



National Park Service
U.S. Department of the Interior

Glacier National Park
Montana

Statement of Findings

Proposal to Maintain, Rehabilitate and Construct National Park Service
and Concession Facilities at Rising Sun, Many Glacier and Lake McDonald
Developed Areas

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Glacier National Park, Montana

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INTRODUCTION

Description of the Proposed Action

The preferred alternative in Glacier National Park's Commercial Services Plan (CSP) includes the maintenance, rehabilitation, and possible construction of National Park Service and concession facilities in the Rising Sun, Many Glacier and Lake McDonald (Lodge area) developed areas. In July, 2002, the Water Operations Branch, Water Resources Division, National Park Service, visited Glacier National Park to develop information related to flood hazard at several areas of the park including Rising Sun and the Lake McDonald developed areas. As a result of their study, one very important conclusion was noted: "Most of the areas studied in this work are geologically very dynamic with unstable fluvial systems present." Although National Park Service policy and management directives direct the National Park Service to build and relocate structures out of floodplains and flood hazard zones, Glacier National Park is the steward of some of America's national historic landmarks and other important cultural resources, and must protect these resources. Many of these outstanding cultural resources are associated with the Rising Sun, Many Glacier and Lake McDonald developed areas. Historic districts at Rising Sun, Many Glacier, and Lake McDonald symbolize western park development. In accordance with the Organic Act of 1916, which established the National Park Service, the agency, and subsequently the staff of Glacier are charged to preserve the park's cultural resources unimpaired for the enjoyment of present and future generations.

Improvements have been proposed for the Lake McDonald Lodge, Rising Sun and Many Glacier areas. These improvements are briefly described below and can be found in the *Draft Commercial Services Plan and Draft Environmental Impact Statement* and are noted as the preferred alternative: Rising Sun alternative C, Lake McDonald Lodge Area alternative C, and Many Glacier alternative C.

LAKE MCDONALD LODGE AREA — Alternative C (Preferred)

Alternative C would continue services similar to those in alternative B, with a slight increase in the number of overnight accommodations. This alternative would better consolidate employee housing, which would be removed from the flood-prone areas. It would emphasize pedestrian circulation and improve the visitor's experience by providing a central parking area to better orient guests to the area. The Coffee Shop would be replaced with a new restaurant, and the Stewart Motel and Annex would be replaced with a new motel.

Alternative C Area I actions would:

Include these services—

- Overnight visitor accommodations
- Employee housing and support facilities
- Maintenance support/laundry
- Food and beverage services
- Retail sales

- Boat tours and rentals
- Public restrooms and pay phones
- Public shuttle and tours

Upgrade facilities and utilities to comply with life safety, accessibility and building codes.
 Construct new accessible trails and walks.
 Modify the main entrance road and reconfigure parking on boulevard.
 Construct new guest and employee parking.
 Remove the Johnson, Jammer, Hydro, and Boys' I and II Dormitories.
 Convert the Snyder and Cobb House Dormitories to guest accommodations.
 Convert the indoor employee recreation space to visitor or management use compatible with the auditorium.
 Close west access to vehicles and convert to foot and bicycle trail.

Alternative C Area II actions would:

Continue existing services—

- Overnight visitor accommodations
- Employee housing and support facilities
- Food and beverage services
- Retail sales
- Horseback riding

Upgrade facilities and utilities to comply with life safety, accessibility and building codes.
 Construct new accessible trails and walks.
 Remove existing parking area for the Coffee Shop and create a pedestrian green space.
 Remove Post Office and expand visitor parking near the General Store.
 Construct new guest and employee parking to provide adequate space.
 Remove the Coffee Shop and construct a new restaurant with employee dining and post office.
 Remove Girls' Dormitories 1 and 2 and restore sites to open space.
 Remove the Stewart Motel and construct a new guest motel and parking on the same site.
 Construct new public restroom.
 Convert Garden Court Dormitory to guest accommodations.
 Construct new access road and formalize parking adjacent to the guest cabin units.
 Construct new employee housing and outdoor recreation area behind Coffee Shop.
 Construct a new laundry and maintenance facility to serve the hotel.

RISING SUN — Alternative C (Preferred)

Alternative C would continue the current services and include many of the adaptations proposed in alternative B. Further separation of guest and employee activities would be provided by adaptive use of existing Dormitory facilities, and construction of replacement housing and guest accommodations outside the floodplain. The types of overnight accommodations could be expanded to include a few high standard accommodations with the majority remaining at the standard level.

Alternative C Area I actions would:

Include these services—

- Overnight visitor accommodations (cabins and motel)
 - Employee housing and related facilities
- Upgrade facilities and utilities to comply with life safety, accessibility and building codes.
 Construct new accessible trails and walks.
 Construct approximately ten two-unit cabins and associated parking on the upper loop.

Convert approximately three employee cabins to guest lodging.
 Construct two new employee dormitories and associated parking near the Lower Motel that was converted to employee housing.
 Construct an employee indoor recreation facility in the new employee dormitory and an outdoor recreation facility in the same general area.
 Convert Lower Motel to employee housing.
 Convert the main Dormitory to guest lodging.
 Relocate Boat Concessioner Housing to new dormitories. Remove existing Boat Concessioner Housing.
 Convert Power House Dormitory to storage.

Alternative C Area II actions would:

Include these services—

- Employee support facilities
- Food and beverage services
- Retail sales
- Public showers, restrooms and pay phones
- Public shuttle and tours

Upgrade facilities and utilities to comply with life safety, accessibility and building codes.
 Construct new accessible trails and walks.
 Remove guest and employee housing from General Store/Motel/Dormitory building.
 Renovate the General Store/Motel/Dormitory building for public showers/restrooms, public laundry, guest registration and retail.
 Reinforce and raise the existing earth berm behind the General Store/Motel/Dormitory building.
 Modify intersection to campground.
 Increase restaurant capacity with an addition to the existing restaurant.

Alternative C Area III actions would:

Include these services—

- Public boat launch and dock
- Boat tours
- Picnic area

Upgrade picnic facilities and utilities to comply with life safety, accessibility and building codes.
 Construct new accessible trails and walks.
 Replace the boat tour ticketing office out of the high-water zone and relocate employee housing to new dormitory site in Area I.

MANY GLACIER — Alternative C (Preferred)

Alternative C would continue all current services and incorporate most of alternative B. Better separation of employee and guest activities would be provided by relocating employee recreational facilities from the hotel and converting the Lower Dormitory to guest accommodations. The types of available accommodations would remain similar to currently available types. Converting the dormitory would provide the potential for some additional standard, high or deluxe units. New employee housing and recreational facilities would be constructed near the Upper Dormitory, with some additional housing needs accommodated at Swiftcurrent developed area or outside the park.

Alternative C Area I actions would:

Include these services—

- Food and beverage services

- Retail sales
- Visitor conveniences (pay phone, restrooms)
- Boat tours and rentals
- Public shuttle and tours
- Overnight guest accommodations
- Employee housing and support facilities

Upgrade facilities and utilities to comply with life safety, accessibility and building codes.

Upgrade existing trails and walks for accessibility.

Upgrade boat ticket booth.

Rehabilitate approach road, including screening and parking modifications.

Relocate the existing retail services currently provided in the lobby.

Restore historical features to the lobby including the historic stairwell.

Improve service road and pedestrian access to and around the hotel.

Remove most employee housing from the hotel.

Convert several rooms for interpretation of historic functions and services.

Remove employee indoor recreation facilities from the hotel and provide them in Area II.

Prepare a flood evacuation and protection plan.

Alternative C Area II actions would:

Include these services—

- Overnight guest accommodations
- Employee housing and related facilities
- Horseback riding

Upgrade facilities and utilities to comply with life safety, accessibility and building codes.

Upgrade existing trails and walks for accessibility.

Convert Lower Dormitory to guest lodging (approximately 30 rooms) and improve associated parking.

Upgrade existing employee housing in Upper Dormitory.

Construct new dormitory, including indoor recreation facilities, near Upper Dormitory, to accommodate employees from Lower Dormitory and hotel.

Construct employee outdoor recreational facilities.

Actions Outside Areas I and II would:

Improve utility infrastructure (water and wastewater).

Construct information/orientation pull-off on Many Glacier Road.

Upgrade for accessibility the trail around Swiftcurrent Lake, and the connecting trail between Swiftcurrent Lake and Lake Josephine.

Construct additional employee housing at Swiftcurrent or outside the park.

Provide shuttle service for employees.

Tour boats and/or docks serving Swiftcurrent Lake and Lake Josephine would be modified to improve access for the mobility-impaired public.

SITE DESCRIPTION (LAKE MCDONALD LODGE AREA)

The development at Lake McDonald lodge area was part of the earliest effort to provide visitor services. The site is on the west side of Glacier National Park, at the north end of Lake McDonald and adjacent to the Going-to-the-Sun Road. Lake McDonald Lodge was originally constructed in 1914. Early visitors arrived by boat from Apgar, and in 1920 a road was completed to the lodge. Overlooking Lake McDonald, the lodge offered some of the finest amenities available at the time and established a tradition of service, comfort, and interaction with the scenery and resources of the park.

This early “resort” approach used architectural themes that contributed to the Western character of the park and defined an experience that continues today. The Lake McDonald historic district was listed in the National Register of Historic Places in 1976 and the lodge is a national historic landmark.

Services today include: lodging, food service, retail, horseback riding, boat rentals, boat and vehicle tours, public shuttle, and general recreation. The goal of the park is to continue the commercial services necessary to accommodate visitors to the area, as well as maintain the character of this historic district and Lake McDonald Lodge.

SITE DESCRIPTION (RISING SUN AREA)

Rising Sun is located near the eastern entrance to Glacier National Park along the Going-to-the-Sun Road. The concept of the motor inn had been initiated as early as the 1920s by Park Director Stephen Mather, who called for the development of inexpensive accommodations that did not require tipping, dress codes, or lavish furnishings. A decade later, the success of the cabin-style accommodations at Swiftcurrent spurred the National Park Service to request that the Great Northern Railway build additional cabin camps. The Rising Sun Auto Camp was constructed in 1941 and is now an historic district.

Today, the entire complex contains 37 motel rooms and 35 cabins, a Coffee Shop, General Store/Motel/Dormitory, public showers, employee housing, and other support facilities. There is a public boat launch and dock, and boat tours are offered on St. Mary Lake.

SITE DESCRIPTION (MANY GLACIER AREA)

The Many Glacier Valley has one of the most impressive views in Glacier that is easily accessible by vehicles. In 1914, the Great Northern Railway began construction of a hotel on the lakeshore in an architectural style that followed the park’s alpine theme. The hotel provided a comfortable setting, amenities, bus and horseback tours, fine dining, and a spectacular view of the Many Glacier Valley.

The Many Glacier Historic District, including the Many Glacier Hotel (a national historic landmark) and associated outbuildings, are significant historical and architectural representations of the development and use of Glacier National Park. In addition to the hotel, significant structures include the Icehouse, Lower Dormitory, Upper Dormitory, Caretaker House, Jammer Dormitory and Boat Concession Housing.

GENERAL CHARACTERIZATION OF THE NATURE OF FLOODING IN THE AREA
(Note: The following information was taken from a report developed by the NPS, Water Operations Branch, Water Resources Division, 2002)

Lake McDonald Lodge Area

Snyder Creek runs through the Lake McDonald Lodge area. This creek drains about 6.4 square miles and its flood frequency information is shown in "Flood Risk" section. The creek passes under three bridges in the subject reach, under the Going-to-the-Sun Highway (GTS), under an access road just upstream from the lodge, and under a pedestrian bridge just upstream from confluence with Lake McDonald. This reach is suspiciously straight, suggesting channel realignment to provide protection to the lodge. Additionally, portions of the channel banks have been armored with stone. Snyder Creek is a very dynamic stream in this area and can be expected to continue to be difficult to manage. With the placement of bridges and other infrastructure, there is a need to keep the channel in a stable location and configuration. However, this state of stability is very unnatural and incompatible with natural processes and forces. Erosion of the channel banks upstream of the GTS bridge is an example of the natural tendency for the creek to migrate across a large area. In such an environment, protection of infrastructure will almost certainly require periodic manipulation of the channel.

The reach from just upstream of the GTS bridge down to just above the pedestrian bridge (including the access road bridge) was surveyed and simulated using HEC-RAS. The pedestrian bridge is below most development and was, therefore, not analyzed for flood hazard. It was found that the GTS bridge can pass up to about a 30-year flood (1800 cfs) if the bridge opening is unobstructed by debris. The lower bridge can only pass up to about the 15-year flood (1100 cfs). Should woody debris collect in the bridge openings, a likely scenario during a large flood, less capacity would be realized. Sediment deposition does not seem to be a large issue in this reach of Snyder Creek.

Modeling of the 100-year flood, assuming free-flowing bridges, suggests that over-bank flooding may be problematic in several areas. The GTS bridge would be overtopped and likely fail, severing access along that road. Flooding would occur upstream of the bridge due to the backwater effect, but no structures or facilities are located here. Flooding would also occur immediately upstream of the lower bridge, however, modeling suggests that the residences on the left bank (looking downstream) would not be inundated during the 100-year flood. Over-bank flooding would occur for at least 150 feet or so downstream of the lower bridge, as illustrated in Figures 1 and 2. This means that the buildings on the left bank in this area should be considered to be within the 100-year floodplain. The lodge building itself is out of the 100-year flood, assuming no blockage of the bridge. If the bridge were to fail, buildings downstream on the left bank would still be flooded during a 100-year flood, but risk to the lodge would be diminished. In this case, over-bank flooding upstream of the bridge is also somewhat reduced.

Should the lower bridge become obstructed, the likelihood of flooding into the lodge building itself increases substantially. The best means to avoid this problem would be to construct a much larger bridge at this crossing, but this may not be possible due to adverse affects on the historic scene. To reduce the probability of debris collecting on the existing bridge, the park could remove large downed wood from (and near) the channel upstream of bridges. This action would provide some additional protection to the lodge and surrounding area, however, during a flood event, large quantities of wood would continue to be supplied to the system through erosion of banks. The preferred alternative includes accepting risk to structures and minimizing risk to humans by evacuation of the site during times of potential flooding. An evacuation plan for the area currently exists and would be updated regularly as necessary to ensure the best protection is provided.

Figure 1: Snyder Creek cross-section downstream of access road bridge

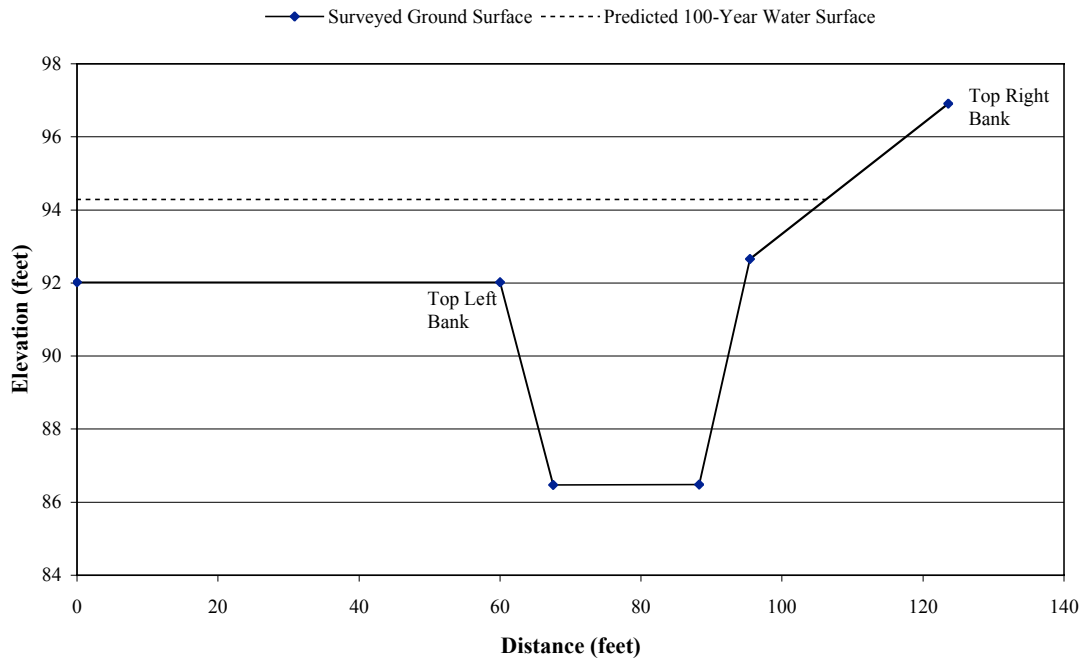
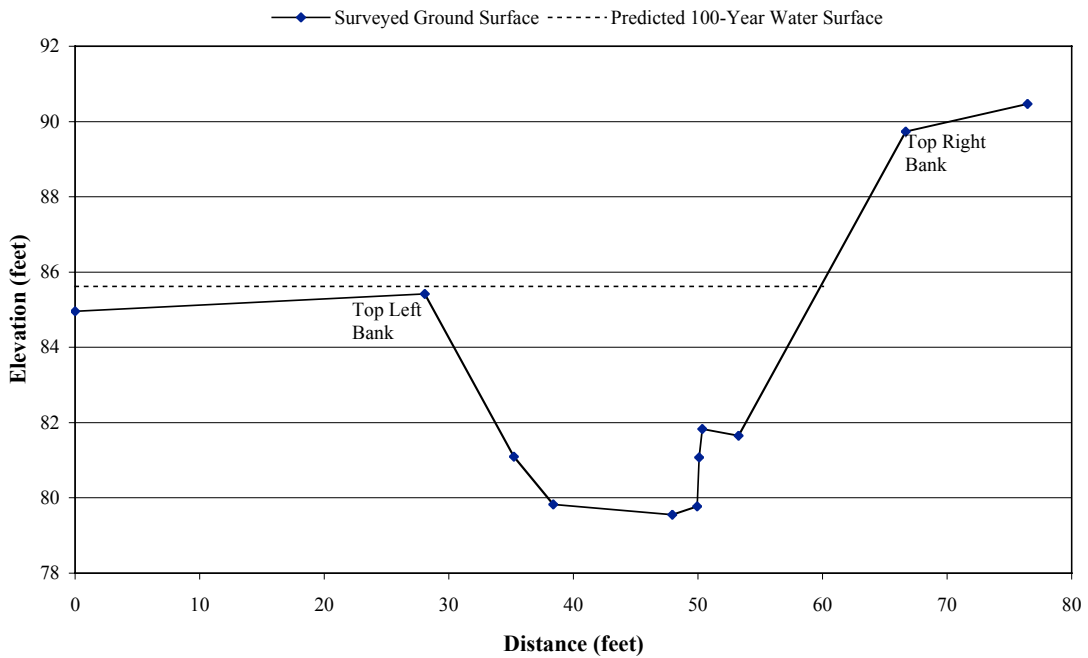


Figure 2: Snyder Creek cross-section 130 feet downstream of access road bridge



Rising Sun Developed Area

Two areas were investigated in the Rising Sun developed area, the bermed reach behind the General Store/Motel/Dormitory (General Store) and the embankment beneath the historic Power House Dormitory. Rose Creek flows through this area and drains about 8 square miles. Flood frequency information for Rose Creek at the Rising Sun developed area is shown in “Flood Risk” section. It appears that the channel upstream of the General Store area has been realigned in the past to reduce erosional pressure on the embankment beneath the several cabins located upstream of the Power House Dormitory. We cannot be sure of the reason for the realignment, but believe that this work was done some time within the past few decades. An earthen berm is located where the channel is closest to the back end of the General Store. We believe it was constructed at the same time or following the channel realignment in response to observed or predicted increased flooding potential to the General Store. The channel realignment also may have caused increased erosional pressure on the channel embankment below the Power House Dormitory.

Two cross sections were surveyed in the reach near the Rising Sun General Store (Figures 3 and 4). One cross section was shot across the existing earthen berm and the other in the area just upstream of the berm where sandbags have been placed to fill a low area. Hydraulic modeling indicates that the existing berm would be over-topped with a flow slightly less than the 100-year flood. Adding one-half foot to the berm would provide 100-year protection. The sandbagged reach would be over-topped with a flow greater than the 10-year event if the sandbags were removed and at about the 25-year flow with the sandbags in place. A berm of about 2.5 feet in this area would provide 100-year protection. Channel aggradation and/or lateral erosion are other factors to be aware of in this reach of Rose Creek. Given our belief that the channel has been realigned upstream, the creek can be expected to make adjustments downstream in response to the changes upstream. If deposition occurs in the channel near the bermed reach, the predicted flood susceptibility described above will no longer apply. Under this circumstance, flooding would be expected to occur more frequently and with greater consequence than predicted above.

Given this information, the following has been recommended in the reach of Rose Creek near the Rising Sun General Store: add about one-half foot of height to the existing levee (see Figure 3). The berm should be continued upstream through the area now filled with sandbags and tied into the hill slope to make a continuous barrier to flow. The new portion of the berm should have a top-elevation that slopes upstream at about the same slope as the channel and have a total height of about 2.5 feet (see Figure 4). The entire berm should be armored to prevent failure by erosion during a flood event. If armor is not provided, observation of the berm during flooding should be made and, if needed, sandbags or rock placed to arrest erosion if it is occurring. Also, it is recommended that excavation of sediment be performed periodically if deposition occurs in the channel.

Upon inspection, the Power House Dormitory appears to be at immediate risk due to likely failure of the embankment during a large flood event. There are two fundamentally different means of providing protection to the structure: 1) armor the embankment or 2) move the channel away from the embankment. Armoring could be accomplished by using rip rap or a “softer” bio-engineering approach. In either case, the channel would need to be somewhat filled-in to provide a suitable slope to apply the revetment material. This can often be accomplished by “laying back” the slope to achieve the necessary slope. In this case, the embankment cannot be cut back because of the proximity of the dormitory. If fill were needed in the channel, it would be necessary to excavate the opposite bank of the creek to provide sufficient flow area. A row of young cottonwood trees would need to be removed in this case. Channel realignment may or may not be feasible in this case. As stated above, the channel has apparently already been moved in the past and we are not sure that a stable channel

configuration can be achieved with further manipulation. The preferred alternative includes accepting risk to structures and minimizing risk to humans by evacuation of the site during times of potential flooding. An evacuation plan for the area currently exists and would be updated regularly as necessary to ensure the best protection is provided.

Figure 3: Rose Creek cross-section in area with berm behind store

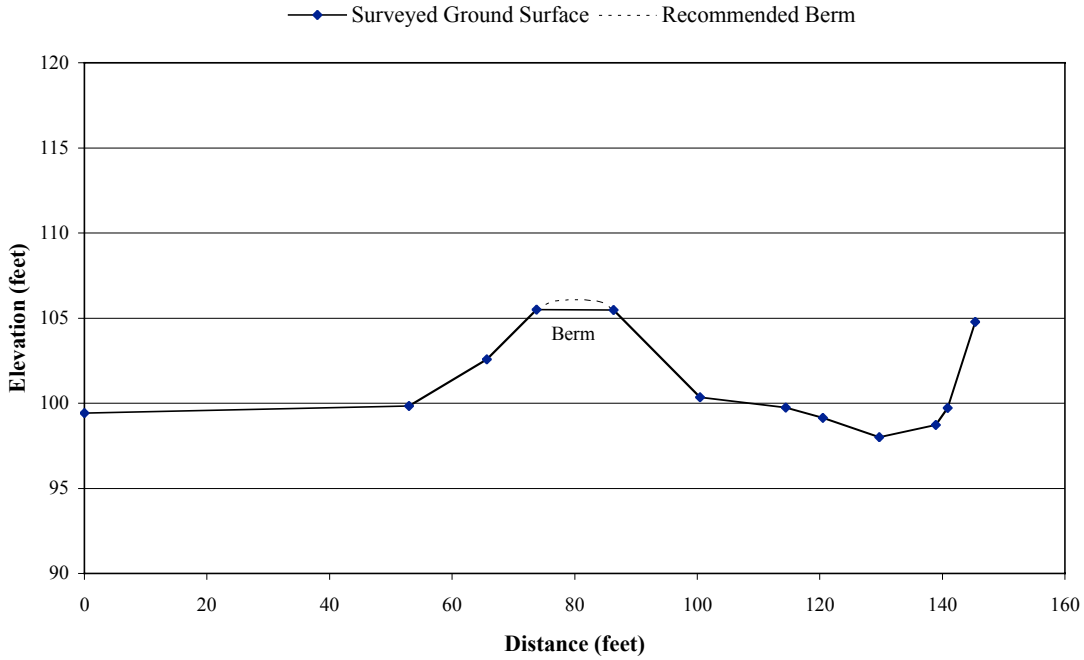
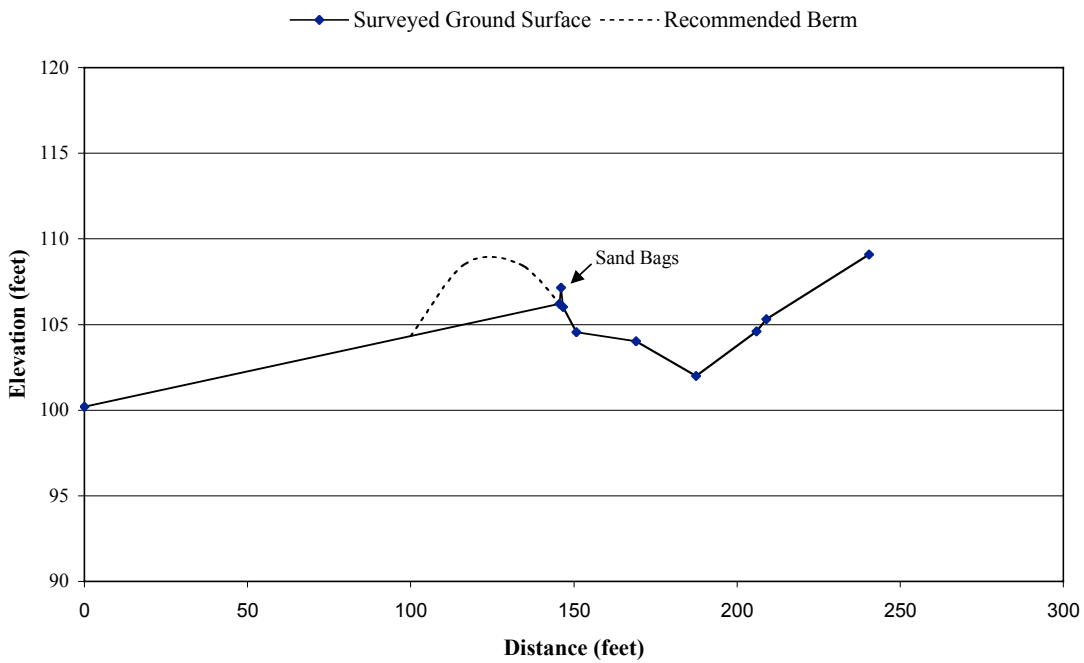


Figure 4: Rose Creek cross-section in area with sand bags



Many Glacier Hotel

Flooding at the Many Glacier Hotel would occur from high lake levels in Swiftcurrent Lake, large waves, or (most likely) a combination of both. Swiftcurrent Lake is not wide and therefore the fetch is limited and it can be assumed that wave heights are limited. The frequency of lake levels high enough to be close to the foundation level of the hotel was analyzed by investigating the lake level record collected by the US Geologic Survey. Lake level frequencies were estimated by using the Weibull plotting position method and are shown in Table 1. The elevation of the threshold of the door facing the lake was reported to be 4884.17 feet msl. This elevation corresponds to a lake level with a frequency of between the 25- and 50-year levels. Therefore, it is estimated that the Many Glacier Hotel is located at approximately the 35-year flood elevation, well within the 100-year floodplain.

Table 1. Recurrence Intervals in years estimated by Weibull plotting position for Swiftcurrent Lake water surface elevations (stage) in feet.

Recurrence Interval	Stage (ft)
10	4882.6
25	4883.8
50	4884.7
100	4885.8
500	4889.1

JUSTIFICATION FOR USE OF THE FLOODPLAIN

Why the Proposed Action Must Be Located In The Floodplain

There are four main reasons why the National Park Service is proposing to continue occupation of the development within the floodplain at Lake McDonald, Rising Sun and Many Glacier.

1. The National Park Service has a substantial investment in infrastructure as well as facilities in these areas, beginning as early as 1910.
2. All three of these areas are historically significant and contain national historic landmarks, national register properties and national historic districts.
3. The topography and landscape of Glacier National Park does not provide safe alternative locations for these functions and facilities.
4. The preferred alternative does not propose new development outside of these developed areas (thereby developing currently undeveloped areas).

Procedural Manual #77-2 does not apply to historic or archeological structures, sites, or artifacts whose location is integral to their significance. They are considered “excepted actions” under Executive Order 11988.

Investigation of Alternative Sites

Glacier National Park has looked at alternative sites out of the developed area floodplains throughout the development of the Commercial Services Plan. Changing geomorphic conditions and rapid aggregation zones in Glacier National Park mean that places that are “safe” today may not be “safe” in the future. However, where feasible, employee and/or visitor overnight accommodations have been

moved outside of the floodplain. In those instances where it is not feasible to locate outside of the floodplain, appropriate measures would be taken to protect life safety (the number one priority) and values at risk. Brief descriptions of actions proposed have been included at the beginning of this *Statement of Findings*. For a more detailed description of the preferred alternatives, please see the *Draft Commercial Services Plan and Draft Environmental Impact Statement*.

DESCRIPTION OF SITE-SPECIFIC FLOOD RISK

The National Park Service acknowledges that many of the existing and proposed structures are within the regulatory floodplain. The preferred alternatives have been selected in consideration of these risks. The likelihood of a life-threatening flood is low, based on the analysis conducted by the National Park Service Water Resources Division. The most hazardous hydraulic conditions are present at Rising Sun and Lake McDonald. The hydraulics is not significant at Many Glacier. Most of the areas studied are geomorphically very dynamic, with unstable fluvial systems present. Due to a general lack of “good” development locations in Glacier National Park, much of the park’s infrastructure is located in problematic settings. Therefore, managing flood hazard would require designing and maintaining desired flow conveyance in developed areas. The challenge of structurally managing flood risk is doing so with sensitivity to natural processes and resources.

Opportunity for Evacuation of Site in the Event of Flooding: Geomorphic Considerations

The preferred alternatives for Lake McDonald and Rising Sun call for evacuation plans to be developed to ensure protection of visitors and employees in the event of a flood. It should be noted that the nature of flooding in these areas would enable early detection and evacuation of a site to occur prior to an event. Furthermore, there are safe locations where people could be moved without putting them at greater risk. At Lake McDonald, people could be moved easily towards West Glacier and/or the Headquarters Area. At Rising Sun, people could be easily evacuated to St. Mary. Although evacuation plans exist now, they would be annually reviewed and updated.

DESCRIPTION OF HOW THE ACTION WILL BE DESIGNED OR MODIFIED TO MINIMIZE HARM TO FLOODPLAIN VALUES OR RISK TO LIFE OR PROPERTY

The following actions would be taken to mitigate the effects of continuing to use existing and proposed new development in the Lake McDonald, Rising Sun and Many Glacier regulatory floodplains.

1. Flood control structures in these areas would be improved and maintained.
2. A warning and evacuation system would be maintained and updated as necessary.
3. Flood warning and evacuation are feasible because the nature of flooding in these areas would provide enough lead-time to evacuate, and there are safe places to move people without putting them at further risk.
4. Wood and other debris would be removed from the bridges to maintain continued flow of Snyder Creek and Rose Creek. The berm adjacent to Rose Creek would be raised and maintained to assure protection of the Rising Sun General Store.
5. The channels of Snyder Creek and Rose Creek through the developed areas would be maintained as necessary.

SUMMARY

The preferred alternatives in Glacier National Park's Commercial Services Plan (CSP) include the maintenance, rehabilitation, and construction of National Park Service and concession facilities in the Lake McDonald (Lodge area), Many Glacier (Hotel area) and Rising Sun developed area. Essential services, visitor services and park functions must continue to operate within these areas. The changes are intended to minimize the impacts on the floodplains and hydrology of the Lake McDonald, Many Glacier and Rising Sun areas.

The National Park Service has a substantial investment in the infrastructure as well as the facilities in these areas dating from as early as 1910. All three of these areas are historically significant and contain national historic landmarks, national register properties and national historic districts. The topography and landscape of Glacier National Park does not provide good, safe alternative locations for these functions and facilities, and the preferred alternative does not propose new development outside of these developed areas (thereby developing currently undeveloped areas). All new facilities and improvements would be designed to be compatible with the historic district and would take into consideration sustainable design guidelines and "flood-proofing." The project locations and design would avoid, minimize or reduce adverse impacts on natural resources and adverse effects on cultural resources.

To minimize the risk to human life, the following actions would be taken:

1. Flood control structures in these areas would be improved and maintained.
2. A warning and evacuation system would be maintained and updated as necessary.
3. Flood warning and evacuation are feasible because the nature of flooding in these areas would provide enough lead-time to evacuate, and there are safe places to move people without putting them at further risk.
4. Wood and other debris would be removed from the bridges to maintain continued flow of Snyder Creek and Rose Creek. The berm adjacent to Rose Creek would be raised and maintained to assure protection of the Rising Sun General Store/Motel/Dormitory.
5. The channels of Snyder Creek and Rose Creek through the developed areas would be maintained as necessary.

The impacts of the new buildings, roads, parking lots and other associated facilities proposed on the floodplain would have minimal impact on increased flooding in the area. When added to the existing development in the area, the cumulative impact would have a minor, negative impact on the Lake McDonald Lodge, Many Glacier and Rising Sun floodplains and hydrology.