

U.S. Department of the Interior

Glacier National Park
Montana



Going-to-the Sun Road Construction and Maintenance Staging and Stockpiling Site

Environmental Assessment

November 2007



Logan Pit, November 2006

This page intentionally left blank

Environmental Assessment

Going-to-the-Sun Road Construction and Maintenance Staging and Stockpiling Site

Glacier National Park • Montana

SUMMARY

The purpose of this document is to evaluate reconstructing the Logan Pit as a staging and stockpiling site or utilizing an alternative site. The Logan Pit staging and stockpiling site was identified in the May 2003 Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement as the primary staging and stockpiling site for rehabilitation of the west side of the Going-to-the-Sun Road (GTSR). The site also serves as a general maintenance staging site and as an administrative and emergency helicopter landing site. The Logan Pit is located adjacent to the GTSR at milepost 20.2 within a point bar on McDonald Creek. The access road to Logan Pit crosses a back bar flood scour channel. In November 2006 Glacier National Park experienced a weather event that resulted in 9.1 inches (23.1 cm) of rain in a 36-hour time period. This event caused multiple creeks within the park to swell above their 100-year-flood-event stage causing notable damage throughout Glacier National Park including Logan Pit and resulting in McDonald Creek backing up into the flood channel and flowing across the access road until June 2007. Access to the Logan Pit site was delayed until the water receded.

Concern for future flooding initiated the park to assess the options of reconstructing Logan Pit and continue utilizing the site or utilizing an alternative staging and stockpiling site. The National Park Service staff and Western Federal Lands Highway Division initially identified the following sites as possible alternatives: Packer's Roost, Moose Country, and the area known as the ballfield. Future discussions about the ballfield refer to it as the West Glacier Staging Area.

Packer's Roost, Moose Country and areas burned during the 2003 fires were eliminated from further analysis due to the limited usable area available at these locations, access complications and resource impacts. Reconstruction and raising the elevation of Logan Pit by placing fill in the area was also eliminated from further analysis due to NPS Policy and impacts on the floodplain. Closing Logan Pit upon completion of the GTSR rehabilitation project was eliminated from further analysis due to the need for a central maintenance staging and storage area along the road and its function as a helicopter landing zone. Also considered but eliminated from further analysis was exclusive use of the West Glacier Staging Area due to distance from the construction work on the road and impacts to visitors. Storing all materials outside of the park was also eliminated from further analysis because the additional travel time and costs would not benefit park operations or the GTSR project. The following impact topics were evaluated by resource specialists: soils, vegetation, wildlife and aquatic species, threatened, endangered and species of concern, natural soundscapes, visitor use and experience, water quality, and floodplains.

This environmental assessment evaluates two alternatives, a no action alternative and an action alternative. The No Action alternative would utilize Logan Pit in its current condition as the primary staging and stockpiling site while overflow would temporarily continue to be staged and stockpiled at the West Glacier Staging Area. The Preferred Alternative would reduce the size of the disturbed area and use concrete forms to stabilize the site. A culvert would be placed across the access road. Logan Pit would only be used during low flow and the West Glacier Staging Area would be used permanently to support the rehabilitation of the GTSR and continued maintenance.

The environmental assessment 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. Impacts to soils would be minor, localized, long-term and adverse due to cumulative impacts of utilizing the sites, immediate impacts would be negligible. Vegetation would experience negligible impacts from the actions proposed in the preferred alternative but would incur minor, localized, long-term and adverse impacts due to the cumulative impacts of continued use of the sites. Wildlife species would have minor, short- and long-term and localized adverse impact. Impacts to aquatic species would be minor, localized, long-term and adverse due to the continued use of Logan Pit and its location in a floodplain. No impacts were assessed for aquatic species at the West Glacier Staging Area as there are no water sources within the vicinity of the site. Impacts to grizzly bears, a federally threatened species, would be minor, short- and long-term and localized adverse. Actions under the preferred alternative would have slightly beneficial impact to harlequin ducks, a species of concern, as the buffer zone between the Logan Pit site and McDonald Creek would increase. Under the preferred alternative impacts to visitor use and experience would be minor, short and long-term, beneficial and adverse, localized and widespread due to the length of the rehabilitation project and the positive improvements once it is complete. The preferred alternative would have negligible to minor, adverse, long-term and localized impacts to water quality in McDonald Creek in the vicinity of the Logan Pit site due to the potential for flooding. The floodplain associated with McDonald Creek would experience minor, adverse and beneficial, short and long-term, and localized impacts upon implementation of the preferred alternative because while there are improvements made to enhance floodplain dynamics in the area, the Pit would continue to be used for staging and stockpiling. No major effects are anticipated as a result of this project. Public scoping was conducted to assist with the identification of resources that could be impacted and to identify additional alternatives. Six letters were received.

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, Glacier National Park, Attn: *Going-to-the-Sun Road Construction and Maintenance Staging and Stockpiling Site EA*, 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 – may 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.

TABLE OF CONTENTS

Purpose and Need.....	1
Introduction	1
Purpose and Need.....	2
Relationship of the Proposed Action to Other Plans.....	3
Scoping and Public Involvement	3
Impact Topics	4
Alternatives	10
Actions Common to All Alternatives	10
No Action Alternative	10
Preferred Alternative – Stabilize and Reduce the Size of Logan Pit, and Establish a Permanent Staging Site at the Existing West Glacier Staging Area.....	10
Alternative Summaries	13
Environmentally Preferred Alternative	16
Affected Environment and Environmental Consequences.....	17
Methodology	17
Impairment of Park Resources or Values.....	18
Cumulative Impacts.....	18
Soils	24
Vegetation	27
Wildlife and Aquatic Species.....	30
Threatened, Endangered, and Species of Concern	33
Natural Soundscapes.....	37
Visitor Use and Experience.....	39
Water Quality	42
Floodplain	44
COMPLIANCE REQUIREMENTS.....	47
CONSULTATION/COORDINATION.....	48
REFERENCES	50
APPENDIX A. Common and Scientific Names of Plant Species Found in Project Areas	51
APPENDIX B. Common and Scientific Names of Wildlife Species Found in Project Areas	53
<i>Statement of Findings for Floodplains</i>	55
for the Going-to-the-Sun Road Construction and Maintenance.....	55
Staging and Stockpiling Site.....	55

This page left intentionally blank.

Purpose and Need

Introduction

Glacier National Park (Glacier or the park) is located on the Canadian border in the northwestern section of Montana. The park is in the northern Rockies, and contains the rugged mountains of the Continental Divide. Together with Canada's Waterton 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 glaciation;
- 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.

In November 2003, GNP issued a Record of Decision to rehabilitate the Going-to-the-Sun Road (GTSR) according to the May 2003 *Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement* (FEIS). The FEIS addressed the issue of rehabilitating the deteriorating road while preserving the GTSR's National Historic Landmark status. The National Park Service selected the preferred alternative known as the Shared Use with Extended Rehabilitation Season Alternative (Shared Use).

The FEIS identified management methods in order to minimize construction/rehabilitation impacts on visitor use and access to the GTSR. One of the management methods identified

Logan Pit as a staging and stockpiling site. Historically it has been used for general road repair and maintenance staging and stockpiling site. Logan Pit also has served as an emergency and administrative helicopter landing site for many years.

Purpose and Need

A flood event in November 2006 flooded Logan Pit and created a number of overflow channels, one of which flooded the access road to the site. The November 2006 event raised the concern of maintaining Logan Pit as a staging and stockpiling site. In a one month period, October – November 2006, the Park received 14.1 inches of precipitation; of which, 9.1 inches fell in a 36 hour period from November 5 to November 6, 2006. This caused numerous rock and mud slides and flooding along the west side of the GTSR which resulted in heavy erosion and roadway undercutting. Based on USGS records and analysis, the flooding that occurred likely exceeded the 100-year flood event. During the November event, the water in McDonald Creek flowed through the scour channel and through the Logan Pit site and across the access road. The potential for future flooding and channel avulsion and uncertain weather requires evaluation of continued use of this site.

Logan Pit is located at milepost (MP) 20.2 on the GTSR (see Map 1) and offers adequate space and short travel routes for hauling materials and equipment storage for all west-side road projects. Logan Pit is visible from the road above the pit and nearby trails. The site is approximately 1 to 2 feet lower than the surface of the GTSR. It is accessed by a road that crosses a back bar flood scour channel. The back bar flood scour channel parallels the GTSR and is between 2 to 3 feet below the surface of the road. The pit area is currently about 85,000 square feet but materials being stored and stockpiled do not occupy the entire space. Rock for walls and bridges, riprap, corrugated metal, plastic pipe, and gravel are currently being stored and stockpiled.

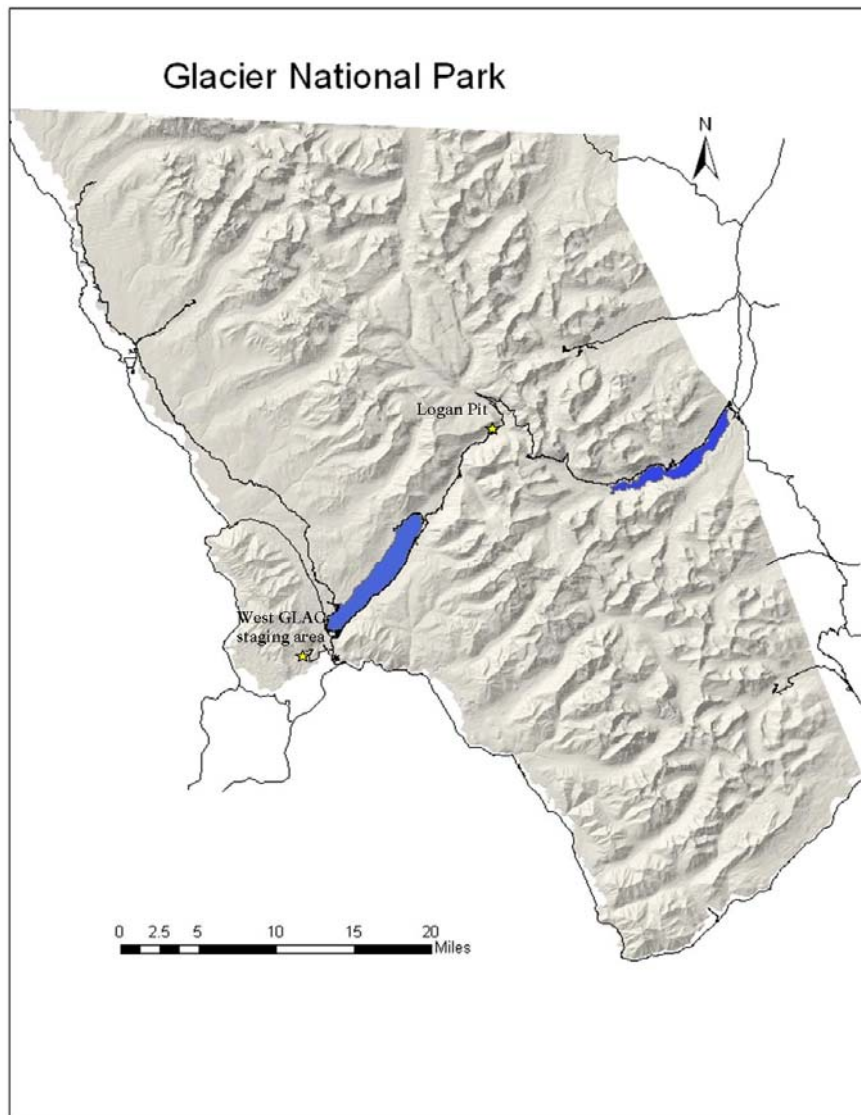
The West Glacier Staging Area was originally used as a social gathering site through the years for the public and was used by park employees for picnics and ball games. This area is approximately a quarter mile from the Going-to-the-Sun Road, just inside the park entrance, and is not visible to the public (see Map 1). For the last five years, the site has been used for seasonal storage of items such as picnic tables. Due to the high number of Columbian ground squirrel burrows at the site it was determined to be unsafe for recreation. In 2006, park management staff decided to use the site for temporary overflow stockpiling for the GTSR rehabilitation project, in order to provide more room at Logan Pit.

The purpose of this proposal is to evaluate the continued use of the Logan Pit site and/or utilizing alternative locations in order to provide a safe and adequately sized staging and stockpiling site for the GTSR rehabilitation project, ongoing road maintenance and emergency and administrative helicopter operations.

In order to meet the purpose and needs of the GTSR rehabilitation project, and provide for ongoing road maintenance staging and emergency and helicopter operations, the following factors would be evaluated in the analysis of alternative sites: distance to the project site, required staging and stockpile usable area for construction work, safe access in and out of the staging site, and the minimization of adverse impacts to natural and cultural resources.

The following objectives would be met:

- Minimize travel distance between staging and stockpiling site and the project work on the GTSR to reduce conflicts with visitor traffic and minimize transportation costs.
- Provide adequate room for materials staging and stockpiling.
- Insure safe access in and out of the staging site.
- Minimize impacts to natural and cultural resources.



Map 1. Location Map of Logan Pit and the West Glacier Staging Area

Relationship of the Proposed Action to Other Plans

Current plans and policy that pertain to this proposal include the *Going-to-the-Sun Road Rehabilitation Plan/ Final Environmental Impact Statement* (NPS 2003) and the *Glacier National Park General Management Plan* (NPS 1998).

Scoping and Public Involvement

Scoping is an early and open 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 National Park Service staff and external scoping with the public and interested and affected groups and agencies. Scoping resulted in identifying 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 and a mailed scoping letter on August 15, 2007. Scoping letters 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 letter was also placed on the National Park Service's Planning Internet site. The public scoping period was completed September 17, 2007.

In accordance with 36 CFR800.8(c), Glacier National Park also notified the Montana State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP) that it intended to prepare a combined Environmental Assessment for the proposed project. The Montana Historic Preservation Office responded that it had no comment at this time. The Advisory Council on Historic Preservation asked to be notified if during consultation it was determined that the proposed undertaking may have an adverse effect on properties listed in or eligible for listing in the National Register of Historic Places.

Six letters were received during the initial scoping. One member of the public voiced concerns about increased noise levels that may result from moving the GTSR construction staging and stockpiling site and helicopter operations to another location. Noise levels and impacts on the natural soundscapes were assessed. Several respondents wrote saying they would like to see various impact topics included in the analysis, including aquatic resources, wildlife, health and human safety, and vegetation. All these impact topics are included in the analysis as well as soils, TES/Species of Concern, visitor use and experience, water (and aquatic) resources, and floodplain. Two members of the public wrote that the project requires an environmental impact statement. An environmental assessment is used to determine the level of impact of a proposed action. If the environmental analysis indicates that proposal would have major and therefore significant environmental impacts, an environmental impact statement must be prepared. The analysis in this EA indicates that impacts would be negligible to moderate. However, after public review of the environmental assessment and consideration of the comments received, the NPS will decide whether to issue a finding of no significant impact or a notice of intent to prepare an environmental impact statement. Two members of the public would prefer that Logan Pit be closed as a staging and stockpiling site and that Moose Country, Packer's Roost or the West Glacier Staging Area site not be utilized as a staging and stockpiling site. All of these sites were considered, but use of Moose Country and Packer's Roost is addressed under alternatives considered but dismissed from further analysis. One commenter would like to see more alternative sites analyzed and suggested the park consider the area burned in the 2003 fires. This was considered and is addressed under alternatives considered but dismissed from further analysis.

Impact Topics

Issues and concerns affecting the proposed action 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 that could be affected by the range of alternatives analyzed. The following impact topics were identified based on federal laws, regulations, orders, and National Park Service *Management Policies, 2006*, and input from the Montana State Historic Preservation Officer. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing other impact topics from further consideration.

Impact Topics Selected for Detailed Study

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. Use of ground surface for a staging and stockpiling site could impact soil resources in the project areas by increasing compaction from heavy equipment use and storing heavy material such as stone masonry pallets; 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). The sites under consideration for material staging and stockpiling are vegetated and could be affected as available area for staging is filled. Therefore, impacts to vegetation resources are analyzed in this EA. The sites would also be susceptible to noxious weed establishment and spread.

Wildlife and Aquatic Resources

The NPS is charged with maintaining native wildlife as an integral component of natural ecosystems. Wildlife occupy the alternative sites being evaluated and therefore may be affected by actions proposed in the environmental assessment.

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. 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 determined that the proposed action would “**may effect, not likely to adversely effect**” **grizzly bears** under Section 7. 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 Environmental Assessment will be sent to the US Fish and Wildlife Service for their review and concurrence. The NPS determined that the proposed actions would have no effect on bull trout, gray wolf, and Canada lynx.

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

Harlequin ducks (*Histrionicus histrionicus*) use McDonald Creek during the breeding season from April to September and possibly Logan Creek during the spring. Upper McDonald Creek has been identified as one of the most important areas for breeding harlequin ducks in Montana. The proposed actions may affect harlequin ducks.

Golden Eagle (*Aquila chrysaetos*) nest sites are documented on the cliffs along the upper McDonald Creek corridor at three different locations: Crystal Point, Red Rocks, and Avalanche Creek; breeding territories encompass the entire upper McDonald Creek Valley, including Logan Pit. The golden eagle nesting period occurs between April and September, with most chicks fledging by early to mid August. The proposed actions may affect golden eagles.

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) have been found in Upper McDonald Creek and Avalanche Creek, below Logan Pit, and Logan Creek, above Logan Pit. The proposed actions may affect the westslope cutthroat trout.

Natural Soundscapes

The NPS 2006 *Management Policies* state that the service will preserve the natural soundscapes of parks. Natural soundscapes are defined as the variety of natural sounds comprising an ecosystem including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes. The degradation of natural soundscapes by impacts from human activities will be minimized or eliminated where possible. The location of the GTSR Staging area could increase noise from equipment and work operations in areas not currently affected by this activity.

Visitor Use and Experience

The Going-to-the-Sun Road is a primary visitor destination and provides access to most of the Park. Construction traffic on the road affects visitors' experience. There are also concerns with the existing level of visitor safety issues along the GTSR corridor created from potential increase in heavy equipment traffic around the west entrance gate.

Water Quality

NPS policies require protection of water quality 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. Water quality and aquatic resources could be affected by materials stored within the floodplain and or vehicles crossing over flow stream channels to access the construction staging area.

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 that is attached to the environmental assessment.

Impact Topics Eliminated from Detailed Study

The rationale for dismissing specific topics from further consideration is given below.

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. 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 (*Canus lupus*). There is no evidence of recent wolf activity in the project area and the area is not considered primary wolf habitat due to a limited prey base for wolves. There are currently no known den or rendezvous sites near the alternative locations being considered.

Canada Lynx (*Lynx Canadensis*). No surveys have been conducted in the immediate project area, but there have been no incidental sightings or track records in the general area. 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. Little is known about lynx habitat use in the park and these criteria are general in nature, however, the amount of development and human presence in the project areas (Logan Pit and the West Glacier Staging Area) 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". 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, located approximately one half mile above the mouth of Upper McDonald Creek.

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. Wolverines (*Gulo gulo*) are wide-ranging carnivores that may pass through the area in search of carrion, 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. Fisher (*Martes pennanti*) also likely make only temporary and sporadic use of the areas, though little is known about the distribution and movements of either of these elusive carnivores in the project area. Both Ruffed grouse (*Bonasa umbellus*) and spruce grouse (*Falcipennis canadensis*) are not well documented in the project area, though they may occur there in low numbers, and are not likely to be affected by the project. The calliope hummingbird (*Stellula calliope*) may 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.

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. A wetland delineation completed by park personnel in September, 2007 determined that while a wetland is adjacent to Logan Pit, it would not be affected by the alternative. Therefore a Statement of Findings will not be prepared, nor will this impact topic be assessed.

Human 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 risk when they are identified. Several alternative sites were considered but eliminated from further study for a number of reasons including safety concerns with entering and exiting these sites because of inadequate sight distance. The alternatives analyzed (No Action and the Preferred) are located on straight-aways off the GTSR and have adequate sight distance for vehicles entering and exiting the two construction staging and material storage sites. As these areas are currently being used, there is no change from current conditions and therefore, human and health and safety would not be affected and was dismissed from further analysis.

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.

Historic Structures and Cultural Landscapes

The Going-to-the-Sun Road (24FH0161/24GL0136) is the only cultural resource near the Logan Pit area. The Road is listed in the National Register of Historic Places and is a designated National Historic Landmark. The GTSR is a cultural landscape significant for its engineering features and as an example of National Park Service landscape design. Logan Pit is visible from the road only briefly as travelers pass the pit's entrance road. The proposed project would have negligible, short term impacts on the Road during the project and under Section 106 of the National Historic Preservation Act of 1966, as amended, there would be no effects from this project that would alter directly or indirectly, any characteristic of the GTSR that qualify it for inclusion in the National Register or as a National Historic Landmark. There are no historic structures or cultural landscapes within the area of potential effect of the West Glacier Staging Area. Therefore, historic structures and cultural landscapes were eliminated from further analysis.

Archeological Resources

No archeological resources were identified in the Logan Pit project area during a 1994 archeological survey (Reeves 1996). The area has been heavily disturbed over the years. The Apgar Flats area, including the West Glacier Staging Area, was surveyed for archeological sites in 1978 with negative results in and near the area of potential effect (Guthrie 1978). Subsequent surveys of the Lake McDonald Valley have found sites to be "few in number and small in size (Reeves 2003). Additionally, the Apgar Flats area was disturbed during cleanup of the 1929 wildland fire, and the staging area by public use over the years.

The two areas have been adequately surveyed, no identified and/or unevaluated resources exist and the probability of discovering historic properties is highly unlikely. Only previously disturbed ground would be affected by the proposed project. However, if cultural resources are discovered during construction the project would be halted until the resources can be evaluated by an archeologist. Neither the Blackfoot Tribal Business Council, nor the Confederated Salish and Kootenai Tribal Council expressed concerns during scoping for the project. This topic was dismissed from further consideration. Under Section 106 of the National Historic Preservation Act of 1966, as amended, there are no historic properties (archeological resources) present in the areas of potential effect.

Ethnographic Resources

Director's Order 28 *Cultural Resource Management* defines ethnographic resources as any site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. DO-28 and Executive Order 13007 *Indian Sacred Sites*, charge the NPS with the preservation and protection of ethnographic resources. An ethnographic study of Glacier National Park was completed in 2001 (Reeves and Peacock 2001). No ethnographic resources have been identified by the Confederated Salish and Kootenai Tribes or the Blackfeet Tribal Business Council in the Logan Pit area and no concerns were raised during scoping for this project. However, Glacier National Park recognizes that the tribes hold a body of knowledge that may result in the identification of ethnographic resources in the area in the future. If ethnographic resources are identified, consultation will occur in accordance with federal legislation and regulations and National Park Service policy. This topic was dismissed from further analysis.

Museum Collections

According to the NPS Management Policies (2006) Director's Order 24, *Museum Collections*, the NPS requires consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript materials). NPS policy defines museum collections management including policy, guidance, standards, and requirements for preservation, protection, documentation, access, and use. Museum collections would not be affected by these alternatives.

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. There are no prime and unique farmlands located within Glacier National Park. (GMP, 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 locating an equipment and material staging and storage area. Therefore, environmental justice was dismissed from further analysis.

Wild and Scenic River. This was considered but dismissed from further analysis because the West Glacier Staging Area is located adjacent to the Wild and Scenic River Corridor Boundary for the Middle Fork of the Flathead River. Approximately 1/5 of the site is already located within the corridor and was there prior to the corridor's designation. It has been utilized since the 1930's as a camp and social area. About 15 years ago, the park began storing equipment there and is now being used as a staging and stockpiling area for the GTSR rehabilitation project. The area is not visible from the river and continued use of the site would not have any effects on the Wild and Scenic River Corridor. Evaluation under Part 7 of the 1968 Wild and Scenic Rivers Act is complete.

Alternatives

Actions Common to All Alternatives

As already analyzed in the *Going-to-the-Sun Road Final Environmental Impact Statement* and *2003 Record of Decision* staging and stockpiling would continue both inside and outside the park. Areas used would be private land under lease to FHWA for this purpose, turn-outs, parking areas, and pull-outs along the Going-to-the-Sun Road and Sun Point on the east side. Hazardous materials would not be stored at Logan Pit overnight.

No Action Alternative

Under this alternative, the Logan Pit staging area would continue to be utilized during the shoulder seasons and in the summer for storage of stone for walls and bridges, rip rap aggregate, and other supplies. The existing disturbed area is about 2 acres (or 87,120 square feet). Logan Pit would remain the primary site for material storage and staging on the west side of the park and the West Glacier Staging Area would continue to be temporarily utilized for additional storage. No actions would be taken to protect/fortify Logan Pit from potential future flooding. During floods, the Pit would likely be closed to use, delaying park maintenance and GTSR construction activities and schedules. Materials and supplies stored at the Pit could be lost during flood events. The access road would be allowed to flood and water would not be diverted to protect it. Under this alternative the West Glacier Staging Area would only be utilized for the duration of the GTSR rehabilitation project and would be rehabilitated after the project was complete. The West Glacier Staging Area site would remain its current size of approximately 1.8 acres.

Preferred Alternative – Stabilize and Reduce the Size of Logan Pit, and Establish a Permanent Staging Site at the Existing West Glacier Staging Area

Under this alternative, Logan Pit would be used for construction staging and materials storage, except during high water times during the year. Material storage would include stone for walls and bridges, rip rap aggregate, and other supplies. Concrete forms wrapped in an impermeable fabric would be placed around a reduced perimeter, shown on Map 2, to stabilize the usable area and to protect the staging area during flooding. The construction staging area would be reduced from its current size of 2 acres to 1.5 acres. The new perimeter is based on the 2001 disturbed mapped at that time (see Map 2) – which is the size of the pit when the GTSR rehabilitation project started. The concrete forms would be buried approximately 1 -2 feet to form a wall (approximately 3.5 feet) on the upstream portion of the site (solid line on Map 2) to divert floodwaters away from the staging site, but only used around the rest of the perimeter to mark the site (dashed line on Map 2). A culvert would be placed across the access road to capture sheet flow during high water flows. The West Glacier Staging Area would be used year round, weather permitting, as it is not located in a floodplain for long term storage of materials including those not suitable for storage in a floodplain. The West Glacier Staging Area site would remain its current size of approximately 1.8 acres and would not be expanded.

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

Soils

- Install filter barriers (silt fences, certified weed seed free straw bales, coir logs).
- Minimize the area of compaction to defined limits.

Vegetation

- Implement Best Management Practices to prevent wind and water 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 landscaping design features to minimize visual impacts and to aid in creating suitable site conditions for revegetation.
- 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.
 - Revegetate to restore native vegetation to areas previously disturbed outside of the Logan Pit boundaries to be established during this project.
 - 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 the staging areas to minimize transport of noxious weeds to other locations along the GTSR.
- Inspect gravel and topsoil sources, and avoid use of material currently supporting invasive exotic plants.
- Inspect construction vehicles to prevent the import of noxious weeds from tires and mud on the vehicles.
- Limit the use of fertilizers that may favor weeds over native species.
- 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.

Wildlife and Aquatic Resources

- Prepare a stormwater management plan to minimize erosion and the introduction of sediments to aquatic habitat.
- Drainage improvements would be used to control runoff and reduce erosion.
- 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 may occur (such fluid spills are potential unnatural attractants to wildlife species including mountain goats and mule deer).

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 restroom facilities for construction workers to eliminate human waste as a wildlife attractant at construction sites.

- Use best management erosion and sediment control measures to prevent sedimentation of aquatic habitats used by westslope cutthroat trout.
- Maintain the larger vegetative buffer zone between McDonald Creek and Logan Pit to minimize impacts to harlequin duck habitat.

Natural Soundscapes

- All construction equipment would contain adequate mufflers and pollution emission controls.

Water Quality

- Conduct periodic water quality monitoring in nearby streams.
- Install filter barriers (silt fences, certified weed seed free straw bales, coir logs)

Floodplain

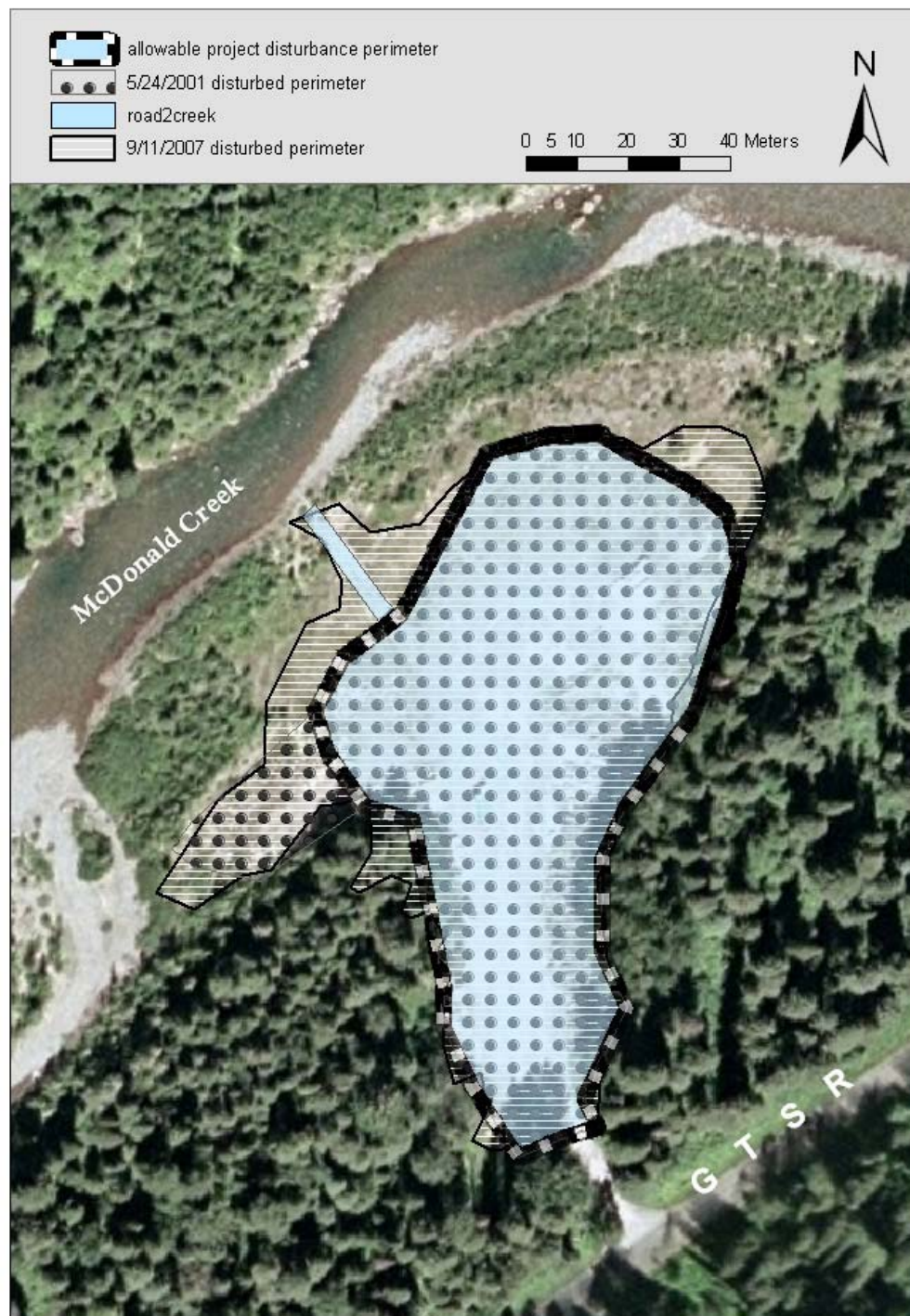
- No overnight storage of hazardous material or fuels would occur within the floodplain.

Alternative Summaries

Table 1 summarizes the major components of the two 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 1. Alternative summary and extent to which each alternative meets project objectives

Objectives	No Action Alternative	Preferred Alternative
Minimize travel distance between staging and stockpiling site and the project work on the GTSR to reduce conflicts with visitor traffic and minimize transportation costs.	Does not meet objective over the long term because use of Logan Pit could be lost or severely limited due to additional erosion and flooding. Construction materials could be lost during a flood event. This alternative could force construction staging and material storage to occur at West Glacier Staging Area substantively increasing the travel distance between the work site and GTSR, increasing costs and time and delaying the GTSR rehabilitation project.	Meets objective because stabilizing/fortifying the Logan Pit site would prevent erosion and small scale flooding and potential loss of construction materials is minimized. Logan Pit would continue to be used as it is a centrally located staging area for the west side of the park. The West Glacier Staging Area would be used year round (weather permitting) to provide additional storage space not available at Logan Pit.
Provide adequate room for materials staging and stockpiling.	Does not meet objective because flooding and erosion could reduce the size and viability of the Logan Pit site and or remove the access road.	Meets objective by providing adequate long term use at Logan Pit for construction staging and materials storage with additional storage provided at the West Glacier Staging Area.
Insure safe access in and out of the staging site.	Meets objective because Logan Pit is still primary construction staging and materials storage and location of access road provides adequate sight distance for vehicles entering and exiting the site. The West Glacier Staging Area entry and exit is also located on straight-aways providing adequate sight distance for entering and exiting vehicles.	Meets objective because Logan Pit is still primary construction staging and materials storage and location of access road provides adequate sight distance for vehicles entering and exiting the site. The West Glacier Staging Area entry and exit is also located on straight-aways providing adequate sight distance for entering and exiting vehicles.
Minimize negative impacts to natural and cultural resources	Does not meet objective because materials stored in Logan Pit could have adverse effects on resources if washed downstream.	Meets objective because size of Logan Pit is reduced, having a beneficial impact on floodplain values and vegetation, operations and storage area is located further away from the creek, reducing impacts on Harlequin Ducks and pit is not used to permanently store materials such as fill that could have adverse impacts on resources downstream. Delineation of pit would ensure that surrounding vegetation and habitat is trampled or removed by materials and operation.



Map 2. Allowable Disturbance area of Logan Pit as Compared to the 2001 and 2007 Disturbance Perimeters

Alternatives Considered But Eliminated from Further Study

Packer's Roost. Utilization of this site for staging and stockpiling was eliminated from further study because the site was too small. The approximate usable area of this site is 500 square feet with limited opportunity to expand due to the steep topography of the surrounding area and presence of a wetland (DeArment 2001). Packer's Roost is located 0.6 miles off the GTSR at MP 22 and is accessed by a single-lane, dirt road. The access road is not wide enough to accommodate large trucks passing each other and enters the GTSR at an angle that does not provide adequate site distance for trucks and other vehicles entering the GTSR. It would require considerable improvements at a considerable cost in order to accommodate increased traffic flows and large truck traffic entering and leaving the site at this location along the GTSR. Currently, the site is used by equestrians who can access several trails in the park from this location. There are a couple of out-buildings at the site that are used for storage.

Moose Country. Moose Country is located at MP 13.7 along the GTSR and is accessed by a 0.3 mile long, single-lane road. This 11,000 square foot site was formally used as a staging and stockpiling site for the GTSR. However, it was discovered that the area was immediately adjacent to a wetland. Due to concerns about destroying the wetland and potential contamination, the area was reclaimed in the late 1990s and revegetated. National Park Service Policy and Executive Order 11990 prohibits adverse impacts to wetlands unless there are no other alternatives. Since other locations are available that do not affect wetlands, utilization of this site as a staging and stockpiling site was eliminated from further study.

Exclusive Use of the West Glacier Staging Area. Utilization of this site as the only staging and stockpiling site was considered but eliminated from further study due to the location near the concession horse barn, and the Glacier Institute Field Camp, impacts on a state listed plant species velvetleaf blueberry (*Vaccinium myrtilloides*) and the distance construction vehicles would have to haul to construction sites on the GTSR. Noise from the staging area could adversely impact visitors and operations at both the Glacier Institute Field Camp and the horse barn. In order to successfully utilize the West Glacier Staging Area site as the only construction staging area on the west side of Logan Pass, it would need to be expanded by a half to one acre. This would adversely impact vegetation including the state listed velvetleaf blueberry, soils, and wildlife resources. This site is located near the entrance to Glacier National Park; increased construction traffic would adversely affect visitor use by causing more construction vehicle use of the 4-way intersection on the GTSR likely delaying or interfering with visitor travel and creating additional safety hazards. The increased distance would add additional hauling costs and time to the GTSR project.

Closing Logan Pit Once the Rehabilitation Project is Complete was also considered but dismissed from further analysis. The site is centrally located and necessary for continued maintenance operations on the GTSR. It is located at one of the few straight portions of the road, which provides adequate sight distance for construction vehicles entering and exiting the site. It is the only site along the GTSR on the west side that provides adequate space for large vehicles turning around and storage of materials needed further up the GTSR. Not using this site would add another 40 miles round trip (7 gallons of diesel fuel) to the maintenance operation resulting in lost time and increased costs. This site is necessary for staging during spring opening and winter closing.

Burned Areas. A suggestion was received from a member of the public to consider using a site within the area burned in the 2003 fires near the GTSR. The only site accessible to the GTSR would be in the vicinity of the Loop. There is no existing road access from the

Loop into the burn area; the area is also very steep and would be subject to a high degree of erosion. Any staging area of the size required would be very visible from the Loop, which is a contributing feature to the listing of the GTSR as a national historic landmark. Other burned areas, besides being a long distance from the GTSR, are undergoing natural succession and would be adversely impacted by developing a staging area in an environment otherwise undisturbed by human causes.

Raising the Elevation of Logan Pit. High flow velocities, coming from the main channel into the back bar flood scour channel, would be reduced or redirected by placing a large woody debris dam at the head of the back bar flood scour channel. Over bank flow velocities and direct stream energy would be directed back to the main channel decreasing the potential for the back bar flood scour channel to avulse. Logan Pit would be raised by approximately 2' by placing fill at the site to protect the pit area from potential future flooding. Hazardous materials would not be stored at Logan Pit overnight. The operational area of the pit would be reduced to the 2001 dimensions of 1.7 acres (see map 2). All work to reconstruct and stabilize the Logan Pit site would be performed in late fall, during low water. This alternative was eliminated from further consideration because of the potential for significant adverse impacts occurring from placing this amount of fill within the floodplain of McDonald Creek.

Storing all Materials Outside the Park Boundary. Utilization of staging and stockpiling areas outside of the park's boundaries currently occurs, but some material storage and staging inside the park is required for the GTSR project as described in the *Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement*. Moving all storage and stockpiling outside the park on the west side was eliminated from further study because of the additional travel costs and inefficiency of time.

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 would accomplish all of the criteria listed above except number 4, preserving an important cultural landscape. Continued use of the Logan Pit site without taking action to protect storage materials and stabilize the site, places the area at high risk of flooding, loss of storage materials and eventual loss of the site. This could lead to deterioration of the

Going-to-the-Sun Road, a national historic landmark, thus criteria 4 would not be met. The Logan Pit site would not be reduced in size and therefore would not provide an enhanced vegetative buffer between the staging and stockpiling site and harlequin duck use of the adjacent McDonald Creek. This would not meet criteria 1 and 3.

The Preferred Alternative would achieve criteria 1 by reducing impacts on the floodplain from the current operation and yet still provide a critical staging and material stockpiling site to accomplish the GTSR rehabilitation and then continue ongoing road maintenance. It achieves criteria 2 reducing the size of the staging area and improving the aesthetics of the site. It achieves criteria 3 by attaining the widest range of beneficial uses including providing for the GTSR rehabilitation project, reducing impacts on the natural environment, improving the viewshed without causing degradation, and reducing the risk to health or safety. It achieves criteria 4 by contributing to the preservation of both a national historic landmark and the McDonald Creek floodplain. Utilizing the Logan Pit and West Glacier Staging Area sites congruently would allow McDonald Creek to flow in a semi-natural condition during high-water periods. Installation of a culvert would allow water to flow in the back bar flood scour channel potentially facilitating floodplain dynamics of McDonald Creek at the Logan Pit site more so than the No Action Alternative. A reduction of usable area at the Logan Pit site would provide a better vegetative buffer zone to protect wildlife species. It achieves criteria 5 by balancing preservation and ultimately visitor use of the GTSR with natural resource restoration and reduction of impacts. Criteria 6 is neither achieved nor not achieved.

Affected Environment and Environmental Consequences

Methodology

The effects of each alternative are assessed for direct, indirect, and cumulative effects on selected impact topics. Actions are first analyzed for their direct and indirect effects. 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 may result in the direct removal of vegetation and soil from a site and result indirectly in increased erosion at the site later 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 may be affected both beneficially and adversely (e.g., one wildlife species may 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 2.
- **Intensity:** the impacts are *negligible*, *minor*, *moderate*, or *major*. Definitions of intensity vary by impact topic and are provided in Table 2.

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 may constitute impairment. Impairment may 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.

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

- Wastewater treatment plant construction in 2004.
- Water utility line replacement in 2004.
- Lengthening the government vehicle lane through the West Entrance Station and

construction of pullout north of the West Entrance Station in 2006.

- Past use of the area known as the ball field in West Glacier from 1933 to present.

On-going Actions

- Going-to-the-Sun Road rehabilitation and mitigation
- Horse concession operations
- Park packer's operations including recent hayshed construction
- Operation of the Glacier Institute Field Camp

Future Actions

- Rehabilitation of the West Entrance Station and Improvements to Entrance Lanes
- Logan Creek toilet replacement
- Logan Creek Bridge rehabilitation and addressing flood potential

Table 2. Impact thresholds for intensity and duration

Impact Topic	Negligible	Minor	Moderate	Major	Duration
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.
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.	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
Wildlife and Aquatic Resources	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 or aquatic species' population.	Effects on wildlife and aquatic 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 and aquatic species would be readily detectable and widespread, with consequences at the population level.	Effects on wildlife and aquatic resources would be obvious and would have substantial consequences to species 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.
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.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Natural Soundscapes	There would be temporary introduction of artificial noise; however effects would not be perceptible.	An introduction of artificial noise would occur temporarily at localized sites. The effects would be readily detectable, but may cause minor disturbance to Park visitors, concessionaires, or wildlife.	An introduction of artificial noise would be readily detectable for longer periods of time over a widespread area and would affect nearby visitors, concessionaires, and/or wildlife.	Continuous, loud, disruptive noise occurring daily, throughout the day affecting visitors, concessionaires, and wildlife.	Short-term – Effects extend only through the period of GTSR rehabilitation project. Long-term – Effects extend beyond the GTSR rehabilitation project.
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.
Water Quality	Neither water quality nor hydrology would be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight and non-measurable.	Changes in water quality or hydrology would be measurable, although the changes would be small and the effects would be localized.	Changes in water quality or hydrology would be measurable but would be noticeable on a widespread scale.	Changes in water quality or hydrology 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 1 year. Long-term – After implementation, recovery would take more than 1 year or effects would be permanent.

Impact Topic	Negligible	Minor	Moderate	Major	Duration
Floodplain	Floodplains would not be affected, or changes would be either non-detectable or if detected, would have effects that would be slight and non-measurable. The change would have barely perceptible consequences to riparian habitat function.	Changes in floodplains would be measurable, although the changes would be small and the effects would be localized. The action would affect a few individual plants or wildlife species within an existing riparian area.	Changes in floodplains would be measurable, long term and on a localized scale. Plant and wildlife species within the existing riparian area would experience a measurable effect, but all species would remain indefinitely viable.	Changes in floodplains would be readily measurable and have substantial consequences to floodplain dynamics and would be noticed on a localized scale within the watershed.	<p>Short-term – After implementation, recovery would last less than one year.</p> <p>Long-term – After implementation, recovery would last more than one year</p>

Table 3 summarizes the anticipated environmental impacts for each 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

Impact Topic	No Action Alternative	Preferred Alternative
Soils	Minor, localized, long-term and adverse	Minor, localized, long-term and adverse
Vegetation	Negligible	Minor, localized, long-term and adverse
Wildlife and Aquatic Species	Minor, both short- and long-term, localized and adverse	Minor, both short- and long-term, localized and adverse
Threatened, Endangered, and Species of Concern	Minor, both short- and long-term, localized and adverse	Minor, both short- and long-term, localized and adverse; harlequin ducks would experience a slight beneficial impact
Natural Soundscapes	Minor, short-term, mostly localized and adverse	Moderate, long-term, mostly localized and adverse
Visitor Use and Experience	Minor, both short- and long-term, adverse, beneficial, localized and widespread	Minor, both short- and long-term, adverse, beneficial, localized and widespread
Water Quality	Negligible to minor, short-term, long-term localized and adverse	Negligible to minor, short-term, long-term localized and adverse
Floodplains	Minor, long-term, localized and adverse	Minor, both short- and long-term, localized, and beneficial and adverse

Soils

AFFECTED ENVIRONMENT

Logan Pit

At the Logan Pit staging and stockpiling site soils are characterized as Flooded Soils of floodplains and low terraces (A1) found along streams within the riparian zone. A1 soils consist of floodplains and low stream terraces with deep sandy and gravelly alluvial soils. Rock types are predominantly quartzite and argillite with some limestone and occasional fragments of granitic rock. Soils are frequently flooded, moderately well to poorly drained alluvial soils. There is very little evidence of soil development due to the young age of these soils. They are classified as Cryofluvents or when wet for most of the year, Cryaquents (Dutton et al. 2001).

Available water holding capacity is usually very low. Productivity and revegetation potentials are generally low, but are improved where shallow seasonal groundwater occurs near the surface. Potential for road and trail construction is low due to flooding and a seasonal high water table. Erosion potential is generally moderate (but high for sandy, rock-free layers) and will occur whenever surface vegetation and plant litter is removed or soil is disturbed. This soil type is highly susceptible to weed infestation when disturbed, due to a combination of frequent soil disturbance from flooding (and, in this case, staging operations), rocky, sandy, soil textures, open canopy conditions, available weed seed source, and low elevation. Flooding, very rapid permeability and seasonal high ground water limit sewage disposal options on these sites (Dutton et al. 2001).

Logan Pit has been used as a staging and stockpiling site for many years. Soils throughout the site have been disturbed and compacted and most vegetation has been removed. The site was mapped with Global Positioning System (GPS) technology in 2001 and was estimated to be 1.7

acres. The outer boundaries for the staging and stockpiling area were defined and limited at the outset of the GTSR construction project (NPS 2003). But the disturbed area has gradually expanded in size since it was first established and is now at 2 acres. In November 2006, an extreme flood event scoured new flow channels through the Logan Pit staging and stockpiling area and deposited a large quantity of sediment and debris across the site. The back bar flood scour channel became more developed and flood waters flowed across the access road, preventing access to the pit until June 2007. The access road experiences minor flooding during above-normal spring run-off due to its low elevation and location on the back bar flood scour channel.

West Glacier Staging Area

The West Glacier Staging Area soil type consists of Sandy Over Cobbly Alluvial Forest Soils on terraces and fans (A4). The soil type includes glacial outwash terraces and more recent alluvial fans and terraces with deep sand and gravelly alluvial soils. These deep well drained forest alluvial soils are dominated by sandy loam, silt loam or silty clay loam textures on the surface. High terraces were deposited by glacial outwash streams at the end of the last ice age or by current streams since de-glaciation ended. Most soils in this type are classified as loamy-skeletal, mixed Typic Dystricrypts (Dutton et al. 2001).

The topography is nearly level and available water holding capacity is low. These soils have high productivity and revegetation potential. However, they are highly susceptible to weed infestation; particularly when soil is disturbed; the canopy is open; a weed source exists; and is a low elevation site, as is the case at the West Glacier Staging Area. These soils are well suited to road and trail construction but they do have moderate erosion potential. There is moderate potential for waste disposal but water quality impacts are a concern because of the short distance to groundwater (Dutton et al. 2001).

The West Glacier Staging Area was originally used as a Civilian Conservation Corps (CCC) camp in the 1930's. Soils were compacted and disturbed but the majority of the area remained in grassy/herbaceous vegetation for most of its history with a dirt road around on one half of the perimeter. In recent decades, the site was used by park employees for ball teams and picnics, and by the public for family reunions and a group gathering site. Soils were often churned by a dense ground squirrel population as well. In 2006, the West Glacier Staging Area was converted to a staging area for the GTSR construction materials, such as stone masonry. This has resulted in additional soil disturbance and compaction and vegetation removal within the site. The ground area for staging here is estimated at 1.8 acres; less than 20% of the area (about 0.3 acre) is currently being used.

IMPACT ANALYSIS

METHODOLOGY

The affected environment for soils is limited to the footprint under and immediately adjacent to the Logan Pit and the West Glacier Staging Area staging and stockpiling sites and access roads, including the area of proposed expansion surrounding the West Glacier Staging Area.

- 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 NO ACTION ALTERNATIVE

There would be a **negligible** change in effects to soils in the vicinity of Logan Pit and the West Glacier Staging Area sites under the No Action alternative. Compaction of soils at both staging and stockpiling sites would continue to increase, resulting from heavy equipment use and storage of materials, such as stone masonry pallets, but these impacts were anticipated in the GTSR FEIS (NPS 2003). Logan Pit would continue to be subject to flooding events that can scour soils from one place and deposit them in another.

Cumulative Impacts of the No Action Alternative

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 may be compacted and top soil may be degraded or disturbed. Excavation of utility lines disturbs the soil profile, but top soil is salvaged and replaced following the disturbance. Horse concession and packer use cause trampling or soil compaction and some erosion within defined trails. The cumulative effect of these activities combined with continued use of the Logan Pit and West Glacier Staging Area would be minor adverse impacts which would be generally localized and long-term.

Conclusion

Since no new actions are proposed, there would be **negligible** effect to soils in the vicinity of Logan Pit and the West Glacier Staging Area from the No Action Alternative. Though the alternative would not be contributing to impacts of the sites; past, present and future actions, in combination with this alternative, would result in **minor adverse, long-term localized** cumulative impacts to soils.

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 or other relevant NPS planning documents, there would be no impairment of park soil resource values related to this alternative.

IMPACT ANALYSIS OF THE PREFERRED ALTERNATIVE

The Preferred Alternative would have a **negligible** effect on soil resources at this site relative to existing conditions. Much of the soil area would continue to be denuded and subject to accelerated erosion. There would be a minor benefit to soils where the staging area is reduced in size by 0.3 acre. As in the No Action Alternative, there would be an increase in soil compaction at both staging sites resulting from heavy equipment use and storage of materials, such as stone masonry pallets. The perimeter of the staging and stockpiling area at the Logan Pit site would be delineated with concrete forms, limiting site expansion and area of disturbance. There would be a minor disturbance to soils for installation of a culvert under the entrance road to accommodate water flow in back bar flood scour channel. Due to the relatively small area involved and the current degraded condition of the Logan Pit and West Glacier Staging Area sites, impacts of this alternative on soil resources would be **minor, localized, long-term and adverse**.

Cumulative Impacts of the Preferred Alternative

Impacts from other past, present, and future actions would be the same as described in the No Action Alternative. The overall cumulative impact of past, present, and future activities in combination with the impacts from the Preferred Alternative would be **minor, localized, long-term and adverse**.

Conclusion

The Preferred Alternative would have **minor, localized, long-term adverse** impacts to soil resources resulting from denuding and compacting soils to utilize space for staging and stockpiling activities and installation of a culvert near the Logan Pit entrance. The Preferred Alternative would have slightly greater adverse impacts to soil resources than the No Action Alternative in the short-term due to the culvert installation, but delineating the perimeter of the staging and stockpiling site would have less impact than the No Action alternative in the long-term. Past, present, and future actions, in combination with the impacts of the Preferred Alternative, would result in minor, long-term, localized, adverse cumulative impacts to soil resources.

Because the Preferred 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 or other relevant NPS planning documents, there would be no impairment of park soil resource values related to this alternative.

Vegetation

AFFECTED ENVIRONMENT

Logan Pit

The Logan Pit staging and stockpiling site is located on a point bar within a riparian zone floodplain. It is largely devoid of vegetation due to a combination of past flooding, scouring, deposition, and storage of road construction materials. There is sparse vegetation scattered in the site, primarily around the edges of the site including native species (mainly cottonwood seedlings and goldenrod) and non-native species (mainly timothy, redtop, quackgrass, ox-eye daisy and St. Johnswort) (see Appendix A).

Vegetation in the surrounding forest immediately adjacent to the staging and stockpiling site includes some of the species found within the staging area as well as native species such as, angelica, harebell, cowparsnip, thimbleberry, mountain maple, starry Solomon's plume, ballhead waterleaf, paper birch, devil's club, large-leaf avens, bluejoint reedgrass, blue wildrye, tall mannagrass, western meadowrue, false hellebore, stinging nettle, bracken fern, fowl bluegrass, arrowleaf groundsel, oakfern, ladyfern, foamflower, and violets (see Appendix A for scientific names).

West Glacier Staging Area

The West Glacier Staging Area is a grassy area predominantly covered by the non-native species Kentucky bluegrass and English plantain. Several other native and non-native species are also present at the site (see Appendix A). There has been about a 30% vegetation loss within the West Glacier Staging Area perimeter due to it being utilized as an overflow staging and stockpiling site. This includes both weedy vegetation where equipment has been driven across the center of the staging area and native vegetation where stone masonry has been stored around the perimeter of the staging area. The surrounding forest is dominated by lodgepole pine with a mix of black cottonwood, western larch, Engelmann spruce, paper birch, Douglas fir, western white pine and western hemlock. The understory along the forest edge and the perimeter of the West Glacier Staging Area (where the stone masonry is currently being stored) contains a varied mix of forbs,

grasses and shrubs (see Appendix A). Some exotic species, such as yellow clover and spotted knapweed, are escaping into the forest.

State Sensitive Plant Species

Velvetleaf blueberry (*Vaccinium myrtilloides*) is a state sensitive species found in forested areas between Glacier National Park headquarters and Apgar. This is primarily a Canadian species with only four recorded observations in Montana, all within Flathead County (MNHP 2003). A fifth population was reported from the North Fork of the Flathead River in 2002, but the extent and precise location of the population has not been documented. Two of the documented populations are within Glacier National Park, although one of these populations has not been observed since 1936. A population on US Forest Service land was last reported in 1995, and a population on private land was last observed in 1994. The population in the vicinity of the park's west entrance and the undocumented North Fork populations are the only populations in the state known to be currently extant and secure. The Lake McDonald population is extensive and within an area of about 700 acres; surveys and mapping have shown its presence scattered over about 200 acres of land. Velvetleaf blueberry is globally secure, but critically imperiled in the state (MNHP 2003). A survey of the project area conducted by the park ecologist in September 2007 showed that a few scattered velvetleaf blueberry plants are present a short distance outside the perimeter of the West Glacier Staging Area site. No other rare or sensitive plant species were found at either site.

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 that is or would be present at the stockpiling and storage sites as described in the above section. Changes in surface disturbance and vegetation productivity are assessed. The affected environment for vegetation is limited to the footprint under and immediately adjacent to Logan Pit as well as surrounding area that may be impacted by altered hydrologic regimes. Also included is the West Glacier Staging Area site along with the area of proposed expansion surrounding the West Glacier Staging Area.

- 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 THE NO ACTION ALTERNATIVE

There would be **negligible** change in effects to vegetation in the vicinity of Logan Pit and the West Glacier Staging Area under the No Action Alternative. There would be some removal of both native and non-native vegetation as the sites are filled to their capacity for staging and stockpiling road construction material. The West Glacier Staging Area and the outer perimeter of Logan Pit would be revegetated once construction activities are completed. The West Glacier Staging Area interior would likely remain as a non-native grassy area. Both areas would be highly susceptible to weed infestation for as long as soils are in a disturbed condition. There is also potential for weed propagules from the staging and stockpiling sites to be transported to other locations along the GTSR resulting in noxious weed spread and the need for additional noxious weed treatment. Because the current perimeter of the West Glacier Staging Area would not change there would be no impact to velvetleaf blueberry.

Cumulative Impacts of the No Action Alternative

Construction activities eliminate vegetation and result in a loss of productivity within the immediate footprint of new structures of facilities for the long-term. Vegetation surrounding construction sites may be trampled or temporarily removed in the short-term, but revegetation and natural succession would mitigate these impacts and return normal productivity within a few years. Excavation of utility lines disturbs the vegetated soil surface, but top soil is salvaged and replaced following the disturbance, often with many plants and plant propagules intact. Horse concession and park packing operations may cause trampling of vegetation and its supporting soil resource within defined use areas. These activities can also contribute to the spread of non-native species. The cumulative result of these activities would be **minor, localized adverse impacts** that would be both **short-term and long-term**.

Conclusion

There would be **negligible** effect to vegetation in the vicinity of Logan Pit and the West Glacier Staging Area from the No Action Alternative, since no new actions are proposed. Past, present, and future actions, in combination with the impacts of this alternative would result in minor, adverse, long-term localized cumulative impacts to vegetation.

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 or other relevant NPS planning documents, there would be no impairment of park vegetation resource values related to this alternative.

IMPACT ANALYSIS OF THE PREFERRED ALTERNATIVE

The Preferred Alternative would have similar impacts as described in the No Action Alternative. The West Glacier Staging Area site would become a permanent staging area for road maintenance activities. It is returned to recreational use under No Action but not under the preferred alternative. Under this alternative it becomes permanent staging. Both areas would be monitored and treated for noxious weeds, during and after road construction activities, especially to prevent noxious weed spread from the staging and stockpiling sites to other locations along the GTSR. Noxious weed treatment would follow guidelines in the park's current Exotic Plant Management Plan (GNP 1991). Because the current perimeter of the West Glacier Staging Area would not change there would be no impact to velvetleaf blueberry. Disturbed areas outside of the concrete form perimeter at Logan Pit may be revegetated with native plants to help prevent noxious weed encroachment. Natural vegetation establishment may also occur. Due to the relatively small area involved, impacts of this alternative on vegetation resources would be **minor, localized, long-term and adverse**.

Cumulative Impacts of the Preferred Alternative

Impacts from other past, present, and future actions would be the same as described in the No Action Alternative. The overall cumulative impact of past, present, and future activities in combination with the impacts from the Preferred Alternative, would be **minor, localized, long-term and adverse**.

Conclusion

The Preferred Alternative would have **minor, localized, long-term adverse** impacts to vegetation resources resulting from disturbance or removal of existing native vegetation within the staging and stockpiling area perimeters and opportunities for noxious weed spread both inside and outside of the staging and stockpiling sites. There would be very little difference in impacts to vegetation between the two alternatives in combination with past, present, and future actions. Mitigation measures to restore disturbance areas outside the staging and stockpiling area perimeter and to aggressively control noxious weeds would decrease impacts of the Preferred Alternative relative to the No Action Alternative.

Because the Preferred 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 or other relevant NPS planning documents, there would be no impairment of park vegetation resource values related to this alternative.

Wildlife and Aquatic Species

AFFECTED ENVIRONMENT

Logan Pit

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. The McDonald Valley, which extends from the southern end of Lake McDonald to Flattop Mountain between the Lewis and Livingston Ranges, provides a diversity of year-round habitats valuable for wildlife. Of particular interest to many species of wildlife are riparian areas, travel corridors, avalanche chutes, shrublands, meadows, bogs, snags, burns, aspen parklands, old-growth forests, floodplains, mineral licks, birthing areas, hibernacula, den sites, roosts, caves, and cliffs. Mammal species include red squirrels, Columbian ground squirrels, red-tailed chipmunks, moose, elk, mule and white-tail deer, black and grizzly bear, cougar, lynx, fisher, wolverine, marten, and long-tailed weasels; seven of the eight species of reptiles and amphibians that occur in the park are found in the McDonald Valley. The McDonald Valley also contains nesting habitat for bald eagles, golden eagles, osprey, pileated woodpeckers, and barred owls. 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).

The Montana Bald Eagle Management Plan recommends restrictions on human activity within 0.25 miles (400 meters) of bald eagle nesting, roosting and primary foraging areas during specific stages of the nesting cycle (Montana Bald Eagle Working Group 1994). The nearest bald eagle nest is over eight miles (>13 km) downstream of the Logan Pit area at the head of Lake McDonald, and the Lake McDonald inlet is a primary foraging area; nesting bald eagles are rarely observed in the project area. There are three golden eagle nesting territories along the upper McDonald Creek Valley; two of the known nest sites are within about two miles (three kilometers) and resident adult and young golden eagles forage in the project area. Other raptor species likely nesting in the area includes the red-tailed hawk, northern goshawk, Cooper's hawk, osprey and northern pygmy owl. During spring and fall migration, thousands of golden and bald eagles (as well as a wide variety of other diurnal raptors) fly over the upper McDonald

Valley near the project area; some pause to forage on carrion or prey on small mammals. The riparian vegetation surrounding Logan Pit provides habitat for nesting breeding and foraging to multiple bird species (see Appendix B).

Moose and elk, primarily adult males, spend most of the winter in the vicinity of the Logan Pit site. Both species make seasonal movements through the McDonald Valley, with calving occurring during May and June. Mountain goats are year-round residents on the Garden Wall east of the project area.

In addition to the fisheries (see section on TES and species of concern), aquatic insects were collected in Upper McDonald Creek in 1978 by the US Fish and Wildlife Service and reported in “Fishery Investigations Glacier National Park 1980 Progress Report”. The report identified 28 total taxa in 4 Orders: Plecoptera (stoneflies), Ephemeroptera (mayflies), Trichoptera (caddisflies), and Diptera (true flies).

West Glacier Staging Area

Wildlife associated with this site includes white-tailed deer, elk (primarily during spring and fall), black bear, multiple small mammal species and an occasional grizzly bear, moose and cougar. Female white-tailed deer continue to utilize the area as they enter fawning season and become reclusive and are not as noticeable in the vicinity of the staging area. Elk calving has been documented in the surrounding forest and meadows. Numerous Columbian ground squirrels have colonized the site and red squirrels are common in the adjacent forest. Coyotes hunt the meadows and forest edges. Ruffed grouse live in the surrounding forest and a variety of songbirds nest in the forest and meadow edge habitat within the vicinity of the project area.

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. The following levels of impacts were defined.

- 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 and aquatic species’ population.
- Minor:* Effects on wildlife and aquatic 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 and aquatic species would be readily detectable and widespread, with consequences at the population level.
- Major:* Effects on wildlife and aquatic 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 THE NO ACTION ALTERNATIVE

The No Action Alternative would not change current conditions for wildlife and aquatic species. Utilization of Logan Pit as a staging and stockpiling site has continually impacted wildlife and aquatic species associated with the stream, riparian zone and adjacent forest habitats negatively.

The stream would continue to function in a semi-natural state. The GTSR forms the east boundary of the stream channel in most areas limiting the stream's ability to function in a natural state. The use of the Logan Pit for storage would continue to compact the pit area, restricting the stream from incising new channels in the area. This continues to be a **minor, adverse impact** that affects the entire aquatic resource.

In addition to adverse impacts at the Logan Pit site, wildlife species at the West Glacier Staging Area site would continue to be negatively impacted as the forest would not be allowed to regenerate and forest dwelling species would continue to be displaced. Impacts of the No Action Alternative on wildlife species would be **minor, short-and long-term, localized and adverse**.

Cumulative Impacts of the No Action Alternative

Construction activities associated with both sites, excavation of utility lines, horse concession and park packing operations, and visitor use activities would continue to displace or habituate wildlife. The cumulative result of these activities would be **minor, local adverse impacts** that would be both **short- and long-term**.

Conclusion

Since there are no new actions proposed, there would be **minor, short-and long-term, localized and adverse** effects to wildlife in the vicinity of the West Glacier Staging Area and **minor, short-and long-term, localized and adverse** effects to wildlife and aquatic species in the vicinity of the Logan Pit site from the No Action Alternative. Past, present, and future actions, in combination with the impacts of this alternative would result in minor, adverse, both short- and long-term, localized cumulative impacts to wildlife and aquatic species.

Because The No Action Alternative would not result in major adverse impacts to wildlife and aquatic 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 wildlife and aquatic resource values related to this alternative.

IMPACT ANALYSIS OF THE PREFERRED ALTERNATIVE

Delineating an appropriate staging and stockpiling usable area, and reducing the size of the disturbed area, at Logan Pit would result in increased riparian habitat along McDonald Creek in the vicinity of Logan Pit. Allowing the recovery of vegetation screening would lessen impacts to wildlife utilizing the surrounding areas for nesting, raising young, and foraging. Placing a culvert at the entrance to the pit and utilizing the pit only during low-water periods would allow for more natural drainage events not affect wildlife and aquatic resources that have adapted to those flood events and drainage patterns. No additional impacts to wildlife are anticipated at the West Glacier Staging Area because the area is already used for construction staging and maintenance operations and surrounded by other uses. Therefore impacts would be **minor, short- and long-term, localized and adverse**.

Cumulative Impacts of the Preferred Alternative

Impacts from other past, present, and future actions would be the same as described in the No Action Alternative. The overall cumulative impact of past, present, and future activities in combination with the impacts from the Preferred Alternative, would be **minor, short- and long-term, localized, and adverse**.

Conclusion

Since road construction-related activity would continue at both sites, impacts to wildlife and aquatic species, though reduced from the No Action Alternative, would be **minor, short- and long-term, localized, and adverse**.

Because the Preferred Alternative would not result in major adverse impacts to wildlife and aquatic 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 wildlife and aquatic resource values related to this alternative.

Threatened, Endangered, and Species of Concern

AFFECTED ENVIRONMENT

There are four threatened wildlife species listed by the U.S. Fish and Wildlife Service (USFWS) in Glacier National Park. They are the threatened grizzly bear (*Ursus arctos*), Canada lynx (*Lynx canadensis*), and bull trout (*Salvelinus confluentus*), and the gray wolf (*Canis lupus*). Grizzly bear has been documented within the project area and Canada lynx and gray wolves have been documented in the Granite park area, approximately 3 miles (5 km) from Logan Pit and likely travel through or forage near the site.

Research-based habitat modeling shows that the entire upper McDonald Creek riparian corridor contains high value grizzly bear foraging habitat during the spring and early summer (until mid-July). During late summer and autumn (after mid-July), portions of the corridor continue to contain high value grizzly bear foraging habitat from Logan Creek to Packer's Roost and the West Tunnel. Grizzly bear breeding season occurs from May 1 until July 1. Breeding bears are likely to be moving through the upper McDonald Creek corridor during this time. Early morning, evening, and night are especially critical times for grizzly bears to travel or forage in the corridor as visitor traffic on the Going-to-the-Sun Road is considerably lower than during the main part of the day. Bears are less likely to be disturbed, displaced, human habituated or injured by moving vehicles during these critical times.

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 may be of concern because of characteristics that make them particularly sensitive to human activities or natural events. In addition, species of concern may 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.

Upper McDonald Creek, above the inlet of Lake McDonald, has been identified as the single most important harlequin duck (*Histrionicus histrionicus*) breeding stream in Montana with about 10 to 20 nesting pairs, annual production for the eight mile section from Lake McDonald to Logan Creek varying between two and over 40 young harlequins. Twenty-six juveniles were recorded during surveys in 2007. The harlequin duck is listed as a Montana "Species of Concern" and a US-Forest Service and Bureau of Land Management "Sensitive" species. Breeding pairs inhabit Upper McDonald Creek from late April through early mid-June and brood during July, August and early September. Females and juveniles generally leave the area in September. Harlequins are most likely to be disturbed by construction noise and activity especially in areas near McDonald Creek. Research and monitoring indicates that harlequin ducks are sensitive to human disturbance, especially during breeding and brood-rearing seasons as they can be displaced from important foraging sites thus potentially reducing the production and survival of their young.

There are three golden eagle (*Aquila chrysaetos*) nest sites on the cliffs along the upper McDonald Creek corridor at Crystal Point, Red Rocks, and Avalanche Creek, with nesting territories encompassing the Logan Pit project area. The golden eagle nesting period occurs between April and September, with most chicks fledging by early to mid August. Fledglings remain in the area for another few weeks and are still dependent upon adult eagles for food. Eagle nests will be monitored for activity and, if active, for disturbance due to construction. The upper Red Rocks and Avalanche Creek nests should be sufficiently distant from the road (i.e. > 800 m) that construction should not significantly disturb them. The lower Red Rock and Crystal Point nests, if active, could be impacted by construction. A fourth nesting territory exists on the Glacier Wall, but the nest appears to be a remnant or alternative nest and has not recently been active.

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) is listed as a Montana “Species of Concern” and a sensitive species by US – Forest Service and Bureau of Land Management. Westslope cutthroat (WCT) in the Flathead drainage may be adfluvial, fluvial, or resident. Adfluvial fish occupy large lakes in the Upper Columbia drainage and spawn in tributaries (e.g. Lake McDonald). Fluvial fish reside in rivers or large streams instead of lake and utilize tributaries for spawning (e.g. McDonald Creek). Most adults return to the river/stream of lake after spawning. All three life history forms occur in the 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 as well. WCT prefer cold nutrient poor waters. Sexually mature adfluvial fish move into the vicinity of tributaries in fall and winter where they stage before beginning their spring migration into spawning streams. They typically spawn at age four or 5, 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. Alternate year spawning has been reported in the Flathead River Basin in Montana (Shepard et al. 1984). 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 may spawn in the lower reaches of streams used by resident fish.

Westslope cutthroat trout have been found in Upper McDonald Creek. The 2004 study, identified westslope cutthroat trout in Avalanche Creek, below Logan Pit, and Logan Creek, above Logan Pit (Dux and Guy 2004). Both of these creeks flow into Upper McDonald Creek. Although no quantitative data are available for WCT in the McDonald Creek drainage, spawning activity occurs in most major tributary streams.

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 Montana Natural Heritage Data Management System (University of Montana) was consulted on the Internet to generate a list of threatened and endangered species, and "species of concern" for Flathead County, Montana. This list was compared to the wildlife database for Glacier National Park and the project area. 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 “likely...” or “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 THE NO ACTION ALTERNATIVE

The No Action Alternative would not change current conditions. Continual staging and stockpiling at Logan Pit has already negatively impacted grizzly bears that forage in the area, through temporary displacement from seasonally important foraging areas or habituated human activity. Continued utilization of the West Glacier Staging Area would have little additional impact on grizzly bears. Actions in this alternative continue to have **minor, adverse, short- and long-term, localized** impacts to grizzly bears.

Species of Concern.

Harlequin Ducks. The No Action Alternative would not change current conditions. Continual staging and stockpiling at Logan Pit has already negatively impacted harlequin ducks and continues to through temporary displacement from seasonally important foraging areas on the adjacent sections of McDonald Creek. Continued utilization of the West Glacier Staging Area would have no additional impact on harlequin ducks, since none occur at that site. Actions in this alternative would continue to have **minor, adverse, short- and long-term, localized** impacts to harlequin ducks.

Golden Eagles. The No Action Alternative would not change current conditions. Continual staging and stockpiling at Logan Pit has already negatively impacted golden eagles through temporary displacement from nesting and foraging sites. Continued utilization of the West Glacier Staging Area would likely have little or no impact on golden eagles because there are no known nest sites nearby, however they may forage there as ground squirrels at the site may attract golden eagles. However, the small size of the meadow and the human activity likely discourages eagle use. Actions in this alternative continue to have **minor, adverse, short- and long-term, localized** impacts to golden eagles.

Westslope Cutthroat Trout. The No Action Alternative would not change current conditions for the westslope cutthroat trout. Historic records indicate low populations of westslope cutthroat trout and continuing use at Logan Pit for staging and stockpiling in its present configuration would most likely have a minor, adverse, short and long term, localized effect on trout populations. There would be negligible impact to westslope cutthroat trout at the West

Glacier Staging Area as that site is not located near a water source.

Cumulative Impacts of the No Action Alternative

Impacts on grizzly bears from this action combined with past construction activities for the wastewater treatment plant and water utility line replacement, on-going rehabilitation of the GTSR would have minor adverse impacts due to associated disturbances. This action combined with continued GTSR rehabilitation and replacement of the Logan Creek toilet would not add any additional adverse impacts to grizzly bears. Replacing the toilet at Logan Creek would discourage the grizzly bears in the area from entering the toilet, getting locked in and decrease the possibility of a human-grizzly bear interaction.

This action combined with continued rehabilitation work on the GTSR, specifically work along McDonald Creek and within the tributaries such as Logan Creek, would have minor impacts on westslope cutthroat trout, harlequin ducks and golden eagles. The impacts would result from minimal amounts of sedimentation in the creek affecting trout, continued construction activities along McDonald Creek disturbing the harlequin ducks and road construction occurring near golden eagle nests. Overall cumulative impacts would be minor, adverse, short and long term and regional.

Conclusion

The No Action Alternative would likely have a **minor, short- and long-term, adverse and localized** impact on harlequin ducks and golden eagles, and a **minor adverse short and long-term and localized** impact on the westslope cutthroat trout. Impacts to grizzly bears would continue to be **minor, short-and long-term, adverse and localized**.

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 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.

IMPACT ANALYSIS OF THE PREFERRED ALTERNATIVE

Impacts would be similar to the No Action Alternative. Continued utilization of the West Glacier Staging Area would have no additional impact on grizzly bears. Delineating an appropriate staging and stockpiling usable area would reduce impacts around the periphery of Logan Pit, allowing the recovery of vegetation screening to help lessen impacts to grizzly bears in areas surrounding the pit. Since road construction-related activity would continue at both sites, impacts to grizzly bears, though reduced from the No Action Alternative, would still be **minor, both short- and long-term, localized adverse**.

Species of Concern.

This alternative would have similar impacts as described in the No Action Alternative. Delineating a smaller staging and stockpiling area would reduce impacts around the periphery of Logan Pit, allowing the recovery of vegetation screening to reduce disturbance to harlequin ducks and golden eagles in the areas surrounding the pit. Placing a culvert at the entrance to the pit, and utilizing the pit only during low-water periods would allow for continued drainage through the area, reducing fine sediment from entering the creek and having a beneficial impact on harlequin ducks and westslope cutthroat trout, including down stream effects. Since road construction-related activity would continue at both sites, impacts to these species, though reduced from the No Action Alternative, would still be **minor, both short- and long-term, localized and adverse**. There would be a **slight benefit** to Harlequin Ducks from the preferred alternative, by increasing the buffer zone between the creek and the operation at Logan Pit.

Cumulative Impacts of the Preferred Alternative

The action of this alternative combined with on-going and future actions would have minor, both beneficial and adverse, localized impacts as in the No Action alternative.

The actions of the preferred alternative combined with the on-going rehabilitation and maintenance of the GTSR, including bridge rehabilitation, would have minor cumulative impacts to westslope cutthroat trout and golden eagles. Impacts to westslope cutthroat trout would result from minimal sedimentation along McDonald Creek and nearby streams, such as Logan Creek. Impacts to golden eagles from disturbance of nesting sites due to construction activities on the GTSR would result in negative impacts. Cumulative impacts to harlequin ducks would be minor as in the No Action alternative but would be lessened due to the increase in riparian habitat between McDonald Creek and Logan Pit. Overall cumulative impacts would be minor, adverse, short and long term and regional.

Conclusion

The Preferred Alternative would likely have a **minor, short- and long-term, adverse and localized** impact on harlequin ducks, golden eagles, and westslope cutthroat trout; though impacts to harlequin ducks would be lessened. Impacts to grizzly bears would continue to be **minor, short-and long-term, adverse and localized**.

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 General Management Plan 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.

Natural Soundscapes

AFFECTED ENVIRONMENT

An important policy of the NPS is 'to preserve, to the greatest extent possible, the natural soundscapes of parks' (NPS 2006). NPS strives to preserve the natural sounds associated with the biological resources of the Glacier National Park. Natural soundscapes can be transmitted in a mixture of all nature's elements and in a wide audible range. They are an important resource and have intrinsic value as a part of the unique environment of the park. Natural sounds of wind, water, animals and other natural phenomena predominated through most of the park. Natural quiet exists when the sound of these natural components of the park prevail.

The Logan Pit area and West Glacier Staging Area are both in and near areas that have experienced artificial noises from human activities, particularly related to construction, staging, and stockpiling activities. The Logan Pit area has been used as a construction staging and material stockpiling area probably since the road was constructed. The area being referred to as the West Glacier Staging area, and formerly known as the 'ballfield' has been used since the 1930's as a camp area, recreation area, and most recently as materials storage. It is also located adjacent to other maintenance facilities and operations and near the Glacier Institute Field Camp. Therefore noises associated with truck traffic, equipment and loading is common place in that area. Natural sounds are more apparent during the winter when park operations use the area less and the Glacier Institute Field Camp is not used.

The backcountry is dominated by natural quiet. About 95% of the park is proposed wilderness where natural quiet is considered an important resource. Logan Pit, the West Glacier Staging Area and the GTSR corridor are surrounded by backcountry where natural quiet dominates.

IMPACT ANALYSIS

METHODOLOGY

Natural soundscapes are defined as the variety of natural sounds comprising an ecosystem including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes. Potential impacts to the natural soundscape within the park associated with use of Logan Pit and the West Glacier Staging Area as a construction staging and material stockpiling areas were evaluated based on anticipated noise typical for similar types of construction work that is occurring and has occurred in the park.

- Negligible:* There would be temporary introduction of artificial noise; however effects would not be perceptible.
- Minor:* An introduction of artificial noise would occur temporarily at localized sites. The effects would be readily detectable, but may cause minor disturbance to Glacier National Park visitors, concessionaires, or wildlife.
- Moderate:* An introduction of artificial noise would be readily detectable for longer periods of time over a widespread area and would affect nearby visitors, concessionaires, and/or wildlife
- Major:* Continuous, loud, disruptive noise occurring daily, throughout the day, affecting visitors, concessionaires, and wildlife.
- Short-term:* Effects extend only through the period of the GTSR rehabilitation project.
- Long-term:* Effects extend beyond the GTSR rehabilitation project.

IMPACTS OF THE NO ACTION ALTERNATIVE

Artificial noise from construction and material stockpiling would continue to be present at Logan Pit and the West Glacier Staging Area. After the road rehabilitation project was completed, the West Glacier Staging Area would no longer continue to be used for road materials, thus reducing the noise levels in that area. At times some noise from these operations may be heard in the backcountry both in the area of the Garden Wall and in the backcountry surrounding West Glacier and Apgar. Impacts to natural sounds from equipment, loading and unloading and traffic would continue to be minor, long term, adverse and localized at the Logan Pit site and minor, short term, adverse and localized at the West Glacier Staging Area.

Cumulative Impacts of the No Action Alternative

Continued use of the Logan Pit site combined with the GTSR rehabilitation project and visitor and park staff traffic on the GTSR would continue to adversely impact natural sounds. Continued temporary use of the West Glacier Staging Area combined with continued horse concession operations, and park packer's barn operations, the West Glacier Wastewater Treatment Plant and summer operation of the Glacier Institute Field Camp would add to the artificial noise in the area. Future construction at the West Entrance Station would temporarily increase artificial noise in the area. Overall cumulative impacts would be minor, short term and long term, adverse and mostly localized though for short periods during the day could be heard in the backcountry and thus be widespread.

Conclusion

The No Action Alternative would be minor, short term and long term adverse mostly localized impacts on natural sounds. While noise impacts could be widespread at times during the day, this is anticipated to have negligible to minor impacts on natural sounds in the backcountry because it would be brief and infrequent during the construction season.

Because the No Action Alternative would not result in major adverse impacts to natural soundscapes 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 natural soundscapes resource values related to this alternative.

IMPACT ANALYSIS OF THE PREFERRED ALTERNATIVE

Artificial noise would continue to be present at both sites, however permanent use of the West Glacier Staging Area for GTSR maintenance would result in a permanent presence and therefore increase in artificial noise at that location. Therefore impacts to natural sounds would be **minor to moderate, long term, adverse and localized**.

Cumulative Impacts of the Preferred Alternative

This action combined with the other actions described under No Action would result in a cumulative **moderate, long term adverse, localized impact** on natural sounds from the permanent use of both areas as construction staging and material storage.

Conclusion

The Preferred Action Alternative would have **moderate, long term adverse mostly localized** impacts on natural sounds. While noise impacts could be widespread at times during the day, this is anticipated to have negligible to minor impacts on natural sounds in the backcountry because it would be brief and infrequent during the construction season.

Because the Preferred Alternative would not result in major adverse impacts to natural soundscapes 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 natural soundscapes resource values related to this alternative.

Visitor Use and Experience

AFFECTED ENVIRONMENT

The Going-to-the-Sun Road (GTSR) is a primary visitor destination as it is the only road available to visitors that provides vehicle access from the west to the east side of the park. Construction traffic on the road affects visitors' experience as construction delays can be long and frequent. Impacts to visitors were evaluated in the 2003 Final Environmental Impact Statement for the GTSR however it was planned at that time to continue use of Logan Pit as the primary construction staging area on the west side of the park. Visitors on the upper section of the road on the west side encounter more construction traffic than do visitors below Logan Pit. At this time most construction vehicles enter the park early in the morning, traveling through the West Entrance before the peak use times on the road.

The Logan Pit site was identified as the primary staging and stockpiling site for the Going-to-the-Sun Road rehabilitation project (NPS 2003). The site is located along the GTSR but is barely perceptible from the road by visitors. The access road allows heavy equipment and vehicles associated with the rehabilitation project and general road maintenance to enter and exit without delaying traffic for long periods of time or inciting hazards. This site is also used as a helicopter landing zone for administrative use such as backcountry projects requiring materials that cannot be packed in, for backcountry rescues and during fires.

The West Glacier Staging Area site was formally known at the "ballfield". The site was first utilized in the 1930s by the Civilian Conservation Corps as a camp. In the recent past, this site

was used by park employees as a ballfield and for a few visitors who knew of the site, it was used for group gatherings and social events. Within the last decade, ground squirrels began using the area causing it to be unsafe for ball games. Ball games were halted about 2001. Five years ago, the park started storing seasonal items, such as picnic tables, at the site. In 2006, the site was evaluated and a decision was made to use it temporarily for overflow storage for the GTSR rehabilitation project. At that time visitor use of the site stopped.

IMPACT ANALYSIS

METHODOLOGY

Potential impacts to visitors associated with use of Logan Pit and the West Glacier Staging Area as a construction staging and materials storage area for the GTSR project and beyond were 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 THE NO ACTION ALTERNATIVE

Under the No Action Alternative, no new impacts would occur to visitors because it maintains the status quo. Visitors would continue to be affected by construction traffic from the West Entrance to the work sites on the west side of the GTSR. They would continue to encounter most construction vehicles from Logan Pit east. Most construction vehicles would continue to enter the park early in the mornings through the West Entrance, thus avoiding most visitors. Use of the West Glacier Staging Area has increased construction traffic on the lower portion of the road; it has not been excessive because most times that area is accessed early in the morning or late in the day. Visitors in the backcountry may occasionally be able to hear the staging operations at both Logan Pit and the West Glacier Staging Area depending on where they are hiking. It is not anticipated this would effect more than a few visitors each season and the noise would not be prolonged. Therefore impacts on visitor experience are **minor, long term, adverse and localized**.

Cumulative Impacts of the No Action Alternative

The impacts of using both these areas for construction staging and material staging (one permanently and one temporarily) combined with the past actions of construction of the wastewater treatment plant, lengthening the government vehicle land through the West Entrance Station, previous use of the West Glacier Staging Area as a ball field and recreational gathering spot by visitors and park staff has resulted in more construction vehicles on the GTSR and

construction related delays. These actions combined with the present and future actions including the GTSR rehabilitation, the horse concession operations, the park's barn operations, operation of the West Glacier Treatment Plant and the Glacier Institute Field Camp, the planned improvements to the West Entrance Station and replacement of the Logan Creek comfort station and rehabilitation of the Logan Creek Bridge all would continue to expose visitors to construction vehicles and construction related delays. Over the long term, the road and other improvements would improve the visitor experience offering them safer conditions, and improved facilities. Cumulative effects would be **minor, short term and long term, adverse and beneficial and widespread**.

Conclusion

Impacts on visitor experience would be **minor, short-term and long-term, adverse, beneficial, localized and widespread** due to the length of the rehabilitation project and the positive improvements once it is complete.

IMPACT ANALYSIS OF THE PREFERRED ALTERNATIVE

Under the Preferred Alternative, no new impacts would occur to visitors from continued use the Logan Pit site, however permanent use of the West Glacier Staging Area would have an impact on visitor use and experience. Visitors would encounter construction vehicles more often on the lower section of the road below Logan Pit than they have previously. They would continue to encounter most construction vehicles from Logan Pit east. Most construction vehicles would continue to enter the park early in the mornings through the West Entrance, thus avoiding most visitors. Use of the West Glacier Staging Area has resulted in visitors encountering construction traffic more frequently on the lower portion of the road. Use of the West Glacier Staging Area as a permanent staging area for GTSR maintenance operations would result in more encounters with visitors, however it is not anticipated it would be excessive because most times that area is accessed early in the morning or late in the day. Logan pit would continue to be accessed during the mid day periods with occasional needs to travel back to West Glacier. Visitors in the backcountry may occasionally be able to hear the staging operations at both Logan Pit and the West Glacier Staging Area depending on where they are hiking. It is not anticipated this would affect more than a few visitors each season and the noise would not be prolonged. Therefore impacts on visitor experience are minor, long term, adverse and localized.

Cumulative Impacts of the Preferred Alternative

The impacts of using both these areas for construction staging and material staging permanently combined with the past actions of construction of the wastewater treatment plant, lengthening the government vehicle lane through the West Entrance Station, previous use of the West Glacier Staging Area as a ball field and recreational gathering spot by park staff and a few visitors has resulted in more construction vehicles on the GTSR and construction related delays. These actions combined with the present and future actions including the GTSR rehabilitation, the horse concession operations, the park's barn operations, operation of the West Glacier Treatment Plant, operation of the Glacier Institute Field Camp, the planned improvements to the West Entrance Station, replacement of the Logan Creek comfort station, and rehabilitation of the Logan Creek Bridge all would continue to expose visitors to construction vehicles and construction related delays. Over the long term, the road and other improvements would improve the visitor experience offering them safer conditions, and improved facilities. Cumulative effects would be minor, short term and long term, adverse and beneficial and widespread.

Conclusion

Impacts on visitor experience would be **minor, short term and long term, adverse, beneficial, localized and widespread** due to the length of the rehabilitation project and the positive improvements once it is complete.

Water Quality

AFFECTED ENVIRONMENT

The headwaters of the McDonald Creek system originate near the peaks of the Continental Divide. The 89,166 acres (36,085 ha) McDonald Creek drainage includes 7,235 acres (2,928 ha) of lake surface area and 230 miles (370.5 km) of streams. Most of the drainage is in proposed wilderness with the lower portion bisected by the Going-to-the-Sun Highway, the only road traversing the park.

Arising at a 6,080 foot (1,853 m) elevation, McDonald Creek flows 25.8 miles (41.5 km) and contains 8.8 miles (14.2 km) of lake and drains into the Middle Fork of the Flathead River at an elevation of 3,151 feet (960 m). The creek flows in a southeasterly direction, and then turns at the Glacier Wall and flows southwesterly, cascading into Lake McDonald. The GTSR forms the east boundary of the stream channel in most areas.

Lake McDonald is the largest lake in Glacier National Park with a surface area of 6,823 acres (2,761 ha) and contains 2,055,376 acre feet in volume. With a maximum depth of 464 feet (146 m) the lake is the deepest in the park. Mean depth is 301 feet (92 m). Below the lake, Lower McDonald Creek, a fifth order tributary, flows for approximately 3,200 feet (975 m) before entering the Middle Fork of the Flathead River. Bull trout are known to inhabit Lake McDonald and spawn in Lower McDonald Creek but are physically unable to access the portions of McDonald Creek adjacent to the project area due to several waterfalls that occur between spawning grounds and the project area.

Logan Pit is approximately half way down the McDonald Creek drainage with approximately two-thirds of the drainage area above the Logan Pit location. Major streams flowing into McDonald Creek above the Logan Pit area include Mineral, Alder, Haystack, and Logan Creeks. Logan Pit is located at MP 20.2 along the GTSR. The head of Lake McDonald is located approximately MP 14.5, Avalanche Creek is at MP 16.2, and Logan Creek is at MP 20.5. The pit itself is a point bar on McDonald Creek and is accessed by a road that crosses a back bar flood scour channel. The pit is about one to two feet lower than the Going-to-the-Sun Road surface and the back bar flood scour channel is about two to three feet lower than the road's surface.

The West Glacier Staging Area is located near the entrance of the park and is situated near the Glacier Institute field camp and the waste-water treatment site. The Middle Fork of the Flathead River is designated as a Wild and Scenic River and has a management buffer zone around it. The West Glacier Staging Area site is partially within this buffer zone but it is not within the vicinity any water sources; hence, there are no water quality concerns for the West Glacier Staging Area site.

IMPACT ANALYSIS

METHODOLOGY

The methodology used to analyze potential impact to water quality is based on modeling techniques to establish stream characteristics that might be affected by project actions, proximity of project actions to streams and lakes, and planned mitigation measures to control runoff and prevent sedimentation. The affected environment and impact analysis for water quality is limited to the Logan Pit site as the West Glacier Staging Area does not have water source; therefore this site does not have water quality concerns.

Negligible: Neither water quality nor hydrology would be affected, or the changes would be either non-detectable or if detected, would have effects that would be considered slight and non-measurable.

<i>Minor:</i>	Changes in water quality or hydrology would be measurable, although the changes would be small and the effects would be localized.
<i>Moderate:</i>	Changes in water quality or hydrology would be measurable but would be noticeable on a widespread scale.
<i>Major:</i>	Changes in water quality or hydrology would be readily measurable, would have substantial consequences and would be noticed on a regional scale.
<i>Short-term:</i>	After implementation, recovery would take less than one year.
<i>Long-term:</i>	After implementation, recovery would take more than one year or effects would be permanent.

IMPACTS OF THE NO ACTION ALTERNATIVE

The No Action alternative would not change current conditions. Continual compaction of the pit area by use for storage and staging restricts the stream from incising new channels in the area. This continues to be a minor impact to the hydrology of the stream and a negligible impact to water quality.

Impacts to the hydrology and water quality of McDonald creek would be negligible to minor, short and long-term, localized and adverse.

Cumulative Impacts of the No Action Alternative

McDonald Creek would continue to function in a semi-natural state. The GTSR forms the east boundary of the stream channel in most areas limiting the streams ability to move across the valley bottom, deposit sediment and channelize in a natural state. Impacts of continued use of Logan Pit combined with the GTSR rehabilitation project including the wall work along McDonald Creek, rehabilitation of Logan Creek Bridge and removal of debris from tributaries that empty into McDonald Creek would result in short term releases of sediment. This would be a minor, short term adverse impact on water quality and hydrology.

Conclusion

The affect of continued use of Logan Pit contributes minimal amounts of sedimentation to the stream which have a negligible impact on the hydrology and water quality. However, the continual use of the area eliminates this roughly 2 acre area from functioning naturally resulting in a **negligible to minor, long-term adverse impact** to water quality and resources.

Because the No Action Alternative would not result in major adverse impacts to water quality, 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 water quality values related to this alternative.

IMPACTS OF THE PREFERRED ALTERNATIVE

This alternative would have similar impacts to the No Action Alternative. Placement of the concrete forms may redirect water during flood events so water is not flowing through the middle of Logan Pit. Impacts to the hydrology and water quality of McDonald creek would be negligible to minor, short and long-term, localized and adverse.

Cumulative Impacts of the Preferred Alternative

McDonald Creek would continue to function in a semi-natural state. The GTSR forms the east boundary of the McDonald Creek stream channel in most areas limiting the streams ability to move across the valley bottom, deposit sediment and channelize in a natural state. Impacts of continued use of Logan Pit combined with the GTSR rehabilitation project including the wall

work along McDonald Creek, rehabilitation of Logan Creek Bridge and removal of debris from tributaries that empty into McDonald Creek would result in short term releases of sediment. This would be a minor, short term adverse impact on water quality and hydrology.

Conclusion

The preferred alternative would result in negligible to minor, adverse, short and long term localized impacts on water quality and hydrology because actions would not change substantially from current conditions.

Because the Preferred Alternative would not result in major adverse impacts to water quality, 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 water quality values related to this alternative.

Floodplain

AFFECTED ENVIRONMENT

Floodplains are only associated with the Logan Pit site and are not present in the West Glacier Staging Area location. Floodplains are a very important component of a river's natural processes. They slow and disperse the energy of floodwaters, providing diverse habitat for wildlife and plants that thrive on flood disturbance. Large woody debris and fine river sediment collects in floodplains increasing biodiversity in these areas. Information on floodplain boundaries along the Upper McDonald Creek in the Going-to-the-Sun Road corridor is incomplete, but previous studies and inferences based on terrain and observations during flood events provide an indication of the 100-year floodplain areas, of which Logan Pit is inclusive. Peak run off for streams along the Going-to-the-Sun Road corridor usually occurs during fall rain on snow events, during the spring in response to snowmelt or during summer thunderstorms.

At the Logan Pit staging and stockpiling soils are characterized as Flooded Soils of floodplains and low terraces (A1) found along streams within a larger complex of Sandy Glacial Soils of glaciated valley bottoms (G3) surrounding the riparian zone. A1 soils consist of floodplains and low stream terraces with deep sandy and gravelly alluvial soils. Rock types are predominantly quartzite and argillite with some limestone and occasional fragments of granitic rock. Soils are frequently flooded, moderately well to poorly drained alluvial soils. There is very little evidence of soil development due to the young age of these soils. They are classified as Cryofluvents or when wet for most of the year, Cryaquents (Dutton et al. 2001). These soils are associated with floodplains and wet areas.

The available water holding capacity of floodplains is usually very low. Productivity and revegetation potentials are generally low, but are improved where shallow seasonal groundwater occurs near the surface. Erosion potential is generally moderate (but high for sandy, rock-free layers) and will occur whenever surface vegetation and plant litter is removed or soil is disturbed. This soil type is highly susceptible to weed infestation when disturbed, due to a combination of frequent soil disturbance from flooding (and, in this case, staging operations), rocky, sandy, soil textures, open canopy conditions, available weed seed source, and low elevation. Flooding, very rapid permeability and seasonal high ground water limit sewage disposal options on these sites (Dutton et al. 2001).

Logan Pit is largely devoid of vegetation due to a combination of past flooding, scouring, deposition, and storage of road construction materials. There is sparse vegetation scattered in the site, primarily around the edges of the site including native species and non-native species.

Vegetation in the surrounding forest immediately adjacent to the staging and stockpiling site includes native species, angelica, harebell, cowparsnip, thimbleberry, mountain maple, starry Solomon's plume, ballhead waterleaf, paper birch, devil's club, large-leaf avens, bluejoint reedgrass, blue wildrye, tall mannagrass, western meadowrue, false hellebore, stinging nettle, bracken fern, fowl bluegrass, arrowleaf groundsel, oakfern, ladyfern, foamflower, and violets.

IMPACT ANALYSIS

METHODOLOGY

Methodology use to analyze impacts to floodplain is based on an analysis of expected changes to the floodplain under the different alternatives. Changes in water distribution and floodplain dynamics are assessed. The affected environment and impact analysis for floodplain is limited to the Logan Pit site as the West Glacier Staging Area does not occur in a floodplain.

- Negligible:* Floodplains would not be affected, or changes would be either non-detectable or if detected, would have effects that would be slight and non-measurable. The change would have barely perceptible consequences to riparian habitat function.
- Minor:* Changes in floodplains would be measurable, although the changes would be small and the effects would be localized. The action would affect a few individual plants or wildlife species within an existing riparian area.
- Moderate:* Change in floodplains would be measurable, long-term and on a localized scale. Plant and wildlife species within the existing riparian area would experience a measurable effect, but all species would remain indefinitely viable.
- Major:* Changes in floodplains would be readily measurable and have substantial consequences to floodplain dynamics and would be noticed on a localized scale within the watershed.
- Short-term:* After implementation, recovery would last less than one year.
- Long-term:* After implementation, recovery would last less than one year.

IMPACTS OF THE NO ACTION ALTERNATIVE

The No Action Alternative would not allow for semi-natural flow conditions in the back bar flood scour channel due to blockage by the access road. The flood waters of McDonald Creek would continually back up above the access road and would overflow when extreme flood events occur. This hinders the floodplain development below the access road and changes the dynamics of the natural floodplain. Continued use of Logan Pit would result in minor, long-term, adverse and localized effects to the McDonald Creek floodplain in the vicinity of Logan Pit.

Cumulative Effects of the No Action Alternative

This action combined with continued rehabilitation and maintenance of the GTSR disrupts of the natural flow of McDonald Creek and the tributaries that cross the GTSR. Floodplain development has been and would continue to be adversely affected at all locations along the GTSR. Cumulative impacts would continue to be minor, adverse, long term and regional.

Conclusion

Continued use of Logan Pit would result in **minor, long-term, adverse and localized** impact to the McDonald Creek floodplain in the vicinity of Logan Pit because there are no changes from the current activity.

Because the No Action Alternative would not result in major adverse impacts to floodplain 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 floodplain resource values related to this alternative.

IMPACT ANALYSIS OF THE PREFERRED ALTERNATIVE

The Preferred Alternative would improve flood flows in back bar flood scour channel by installing a culvert across the access road. The placement of concrete blocks in the floodplain may redirect flows during minor flood events. Reduction in the size of the Pit would increase the floodplain area. Floodplain dynamics would improve by removing materials from the Pit that otherwise restrict flood flows. Continued use of the pit would affect floodplain dynamics. Impacts would be **minor, beneficial and adverse, short and long term and localized**.

Cumulative Impacts of the Preferred Alternative

This action combined with continued rehabilitation and maintenance of the GTSR disrupts of the natural flow of McDonald Creek and the tributaries that cross the GTSR. Floodplain development has been and would continue to be adversely affected at all locations along the GTSR. Cumulative impacts would continue to be minor, adverse, long term and regional.

Conclusion

Impacts would be minor, **beneficial and adverse, short and long term and localized** because while there are improvements made to enhance floodplain dynamics in the area, the Pit continues to be used for staging and stockpiling.

Because the Preferred Alternative would not result in major adverse impacts to floodplain 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 floodplain resource values related to this 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 may 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.) – Section 7 of the Endangered Species Act is designed to ensure that any action authorized, funded, or carried out by a federal agency likely would not jeopardize the continued existence of any endangered or threatened plant or animal species. If a federal action may affect threatened or endangered species, then consultation with the U.S. Fish and Wildlife Service is required. The NPS determined that the proposed action would “**may effect, not likely to adversely effect**” **grizzly bears** under Section 7. 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 Environmental Assessment will be sent to the US Fish and Wildlife Service for their review and concurrence. The NPS determined that the propose actions would have no effect on bull trout, gray wolf, and Canada lynx.

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*. The service will strive to preserve floodplain values and minimize hazardous floodplain conditions. The impacts of the proposed action within the 100-year floodplain are discussed and analyzed in a separate Statement of Findings document that is attached to this environmental assessment.

Montana Floodplain and Floodway Management Act – The Montana Department of Natural Resources of local floodplain administrator regulates construction activities in the 100-year floodplain. The park would apply for a Floodplain Development Permit if necessary.

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 effect (no historic properties affect) upon historic properties.

CONSULTATION/COORDINATION

PREPARERS AND CONSULTANTS

Tara Carolin, Ecologist

Steve Gniadek, Wildlife biologist

Lon Johnson, Historical Architect, Cultural Resource Specialist

Bill Michels, Air and Water Resource Specialist

Mary Riddle, Environmental Protection and Compliance Specialist

Karen Stockmann, Biological Science Technician (Compliance)

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

Federal and International

Advisory Council on Historic Preservation

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

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

Earl Old Person, 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

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

Wilderness Watch

Wild River Adventures

Individuals

A complete list is available upon request

REFERENCES

- DeArment, J. 2001. Wetland delineation in Glacier National Park developed zone. Unpublished report. Glacier National Park, West Glacier, MT.
- Dutton, B.L., J. Hadlock, M. Arthur, D. Marrett, A. Goldin, and A. Zhu. 2001. Soils of Glacier National Park. Land and Water Consulting, Inc., Missoula, MT.
- 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.
- 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.
- Glacier National Park (GNP). 1991. Exotic Vegetation Management Plan. Unpublished Report, Glacier National Park, West Glacier, MT.
- Guthrie, Mark R. 1978. "Cultural Resource Inventory of Specified Areas within Glacier National Park."
- Montana Bald Eagle Working Group. 1994. Montana Bald Eagle Management Plan. U.S. Bureau of Reclamation, Billings, MT.
- Montana Natural Heritage Program (MNHP). 2003. Plant Species of Concern. Helena, MT. 34 pp.
- 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, 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.
- Reeves, Dr. Brian O.K. 2003. "The Archeology of Waterton-Glacier International Peace Park."
- Shepard, B.B., Pratt, K.L., and Graham, P.J. 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.
- 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.

APPENDIX A. Common and Scientific Names of Plant Species Found in Project Areas

Common Name	Scientific Name	Common Name	Scientific Name
PLANTS OF LOGAN PIT		PLANTS OF WEST GLACIER STAGING AREA	
Forbs		Forbs	
Angelica	<i>Angelica sp.</i>	Beargrass	<i>Xerophyllum tenax</i>
Arrowleaf groundsel	<i>Senecio triangularis</i>		
Ballhead waterleaf	<i>Hydrophyllum capitatum</i>	Blue-leaf strawberry	<i>Fragaria virginiana</i>
Beargrass	<i>Xerophyllum tenax</i>	Bull thistle*	<i>Cirsium vulgare</i>
Blue-leaf strawberry	<i>Fragaria virginiana</i>	Bunchberry	<i>Cornus canadensis</i>
Bracken fern	<i>Pteridium aquilinum</i>	Canada thistle*	<i>Cirsium arvense</i>
Canada goldenrod	<i>Solidago canadensis</i>	English plantain*	<i>Plantago lanceolata</i>
Canada thistle*	<i>Cirsium arvense</i>	Field pussytoes	<i>Antennaria howellii</i>
Common dandelion	<i>Taraxum officinale</i>	Northern bedstraw	<i>Galium boreale</i>
Cowparsnip	<i>Heracleum sphondylium</i>	Ox-eye daisy*	<i>Chrysanthemum leucanthemum</i>
Devil's club	<i>Oplopanax horridum</i>	Pathfinder	<i>Adenocaulon bicolor</i>
False hellebore	<i>Veratrum viride</i>	Paul's betony*	<i>Veronica officinalis</i>
Fireweed	<i>Chamerion angustifolium</i>	Pearly everlasting	<i>Anaphalis margaritacea</i>
Foamflower	<i>Tiarella trifoliata</i>	Prince's pine	<i>Chimaphilla umbellatum</i>
Great northern aster	<i>Aster modestus</i>	Rosy pussytoes	<i>Antennaria rosea</i>
Harebell	<i>Campanula rotundifolia</i>	Spotted knapweed*	<i>Centaurea maculosa</i>
Hound's tongue*	<i>Cynoglossum officinale</i>	Starry Solomon's plume	<i>Smilicina stellata</i>
Horsetail	<i>Equisetum arvense</i>		
Lady-fern	<i>Athyrium filix-femina</i>	St. John's wort*	<i>Hypericum perforatum</i>
Large-leaved avens	<i>Geum macrophyllum</i>	Woods strawberry	<i>Fragaria vesca</i>
Mountain dandelion	<i>Agoseris glauca</i>	Yarrow	<i>Achillea millefolium</i>
Mullein*	<i>Verbascum thapsus</i>		
Oak-fern	<i>Gymnocarpium dryopteris</i>	Yellow clover*	<i>Trifolium agrarium</i>
Oxeye daisy*	<i>Chrysanthemum leucanthemum</i>		
Pearly everlasting	<i>Anaphalis margaritacea</i>		
Penstemon	<i>Penstemon spp.</i>		
Plantain*	<i>Plantago major</i>		
Silverleaf phacelia	<i>Phacelia hastata</i>		
Spotted knapweed*	<i>Centaurea maculosa</i>		
Starry Solomon's plume	<i>Smilicina stellata</i>		
Stinging nettle	<i>Urtica dioica</i>		
St. John's wort*	<i>Hypericum</i>		

	<i>perforatum</i>		
Violets	<i>Viola spp.</i>		
Western meadowrue	<i>Thalictrum occidentale</i>		
Western mugwort	<i>Artemisia ludoviciana</i>		
White campion*	<i>Silene latifolia</i>		
Wild chives	<i>Allium schoenoprasum</i>		
Yarrow	<i>Achillea millefolium</i>		
Grasses		Grasses and Sedges	
Bluejoint reedgrass	<i>Calamagrostis canadensis</i>	Hood's sedge	<i>Carex hoodii</i>
Blue wildrye	<i>Elymus glaucus</i>	Intermediate oatgrass	<i>Danthonia intermedia</i>
Fowl bluegrass	<i>Poa palustris</i>	Kentucky bluegrass*	<i>Poa pratensis</i>
Kentucky bluegrass	<i>Poa pratensis</i>	Pinegrass	<i>Calamagrostis rubescens</i>
Redtop*	<i>Agrostis stolonifera</i>	Redtop*	<i>Agrostis stolonifera</i>
Reed canarygrass	<i>Phalaris arundinacea</i>	Timothy*	<i>Phleum pratense</i>
Tall mannagrass	<i>Glyceria elata</i>		
Ticklegrass	<i>Agrostis scabra</i>		
Timothy*	<i>Phleum pratense</i>		
Quackgrass	<i>Agropyron repens</i>		
Shrubs		Shrubs	
Green alder	<i>Alnus viridis</i>	Globe huckleberry	<i>Vaccinium membranaceum</i>
Red-osier dogwood	<i>Cornus sericea</i>	Kinnikinnick	<i>Arcostaphylos uva-ursi</i>
Rocky Mountain maple	<i>Acer glabrum</i>	Ocean spray	<i>Holodiscus discolor</i>
Shrubby cinquefoil	<i>Pentaphylloides fruticosa</i>	Oregon grape	<i>Berberis repens</i>
Snowberry	<i>Symphoricarpos albus</i>	Prickly rose	<i>Rosa acicularis</i>
Thimbleberry	<i>Rubus parviflorus</i>	Shiny-leaf spirea	<i>Spirea betulifolia</i>
Willows	<i>Salix spp.</i>	Snowberry	<i>Symphoricarpos albus</i>
		Thimbleberry	<i>Rubus parviflorus</i>
		Twinflower	<i>Linnaea borealis</i>
		Velvetleaf blueberry	<i>Vaccinium myrtilloides</i>
Trees		Trees	
Black cottonwood	<i>Populus balsamifera</i>	Black cottonwood	<i>Populus balsamifera</i>
Engelmann spruce	<i>Picea engelmannii</i>	Douglas fir	<i>Pseudotsuga menziesii</i>
Lodgepole pine	<i>Pinus contorta</i>	Engelmann spruce	<i>Picea engelmannii</i>
Paper birch	<i>Betula papyrifera</i>	Lodgepole pine	<i>Pinus contorta</i>
Subalpine fir	<i>Abies lasiocarpa</i>	Paper birch	<i>Betula papyrifera</i>
Western red cedar	<i>Thuja plicata</i>	Western hemlock	<i>Tsuga heterophylla</i>
		Western larch	<i>Larix occidentalis</i>
		Western white pine	<i>Pinus monticola</i>
*Exotic			

APPENDIX B. Common and Scientific Names of Wildlife Species Found in Project Areas

Common Name	Scientific Name
Mammals	
Bear, Black	<i>Ursus americanus</i>
Bear, Grizzly	<i>Ursus arctos</i>
Chipmunks, red-tailed	<i>Tamias ruficaudus</i>
Cougar (Mountain lion)	<i>Puma concolor</i>
Coyote	<i>Canis latrans</i>
Deer, mule	<i>Odocoileus hemionus</i>
Deer, white-tailed	<i>Odocoileus virginianus</i>
Elk	<i>Cervus elaphus</i>
Fisher	<i>Martes pennanti</i>
Hare, snowshoe	<i>Lepus americanus</i>
Lynx, Canada	<i>Lynx canadensis</i>
Marten, American	<i>Martes americana</i>
Marten, pine	<i>Martes martes</i>
Moose	<i>Alces alces</i>
Mouse, deer	<i>Peromyscus maniculatus</i>
Shrew	<i>Sorex spp.</i>
Skunk, striped	<i>Mephitis mephitis</i>
Squirrel, Columbian ground	<i>Spermophilus columbianus</i>
Squirrel, red	<i>Tamiasciurus hudsonicus</i>
Vole	<i>Microtus spp.</i>
Weasel, long-tailed	<i>Mustela frenata</i>
Wolverine	<i>Gulo gulo</i>
Birds	
Chickadee, chestnut-backed	<i>Poecile refescens</i>
Creeper, brown	<i>Certhia americana</i>
Dipper, American	<i>Cinclus mexicanus</i>
Eagle, bald	<i>Haliaeetus leucocephalus</i>
Eagle, golden	<i>Aquila chrysaetos</i>
Flycatcher, Hammond's	<i>Empidonax hammondi</i>
Flycatcher, willow	<i>Empidonax traillii</i>
Goldeneye, Barrow's	<i>Bucephala clangula</i>
Goose, Canada	<i>Branta Canadensis</i>
Goshawk, northern	<i>Accipiter gentilis</i>
Grouse, ruffed	<i>Bonasa umbellus</i>
Hawk, Cooper's	<i>Accipiter cooperii</i>
Hawk, Red-tailed	<i>Buteo jamaicensis</i>
Hummingbird, calliope	<i>Stellula calliope</i>
Junco, dark-eyed	<i>Junco hyemalis</i>
Kingfisher, belted	<i>Ceryle alcyon</i>
Kinglet, Golden-crowned	<i>Regulus satrapa</i>
Merganser, common	<i>Mergus merganser</i>
Nuthatch, red-breasted	<i>Sitta canadensis</i>
Osprey	<i>Pandion haliaetus</i>
Owl, barred	<i>Strix varia</i>

Common Name	Scientific Name
Owl, northern pygmy	<i>Glaucidium gnoma</i>
Robin, American	<i>Turdus migratorius</i>
Sandpiper, spotted	<i>Actitis macularia</i>
Sapsucker, red-naped	<i>Sphyrapicus nuchalis</i>
Siskin, pine	<i>Carduelis pinus</i>
Sparrow, fox	<i>Passarella iliaca</i>
Swift, Vaux's	<i>Chaetura vauxi</i>
Thrush, Swainson's	<i>Catharus ustulatus</i>
Thrush, varied	<i>Ixoreus naevius</i>
Vireo, warbling	<i>Vireo gilvus</i>
Warbler, Audubon's	<i>Dendrocia</i>
Warbler, Townsend's	<i>Dendroica townsendi</i>
Warbler, Wilson's	<i>Wilsonia pusilla</i>
Waterthrush, northern	<i>Seiurus noveboracensis</i>
Woodpecker, hairy	<i>Picoidus villosus</i>
Woodpecker, pileated	<i>Dryocopus pileatus</i>
Wren, winter	<i>Troglodytes troglodytes</i>

This page intentionally left blank.

Statement of Findings for Floodplains

**for the Going-to-the-Sun Road Construction and
Maintenance
Staging and Stockpiling Site**

Glacier National Park, Montana

INTRODUCTION

Glacier National Park (GNP) has prepared and made available an Environmental Assessment (EA) analyzing the continued use of Logan Pit as a construction staging and storage area and formalizing permanent use of the West Glacier Staging Area (formally known as “the ballfield”) as an additional staging and stockpiling site area for the west-side of the Going-to-the-Sun Road rehabilitation project and general road maintenance by the park. Logan Pit would remain the preferred site for administrative and emergency helicopter landings. Flooding in November 2006 affected the Logan Pit site. Some changes are required to continue use of this site.

In the 2003, Going-to-the-Sun Road Rehabilitation Plan/Final Environmental Impact Statement Logan Pit was identified as the primary construction staging and material storage area for the road rehabilitation project (NPS 2003). Flooding in November 2006, affected the Logan Pit site. Some changes are required to continue use of this site. These changes are evaluated in the proposed action described below and described as the preferred alternative in the environmental assessment.

Executive Order 11988 ("Floodplain Management") requires the National Park Service and other agencies to evaluate the likely impacts of actions in floodplains. NPS Director's Order #77-2: Procedural Manual 77-2: Floodplain Management provides NPS policies and procedures for complying with EO 11988. This Statement of Findings (SOF) documents compliance with these NPS floodplain management procedures.

PROPOSED ACTION

The preferred alternative allows for the continued utilization of the Logan Pit staging and stockpiling site for road rehabilitation and general road maintenance purposes as well as an emergency and administrative helicopter landing site. The area is located adjacent to the Going-to-the-Sun Road (GTSR) at mile post 20.2 and is within the McDonald Creek floodplain. The existing disturbed area is about 2 acres (or 90,000 square feet). The area is located on a point bar within McDonald Creek. Concrete forms would be placed around the perimeter of allowable project disturbance for Logan Pit area (as shown on Figure 4) to assist in stabilizing the area during flooding. This would total about 1.5 acres and reduce the amount of area used within this site by 0.5 acres. The allowable disturbance perimeter is based on the 2001 disturbance area. The concrete forms would be placed to construct a wall on the upstream portion of the site (solid line), but only used to mark the site around the rest of the perimeter (dashed line). The access road crosses a back bar flood scour channel which supports excess water during flood stages. A culvert would be installed across the road and countersunk as needed to allow water passage and maintain flow from the back bar flood scour channel during high water and to provide adequate pipe cover. During high water, flows throughout the Logan Pit site jeopardize supplies and equipment. No fill would be placed in Logan Pit. The West Glacier Staging Area would be utilized during flood periods, thus eliminating the danger of damaging supplies and equipment in Logan Pit. The West Glacier Staging Area is located near the entrance of the park and is about 1.8 acres (or 79,000 square feet). Currently it is being used as a temporary site for the additional staging and stockpiling of supplies and equipment associated with the GTSR rehabilitation project. The West Glacier Staging Area site is not within a floodplain or riparian area so it will not be analyzed in the rest of this Statement of Findings (see figure 1).

Though the possibility of flooding at Logan Pit would not be reduced by actions considered in the environmental assessment, the pit floor would be stabilized by the use of concrete forms to prevent further scouring and erosion.

SITE DESCRIPTION

FLOODPLAIN

Arising at a 6,080 foot (1,853 m) elevation, McDonald Creek flows 25.8 miles (41.5km) and contains 8.8 miles (14.2 km) of lake and drains into the Middle Fork of the Flathead River at an elevation of 3,151 feet (960 m). The creek flows in a southeasterly direction, and then turns at the Glacier Wall and flows southwesterly, cascading into Lake McDonald. The Going-to-the-Sun Road forms the east boundary of the stream channel in most areas. Bull trout are known to inhabit Lake McDonald and spawn in Lower McDonald Creek but are physically unable to access the portions of McDonald Creek adjacent to the project area due to several waterfalls that occur between spawning grounds and the project area. Information on floodplain boundaries along Going-to-the-Sun Road corridor is incomplete, but previous studies and inferences based on terrain and observations during flood events provide an indication of the 100-year floodplain areas, of which Logan Pit is inclusive.

Logan Pit is approximately half way down the McDonald Creek drainage with approximately two-thirds of the drainage area above the Logan Pit location. Major streams flowing into McDonald Creek above the Logan Pit site include Mineral, Alder, Haystack, and Logan Creeks. The head of Lake McDonald is located approximately MP 14.5, Avalanche Creek is at MP16.2, and Logan Creek is at MP 20.5.

At the Logan Pit staging and stockpiling soils are characterized as Flooded Soils of floodplains and low terraces (A1) found along streams within a larger complex of Sandy Glacial Soils of glaciated valley bottoms (G3) surrounding the riparian zone. A1 soils consist of floodplains and low stream terraces with deep sandy and gravelly alluvial soils. Rock types are predominantly quartzite and argillite with some limestone and occasional fragments of granitic rock. Soils are frequently flooded, moderately well to poorly drained alluvial soils. There is very little evidence of soil development due to the young age of these soils. They are classified as Cryofluvents or when wet for most of the year, Cryaquents (Dutton et al. 2001).

Available water holding capacity is usually very low. Productivity and revegetation potentials are generally low, but are improved where shallow seasonal groundwater occurs near the surface. Erosion potential is generally moderate (but high for sandy, rock-free layers) and will occur whenever surface vegetation and plant litter is removed or soil is disturbed. This soil type is highly susceptible to weed infestation when disturbed, due to a combination of frequent soil disturbance from flooding (and, in this case, staging operations), rocky, sandy, soil textures, open canopy conditions, available weed seed source, and low elevation. Flooding, very rapid permeability and seasonal high ground water limit sewage disposal options on these sites (Dutton et al. 2001).

It is largely devoid of vegetation due to a combination of past flooding, scouring, deposition, and storage of road construction materials. There is sparse vegetation scattered in the site, primarily around the edges of the site including native species and non-native species. Vegetation in the surrounding forest immediately adjacent to the staging and stockpiling site includes native species, angelica, harebell, cowparsnip, thimbleberry, mountain maple, starry Solomon's plume, ballhead waterleaf, paper birch, devil's club, large-leaf avens, bluejoint reedgrass, blue wildrye, tall mannagrass, western meadowrue, false hellebore, stinging nettle, bracken fern, fowl bluegrass, arrowleaf groundsel, oakfern, ladyfern, foamflower, and violets.

The Logan Pit staging and stockpiling site is located between McDonald Creek and the Going-to-the-Sun Road at milepost 20.2 near the Avalanche Creek area. The pit area is within a point bar on McDonald Creek and the access road crosses a back bar flood scour channel. The pit floor is approximately one to two feet below the GTSR surface. The back bar flood scour channel parallels the GTSR and is approximately two to three feet lower than the GTSR surface. The access road is elevated approximately

0.5 feet above the back bar flood scour channel. The site is identified in multiple park environmental documents as the primary staging, stockpile, and helicopter landing site. The site provides a central location, adequate size and safe access for rehabilitation and ongoing maintenance of the GTSR.

During November 2006 the park experienced a weather event that accumulated 9.1 inches of precipitation in a 36-hour time period. A field investigation was completed in April 2007 to assess flood damage. At that time flowing water was observed at depths of three inches. Further site investigation suggested water heights as high as three feet in the pit area. The November flood event likely exceeded the 100-year flood event stage as the pit area is vegetated with moderately abundant 6 to 18 inch diameter trees. Numerous flow paths were observed but the site gave no indication of an imminent avulsion of the main McDonald Creek channel into the pit area or the back bar flood scour channel (see Figures 2 and 3).

WETLAND

Park personnel conducted a wetland determination base on the Wetlands Delineation Manual (Environmental Laboratories 1987). Based on vegetation, soils and hydrological information gathered at the Logan Pit project area, it was determined a small area (0.07 acres) that is located in the surrounding area does qualify as a wetland. Hydrophytic vegetation and drainage pattern requirements were met at four wetland sampling sites but only one of the four sites has hydrologic characteristics needed to qualify as a wetland. This small site is located between the Logan Pit staging and stockpiling area and the GTSR with an immediate vegetative buffer zone around it. Actions proposed in this project would have negligible affects on the wetland and therefore a statement of findings for wetlands is not being prepared. (Wetland Survey, September, 2007 by Jennifer Hint z, Biological Science Technician, Glacier National Park)

JUSTIFICATION FOR USE OF THE FLOODPLAIN

The purpose of this project is to provide a staging and stockpiling site for general road maintenance and the rehabilitation of the Going-to-the-Sun Road. The Logan Pit site has also served as an emergency and administrative helicopter landing site. In order to meet the purpose of this planning effort, the following objectives would need to be addressed:

- Minimize travel distance between staging and stockpiling site and the project work on the GTSR to reduce conflicts with visitor traffic and minimize transportation costs.
- Provide adequate room for materials staging and stockpiling.
- Insure safe access in and out of the staging site.
- Minimize impacts to natural and cultural resources.

The preferred alternative proposes to continue to utilize Logan Pit for construction staging and material storage, but only during low water periods. During high water periods the park and contractors would utilize the West Glacier Staging Area. Logan Pit is situated within the floodplain of McDonald Creek and has been used as a staging and stockpiling site probably since the road was constructed in the 1930's. Its central location and accessibility make it the ideal site for staging and stockpiling for construction contractors and park personnel for road rehabilitation and maintenance projects and for helicopter flight landings. There is no other suitable location along the road that could be used for this purpose that provides adequate space. Construction of a new staging area would require impacting previously undisturbed areas, removing 1-2 acres of trees and vegetation and would likely be visible to visitors. Continued use of this site is not projected to alter floodplain conditions, but with sporadic weather events and climate change, site stabilization is necessary for access and functional requirements.

The preferred alternative would have the least impacts to natural and cultural resource in the vicinity of the site, including the floodplain. Mitigation measures ensure immediate impacts would not adversely affect the environment (see Mitigation section).

INVESTIGATION OF ALTERNATIVE SITES

In addition to the preferred alternative two other locations were identified and assessed as possible staging and stockpiling sites. A No Action alternative was also assessed. The two alternative locations were Packer's Roost and Moose Country. Both locations were determined to be inadequate and did not meet all the criteria objectives defined by the project needs. Enlargement of the alternative locations would have affected the natural environment to a greater extent than choosing to utilize the Logan Pit site. Both alternative locations would not be easily accessible and would not provide an adequate landing zone for helicopters. The Moose Country site is situated within a floodplain/wetland.

The No Action alternative would not meet the purpose of this project. Glacier National Park has identified the need for a staging and stockpiling site, as well as a need for an emergency and administrative helicopter landing site in multiple documents. Not providing or maintaining a sufficient site would hinder the progress of other projects; thereby would not meet the guidelines set before the park by the park's General Management Plan (GMP) (NPS 1999) and the NPS Organic Act.

SITE-SPECIFIC FLOOD RISK

The November 2006 flood exceeded the 100-year flood levels, and the park must take into consideration all reasonable scenarios as weather patterns may become more sporadic and severe.

The following information based on the HEC-RAS model for McDonald Creek was developed by Federal Highway Works Administration (FHWA) (Leon pers comm 2007). Overbank flow of McDonald Creek enters the backbar flood scour channel at floods equal to and larger than the 2-year flood event (3,030 cubic feet per second (cfs)). The access road to Logan Pit crosses this channel and is approximately 0.5 feet below the bank of the channel. The pit area is inundated at floods greater than the 2-year flood event. Flood water depth within the pit area is approximately 0.5 feet for the 25-year flood event (4,350 cfs), one foot for the 50-year flood event (5,670 cfs), and two feet for the 100-year flood event (7,650 cfs). The Going-to-the-Sun Road would not be inundated for floods up to and including the 100-year flood event, only the access road nearest the pit area is inundated.

MITIGATION

Actions proposed in the floodplain would not affect the flood storage capacity of the floodplain. The natural floodplain value would not be affected but due to sporadic and severe weather events mitigation measures would be implemented to lessen impacts to natural resources throughout the project. The project design would further minimize potential hazards to human life and property destruction.

- Development within the floodplain would not result in an increase of the base flood level more than 0.5 feet.
- Adequate erosion protection (such as concrete forms, trees) would be installed to prevent the pit floor from being exposed to flood waters.
- No overnight storage of hazardous material or fuels would occur within the floodplain.
- The pit staging and stockpiling area would be reduced to a smaller area than the 2001 size (based on GPS waypoints and aerial photography) (see Figure 4). A reduction of 0.5 acres from the current (2007) size.

- A vegetative buffer zone would be restored and maintained to provide habitat protection for harlequin ducks.

SUMMARY

The preferred alternative was designed to minimize impacts to the floodplain along McDonald Creek while maintaining a storage and stockpile site for the rehabilitation and continued maintenance of the GTSR. Utilizing the West Glacier Staging Area during flood periods would allow floodplain dynamics at the Logan Pit site to occur in a semi-natural condition. The culvert installation at the Logan Pit site would enhance the floodplain conditions below the access road by allowing continuous water flow during flood stages. Continued use of the Logan Pit site as a staging and stockpiling site would not allow the floodplain to fully return to a natural state. Having the Going-to-the-Sun Road border the eastern side of McDonald Creek also hinders the natural meandering of McDonald Creek.

There would be no loss of floodplain area or impacts to floodplain dynamics upon implementation of the proposed action. Therefore the NPS finds this proposed action is consistent with the policies and procedures of NPS Director's Order #77-2: Procedural Manual 77-2: Floodplain Management which provides NPS policies and procedures for complying with Executive Order 11988.

REFERENCES

- Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, US Army Engineers Waterways Experiment Station, Vicksburg, Mississippi. 100 pp.
- Dutton, B.L., J. Hadlock, M. Arthur, D. Marrett, A. Goldin, and A. Zhu. 2001. Soils of Glacier National Park. Land and Water Consulting, Inc., Missoula, MT.
- Leon, Sven PE. 2007. Personal communication. Western Federal Lands Highway Division, Hydraulics Engineer.
- National Park Service. United States Department of Interior. 2003. Director's Order 77-2. Floodplain Management. Washington D.C.
- _____. 2003. Going-to-the-Sun Road Rehabilitation Plan Final Environmental Impact Statement. Glacier National Park. West Glacier, MT. 353 pp.
- _____. 1999. General Management Plan. Glacier National Park. West Glacier, MT. 340 pp.

Figure 1. Location Map of Logan Pit and the West GLAC staging area

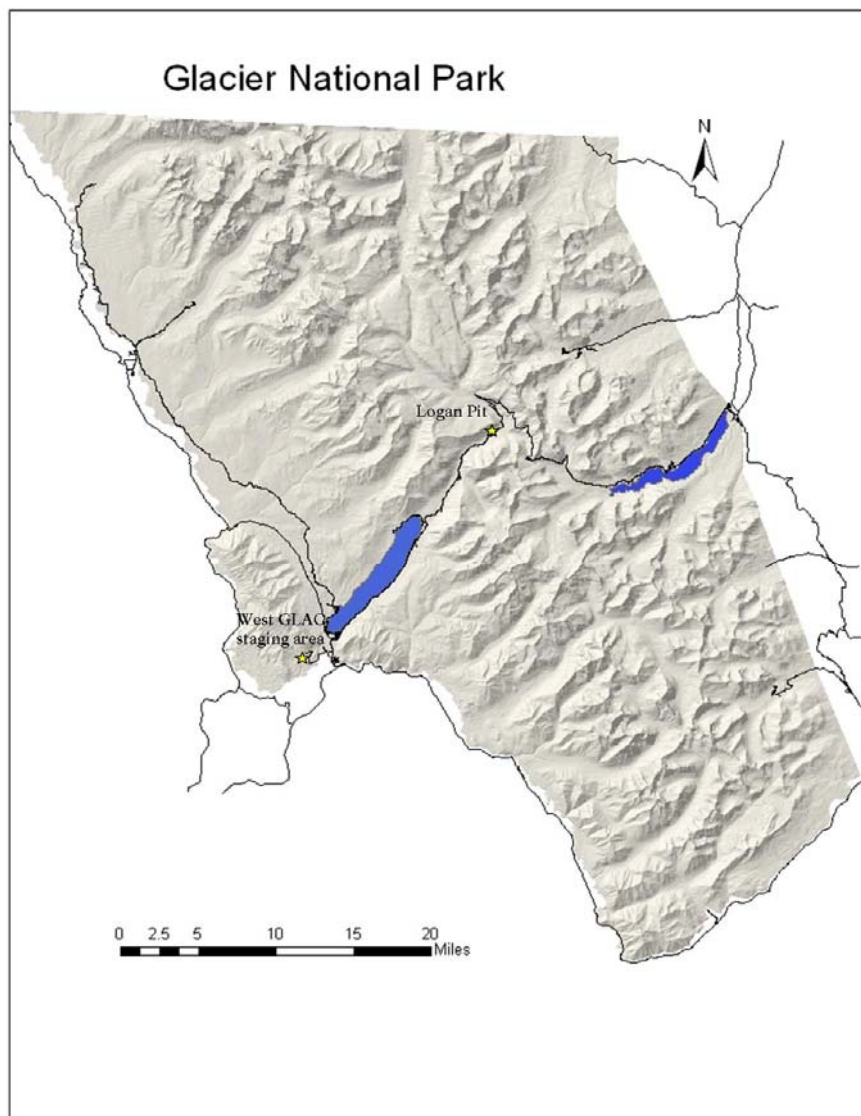


Figure 2. Photo, November 2006 flooding of Logan Pit



Figure 3. Photo, Logan Pit access road flooding



Figure 4. Logan Pit Disturbance Area

