staff to clean the restrooms on a more frequent basis without inconveniencing the visitor. This would provide the visitor with a more sanitary restroom and opportunity to use the restroom when needed. The project design would also provide more restrooms, including additional handicap accessible and a family restroom, which could also benefit the visitors' and employees' health and safety. The new restroom (at the parking lot level) would provide an additional handicap accessible restroom and restrooms that would be available during the shoulder season.

The shuttle stop improvements would be expected to decrease the congestion in front of the visitor center. This would benefit visitor safety by keeping visitors on the sidewalk and from wandering into the parking lot area. Additionally, the park would expect a more organized

shuttle stop would benefit visitors' safety by providing an easier to understand system such that visitors would not board the wrong bus or miss their bus.

Additional energy, supplied by a more efficient system, would allow the park to install more safety and emergency response equipment to protect visitors and employees. The additional energy supply would also support the park's *Intelligent Transportation Systems Plan*, which is part of the mitigation effort for the *GTSR Rehabilitation Plan*. Beneficial, long-term, minor to moderate impacts to health and safety would result from improvements that would be made at Logan Pass under this alternative.

Cumulative Impacts of Alternative B

Glacier National Park is continuously implementing plans, policies, and guidelines that identify hazards and manage risk appropriate with the mission of the National Park Service. The park strives to provide a safe and healthful worksite and reduce risks (as best possible) to the visitor. Impacts from this alternative, combined with past, ongoing, and future actions results in negligible to moderate, as some safety improvements may go unnoticed by the visitor, but all improvements would be designed to be long-term and beneficial.

Conclusion

Implementation of Alternative B would have beneficial, long-term, minor to moderate impact on health and safety. In combination with past, ongoing, and future actions, this alternative would result in negligible to moderate, long-term and beneficial impacts to health and safety.

IMPACT ANALYSIS OF ALTERNATIVE C – MICRO-HYDRO

Under this alternative, the impacts from existing restroom updates, the new restroom building, the new shuttle stop, and additional energy would be the same as described in Alternative B (the preferred).

Cumulative Impacts of Alternative C

Same as the preferred alternative

Conclusion

Same as the preferred alternative

IMPACT ANALYSIS OF ALTERNATIVE D – SOLAR

Under this alternative, the impacts from existing restroom updates, the new restroom building, the new shuttle stop, and additional energy would be the same as described in Alternative B (the preferred).

Cumulative Impacts of Alternative D

Same as the preferred alternative

Conclusion

Same as the preferred alternative

COMPLIANCE REQUIREMENTS

National Environmental Policy Act (NEPA) and Regulations of the Council on Environmental Quality – The National Environmental Policy Act applies to major federal actions that might significantly affect the quality of the human environment. This generally includes major construction activities that involve the use of federal lands or facilities, federal funding, or federal authorizations.

This Environmental Assessment meets the requirements of the NEPA and regulations of the Council on Environmental Quality in evaluating potential effects associated with activities on federal lands. If no significant effects are identified a finding of no significant impacts (FONSI) would be prepared. If significant effects are identified a notice of intent (NOI) would be filed for preparation of an environmental impact statement (EIS).

Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) –In accordance with *Endangered Species Act*, Section 7, and *National Park Service Management Policies 4.4.2.3*, Glacier National Park is required to request formal consultation with U.S. Fish and Wildlife Service (USFWS) regarding the determination of potential adverse effects on threatened and endangered species. The NPS conducted formal consultation with the USFWS on the *Going-to-the Sun Road Rehabilitation Plan Final Environmental Impact Statement* which had determined an adverse effect on grizzly bears. The USFWS concurred with this determination and a number of mitigation actions were agreed to. The biological assessment (February 13, 2003) prepared for the *2003 Going-to-the Sun Road Rehabilitation Plan, FEIS* covers this action. A Biological Opinion was issued by the US Fish and Wildlife Service on July 30, 2003 concurring with the park's determination. This EA and a mini-BA will be sent to the US Fish and Wildlife Service for their review and concurrence.

Clean Water Act (CWA) and Montana Stream Protection Act – The U.S. Army Corps of Engineers (COE) is responsible for authorizing the placement of fill into waters of the U.S. and filling of wetlands under Section 404 of the Clean Water Act. No wetlands would be filled from project implementation. The Montana Stream Protection Act and the State's responsibility under the Clean Water Act are responsible for dredging and removal of materials from streams. The park would apply for necessary permits to the COE and to Montana Department of Fish, Wildlife and Parks and the Department of Environmental Quality.

Executive Order 11990, Protection of Wetlands – This order requires federal agencies to avoid, where possible, impacts to wetlands. The NPS is guided by the *2006 Management Policies* and Director's Order 77-1: *Wetland Protection*. No wetlands would be affected by this project.

Executive Order 11988, Floodplain Management – Executive Order 11988 *Floodplain Management* requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The NPS is guided by the *2006 Management Policies* and Director's Order 77-2: *Floodplain Management*. No floodplains are being affected by this project.

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et. seq.)— Section 106 of the National Historic Preservation Act of 1966 (as amended) requires all federal agencies to consider effects from any federal action on cultural resources eligible for or listed on the National Register of Historic Places (NHRP), prior to initiating such actions. For Section 106 purposes, the park finds that the undertaking will have no adverse effect (no historic properties affect) upon historic properties.

CONSULTATION/COORDINATION

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AGENCIES/ TRIBES/ ORGANIZATIONS/ INDIVIDUALS CONTACTED (EA NOTIFICATION)

Federal and International

Max Baucus, United States Senate
Jon Tester, United States Senate
Dennis Rehberg, United States House of Representatives
Flathead National Forest (Kalispell, Hungry Horse)
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service (Helena and Creston)
U.S. Geological Survey, Biological Resources Division
U.S. Department of the Interior, Office of the Solicitor
Waterton Lakes National Park, Canada
Premier of the Province of Alberta, Honorable Ed Stelmach
National Trust for Historic Preservation

State

Environmental Quality Council, Director, Helena
Montana Department of Environmental Quality, Board of Environmental Review
Montana Department of Environmental Quality Permitting & Compliance, Helena
Montana Department of Environmental Quality, Water Protection Bureau
Montana Department of Environmental Quality, Air Quality Division
Montana Department of Natural Resources and Conservation
Montana Fish, Wildlife, and Parks, Region One Supervisor, Kalispell
Montana State Historic Preservation Office
Brian Schweitzer, Governor of Montana
Stillwater State Forest

Tribes

Willie A. Sharp, Chair, Blackfeet Tribal Business Council w/copies to Tribal Council and the Blackfeet Tribal Historic Preservation Office
James Steele, Chair, Confederated Salish and Kootenai Tribes of the Flathead Reservation w/copies to Tribal Council and Confederated Salish and Kootenai Tribal Historic Preservation Department

County and City

Chair, Flathead County Board of Commissioners
Chair, Glacier County Commissioners
Mayors and City Councils of Browning, Kalispell, Columbia Falls, and Whitefish, MT
Public Libraries: Bigfork, Columbia Falls, Kalispell, Whitefish, MT

Private

Friends of the Wild Swan
Glacier National Park Fund
Glacier Natural History Association
Glacier Park Inc.
Glacier Park Foundation
Glacier Raft Company
Glacier Waterton NP Visitor Association
Great Northern Whitewater Resort
Montana Preservation Alliance
Montana Raft Company
Montana Wilderness Association
National Parks Conservation Association
National Trust for Historic Preservation
Wilderness Watch
Wild River Adventures

Individuals

A complete list is available upon request

REFERENCES

- Allaback, Sarah. 2000. Mission 66 Visitor Centers: The History of a Building Type. Washington, D.C.: Government Printing Office, 2000.
- Black, J.H. 1967. Toads of Montana. *Montana Wildlife* 1967(Spring):22-28.
- Black, J.H. 1970. Unusual forms of boreal toads *Bufo boreas* (Amphibia: Bufonidae) in Glacier National Park, Montana. *Proceedings of the Oklahoma Academy of Sciences* 50:127-128.
- Black, J.H. 1971. The toad genus *Bufo* in Montana. *Northwest Science* 45:156-162.
- Braun, C. E., K. Martin, and L. A. Robb. 1993. White-tailed Ptarmigan (*Lagopus leucurus*). In *The Birds of North America*, No. 68 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union. 24 pp.
- Brittell, J. D., Poelker, R. J., S. J. Sweeney, and others. 1989. Native cats of Washington. Unpubl. Report, Washington Dept. of Wildlife. Olympia, WA. 169 pp.
- Choate, T. S. 1963. Habitat and population dynamics of White-tailed Ptarmigan in Montana. *Journal of Wildlife Management* 27:684-699.
- Claar, J.J., N. Anderson, D. Boyd, M. Cherry, B. Conard, R. Hompesch, S. Miller, G. Olson, H. Ihle Pac, J. Waller, T. Wittinger, H. Youmans. 1999. Carnivores. Pages 7.1-7.63 In Joslin, G. and H. Youmans, coordinators. *Effects of recreation on Rocky Mountain wildlife: A review for Montana*. Committee on Effects of Recreation on Wildlife. Montana Chapter of the Wildlife Society. 307 pp.
- Copeland, J.P. and R.E. Yates. 2008. Wolverine Population assessment in Glacier National Park, Comprehensive Summary Update (preliminary results).
- CTA Architects Engineers. 2007. Power Alternatives Study for Logan Pass Visitor Center, Glacier National Park. 1143 Stoneridge Dr., Bozeman, MT 59718.
- DEA (David Evans and Associates). 2008. Transit Modification to Logan Pass Visitor Center, Value Analysis Summary Report. PMIS 121816 & 100571.
- Downs, C.C. 1995. Age determination, growth, fecundity, age at sexual maturity, and longevity for isolated, headwater populations of westslope cutthroat trout. Master's Thesis. Montana State University, Bozeman.
- Downs, C.C., R.G. White, and B.B. Shepard. 1997. Age at sexual maturity, sex ratio, fecundity, and longevity of isolated headwater populations of westslope cutthroat trout. *North American Journal of Fishery Management* 17:85-92.
- Dux, Andrew M. and Christopher S. Guy. 2004. Evaluation of Fish Assemblages and Habitat Variables in Streams Bisecting the Going-to-the-Sun Road and Peripheral Roads in Glacier National Park – Final Report. Montana Cooperative Fishery Research Unit. Department of Ecology, Montana State University. Bozeman, MT. 59717. 30pp.
- Ellis, B.K., J.A. Stanford, J.A. Craft, D.W. Chess, G.R. Gregory, and L.F. Marnell. 1992. Monitoring water quality of selected lakes in Glacier National Park, Montana: Analysis of data collected, 1984-1990. Open file Report 129-92 in Conformance with Cooperative Agreement CA 1268-0-9001, Work Order 6, National Park Service, Glacier National Park, Montana. Flathead Biological Station, The University of Montana, Polson.
- Environmental Protection Agency (EPA). 1998. Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. Prepared by U.S. Environmental Protection Agency, Washington, D.C.
- Guthrie, Mark R. 1978. "Cultural Resource Inventory of Specified Areas [including Logan Pass] within Glacier National Park."
- Jakober, M.J., T.E. McMahon, R.F. Thurow, and C.G. Clancy. 1998. Role of Stream Ice on Fall and

Winter Movements and Habitat use of Bull Trout and Cutthroat Trout in Montana Headwater Streams. *Transactions of the American Fisheries Society* 127:223-235.

- Kendall, K. C., J. B. Stetz, D. A. Roon, L. P. Waits, J. B. Boulanger, and D. Paetkau. 2008. Grizzly Bear Density in Glacier National Park, Montana. *Journal of Wildlife Management*. 72(8):1693-1705.
- Landers, D.H., S.L. Simonich, D.A. Jaffe, L.H. Geiser, D.H. Campbell, A.R. Schwindt, C.B. Shreck, M.L. Kent, W.D. Hafner, H.E. Taylor, K.J. Hageman, S. Usenko, L.K. Ackerman, J.E. Schrlau, N.L. Rose, T.F. Blett, and M.M. Erway. 2008. The Fate, Transport, and Ecological Impacts of Airborne Contaminants in Western National Parks (USA). EPA/600/R-07/138. U.S. Environmental Protection Agency, Office of Research and Development. NHEERL. Western Ecology Division, Corvallis, Oregon.
- Mace, R. D. and J. S. Waller. 1997. Final report: grizzly bear ecology in the Swan Mountains, Montana. Montana Fish, Wildlife & Parks, Helena, MT. 191 pp.
- Mace, R.D., J.S. Waller, T.L. Manley, K. Ake, and W.T. Wittinger. 1999. Landscape evaluation of grizzly bear habitat in western Montana. *Conservation Biology*. Vol. 13, No. 2, pp. 367-377.
- Marnell, L.F. 1988. Status of the Westslope Cutthroat Trout In Glacier National Park, Montana. *American Fisheries Society Symposium* 4: 61-70.
- Marnell, L. 1997. Herpetofauna of Glacier National Park. *Northwestern Naturalist* 78:17-33.
- Martinka, C. 1972 Habitat relationships of grizzly bears in Glacier National Park, Progress Report, USDI National Park Service, Glacier National Park, West Glacier, MT. 19pp.
- Mast, M.A., W.T. Foremanand, and S.V. Skaates. 2006, Organochlorine compounds and current-use pesticides in snow and lake sediment in Rocky Mountain National Park, Colorado, and Glacier National Park, Montana, 2002–03: U.S. Geological Survey Scientific Investigations Report 2006–5119, 54 p.
- Mech, L.D. 1989. Wolf population survival in an area of high road density. *American Midland Naturalist* 121:387-389.
- National Park Service. 1999. Final *General Management Plan* and Environmental Impact Statement for Glacier National Park. U.S. Department of the Interior, National Park Service, Glacier National Park, West Glacier, Montana.
- National Park Service. 2003. *Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement*. Glacier National Park, West Glacier, Mt.
- National Park Service. 2006. NPS Management Policies. Prepared by US Department of the Interior, National Park Service, Washington, D.C.
- Reeves, Dr. Brian. 1996. Glacier National Park Archaeological Inventory and Assessment – 1994 Field Season Final Report, Part I: Inventory.
- Reeves, Dr. Brian, and Dr. Sandra Peacock. 2001. “Our Mountains are Our Pillows:” An Ethnographic Overview of Glacier National Park.” Final Report.
- Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp. 142 pp.
- Schmetterling, D.A. 2001. Seasonal movements of fluvial westslope cutthroat trout in the Blackfoot River drainage, Montana. *North American Journal of Fishery Management* 21:507-520.
- Scott, M. D. 1982. Distribution and habitat use of White-tailed Ptarmigan in Montana. *Proceedings of*

the Montana Academy of Sciences 41:57-66.

- Servheen, Christopher. 1983. Grizzly bear food habits, movements, and habitat selection in the Mission Mountains, Montana. *The Journal of Wildlife Management*. Vol. 47, No. 4, pp. 1026-1035.
- Shepard, B.B., K.L. Pratt, and P.J. Graham. 1984. Life histories of westslope cutthroat trout and bull trout in the upper Flathead River basin, Montana. Report to the Environmental Protection Agency, Contract R008224-01-5. Montana Department of Fish, Wildlife and Parks, Helena, MT.
- US Fish and Wildlife Service (USFWS). 1993. Grizzly bear recovery plan. US Fish and Wildlife Service, Missoula, MT. 181 pp.
- Vershuren, D. and L.F. Marnell. 1997. Fossil zooplankton and the historical status of westslope cutthroat trout in a headwater lake of Glacier National Park, Montana. *Transactions of the American Fishery Society* 125:21-34.
- Yates, R.E., B.R. McClelland, P.T. McClelland, C.H. Key, and R.E. Bennetts. 2001. The influence of weather on golden eagle migration in Northwestern Montana. *Journal of Raptor Research* 35(2):81-90.