United States Department of the Interior

NATIONAL PARK SERVICE
PO Box 168
Yellowstone National Park
Wyoming 82190

IN REPLY REFER TO:

November 22, 2004

To: Superintendent, Assistant Superintendent, Division Chiefs, Branch Chiefs, and Other Interested Parties

From: Outdoor Recreation Planner

Subject: Internal Review of the *Madison Wastewater Treatment Plant EA*

The final draft of the *Madison Wastewater Treatment Plant EA* is attached. Please review and/or distribute to appropriate staff. If you need additional copies, call me at x2703 and I'll forward one to you.

Please send all comments to me by **Friday, December 17**. If I do not hear from you, I will assume that you have no concerns with the document.

Thank you for your time and expertise.

Mike

Mike Yochim

Enclosure

National Park Service
U.S. Department of the Interior
Yellowstone National Park

November, 2004

Environmental Assessment

Madison Wastewater Treatment Plant



NOTE TO REVIEWERS AND RESPONDENTS

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. This environmental assessment will be available for public review for 30 days. Please note that names and addresses of people who comment become part of the public record, which is available (including names and home addresses of respondents) for public review during regular business hours. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment**. We will make all 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.

Comments are due December 17, 2004, and should be addressed to:

Superintendent
Attn: Management Assistant's Office
Madison Area Wastewater Treatment Project
P.O. Box 168
Yellowstone National Park, WY 82190

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INTRODUCTION

On March 1, 1872, the U.S. Congress took a bold step into conservation history by creating the world's first national park, Yellowstone. Congress stipulated that the park was "dedicated and set apart as a public park or pleasuring ground for the benefit and enjoyment of the people," and "for the preservation from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders... and their retention in their natural condition" (U.S.C. 16, Section 22; 17 Stat. 32). These words, engraved on the park's historic Roosevelt Arch, provide inspiration to conservationists and park managers worldwide.

Indeed, Yellowstone's wonders are famous, and worthy of protection. The park contains the world's greatest collection of geothermal features, including more geysers than the rest of the world combined. An outstanding mountain wildland with clean water and air, Yellowstone protects grizzly bears, wolves, the greatest herd of elk in the country, and our only continuously free-ranging herd of bison. Complementing Yellowstone's wildness is its history; the National Park Service today protects many historic and archaeological sties that reflect the park's unique heritage. Park managers today strive to protect these resources for the enjoyment, education, and inspiration of this and future generations.

Congress charged the National Park Service with its now-famous dual mission: "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Providing effective sewage treatment for the 3 million annual visitors to Yellowstone is crucial to both accommodating the visitors while also protecting them and park resources. Today, Yellowstone National Park contains five sewage treatment facilities with another currently being constructed. All but one of the existing plants have been recently rebuilt or modernized; the plant at Madison Junction is the exception.

PURPOSE AND NEED

The National Park Service (NPS) is proposing to replace most of the wastewater treatment system that serves the Madison Junction area of Yellowstone National Park. The existing wastewater treatment system is aging, and at risk of complete failure.

The expected useful life span of wastewater treatment facilities is 20 to 30 years. The current Madison wastewater plant was built around 1959, exceeding the useful life by several years. The system's original treatment methods and equipment have not worked well with Yellowstone's extreme climate and variable seasonal uses. Park managers therefore modified the plant in 1966, 1974, and 1984, but today the plant's equipment is worn out and a major failure could happen at any time. The treatment is marginal during the summer season, and the plant is not capable of running from October to May, despite about 87,000 visits by winter tourists (the sewage is stored during this season; see below). The system has no backup power or overflow tanks to handle the sewage flow during equipment failure or power outages. Both of these situations occur occasionally and the partially treated sewage runs to a meadow to the west (the sewage does not reach the river). The plant's aging equipment make maintenance costs increasingly expensive.

Furthermore, the existing plant provides only secondary sewage treatment, while national parks are required to provide tertiary treatment to their wastewater, as mandated by recent code changes by the Environmental Protection Agency (EPA) (40 CFR 437; Chapter 16, Wyoming State Water Quality Regulations). Tertiary treatment is the reduction of nitrogen and phosphorus, which are both known to cause eutrophication (algae blooms) when wastewater high in them is released to nearby surface waters. While working secondary facilities such as Madison's are grandfathered into the code changes, extensive renovations to such facilities require improvement to tertiary cleaning. Therefore, renovations to the existing plant would not be cost-effective.

Existing Conditions

The existing Madison wastewater treatment plant serves the Madison campground, the National Park Service employee housing and maintenance area, and the Madison picnic area, and is about a half-mile (1 k) west of Madison Junction. The campground contains 292 sites and fourteen restroom buildings with flush toilets and cold-water sinks. Approximately thirty NPS and Xanterra personnel reside in the housing area in summer, with about fifteen staff living there in winter. Both summer and winter resident populations are roughly double what they were ten years ago.

Currently, a lift station in the tent loops of the campground and another at the nearby picnic area pump wastewater to a primary collection main in the campground. From there, the sewage flows via gravity to the existing plant, where it meets the wastewater from the government area, which also flows via gravity in a separate line. There, the wastewater receives primary treatment, which is the removal of suspended solids. Solids are then dried and landfilled. The wastewater then receives secondary treatment, which is the reduction of biochemical oxygen demand, or BOD. This is a measure of the amount of oxygen needed by bacteria and other microorganisms to oxidize the organic matter present in a water sample over a period of 5 days. The BOD of drinking water should be less than 1 ppm (parts of O_2 per million parts of water), while that of raw sewage may run to several hundred ppm. Finally, a third lift station pumps the now treated wastewater up to two percolation ponds, where the treated effluent sinks into the ground and/or evaporates. In winter, the treatment plant and campground lift station are shut down, with the remaining two lift stations pumping the wastewater up to a storage pond adjacent to the two percolation ponds. This sewage is then treated when the facility reopens in spring.

The Madison area is popular in summer, with about 61 percent of the approximately 2.8 million Yellowstone visitors stopping at the Madison museum, picnic area, or campground (Littlejohn, Dolsen, and Machlis 1990). The picnic area's restrooms are particularly popular with bus tours, as the restrooms are full-service (i.e. not pit toilets). The campground is popular as well, with up to 1,200 visitors staying overnight at any given time.

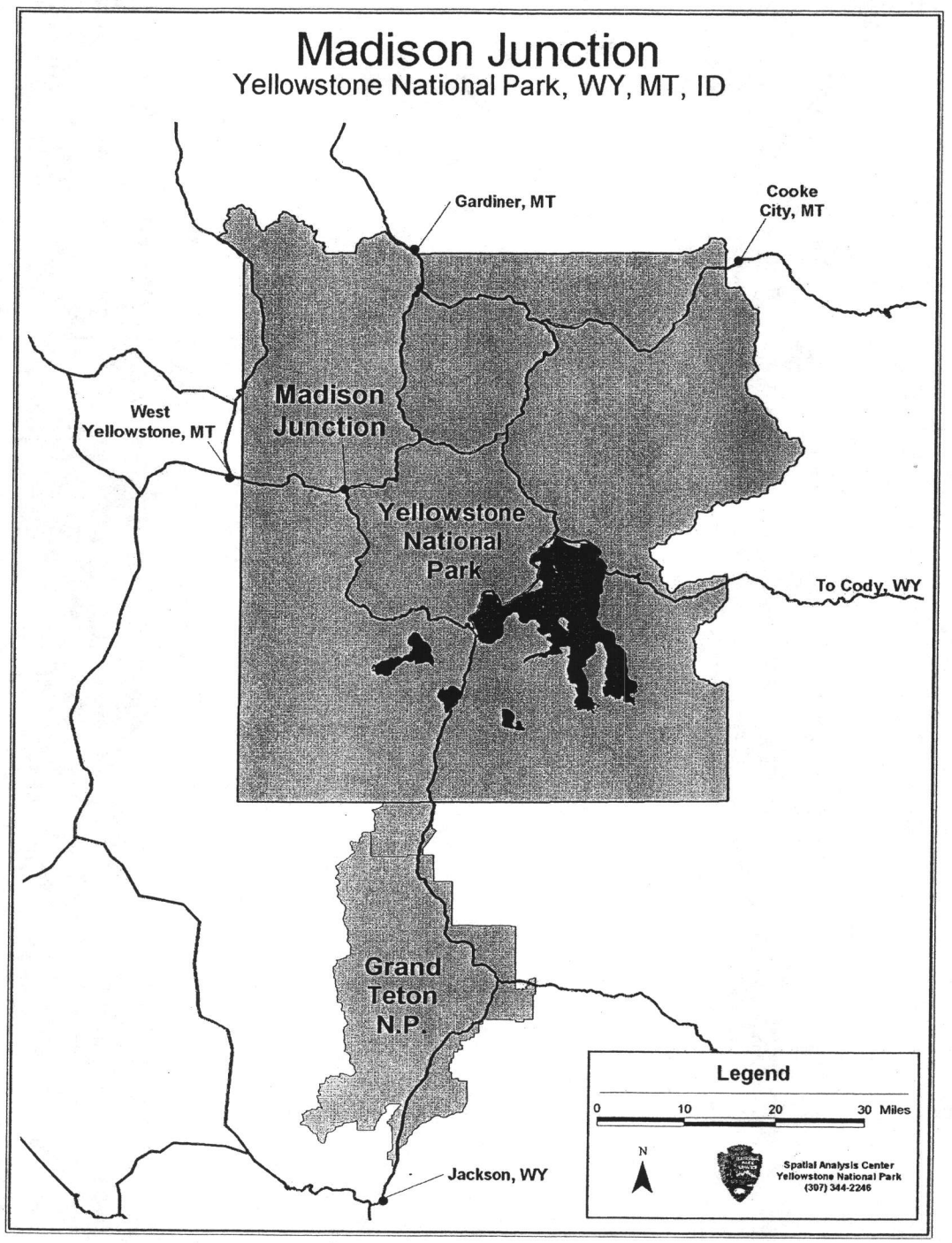
In the winter months, approximately 62 percent of the 90,000 to 120,000 seasonal visitors (Littlejohn 1996) stop at Madison Junction. Madison is one of only three locations in the park interior which provide food service and full-service restrooms in winter. Additionally, its geographic location makes it popular with winter visitors on their morning and afternoon tours to and from Old Faithful (see Map 1).

The National Park Service has considered building a laundry and shower building for the Madison campground, because the nearest such facilities are at Canyon, twenty-six miles to the northeast and inconvenient for most campers. Construction of such facilities is contingent upon 1) procuring the necessary funding; 2) finding a suitable site (the geography of the Madison area restricts available sites, often due to archaeological concerns); and 3) increasing the water storage capacity at Madison (the current storage reservoir is inadequate for laundry and shower needs). If no suitable site can be found for the shower/laundry building, enlarging some or all of the existing restroom facilities to include shower stalls is a possibility. Either possibility—a new building or enlargements of the existing restrooms—would both add to the volume of the existing wastewater stream and also be made feasible by a new, enlarged wastewater treatment plant

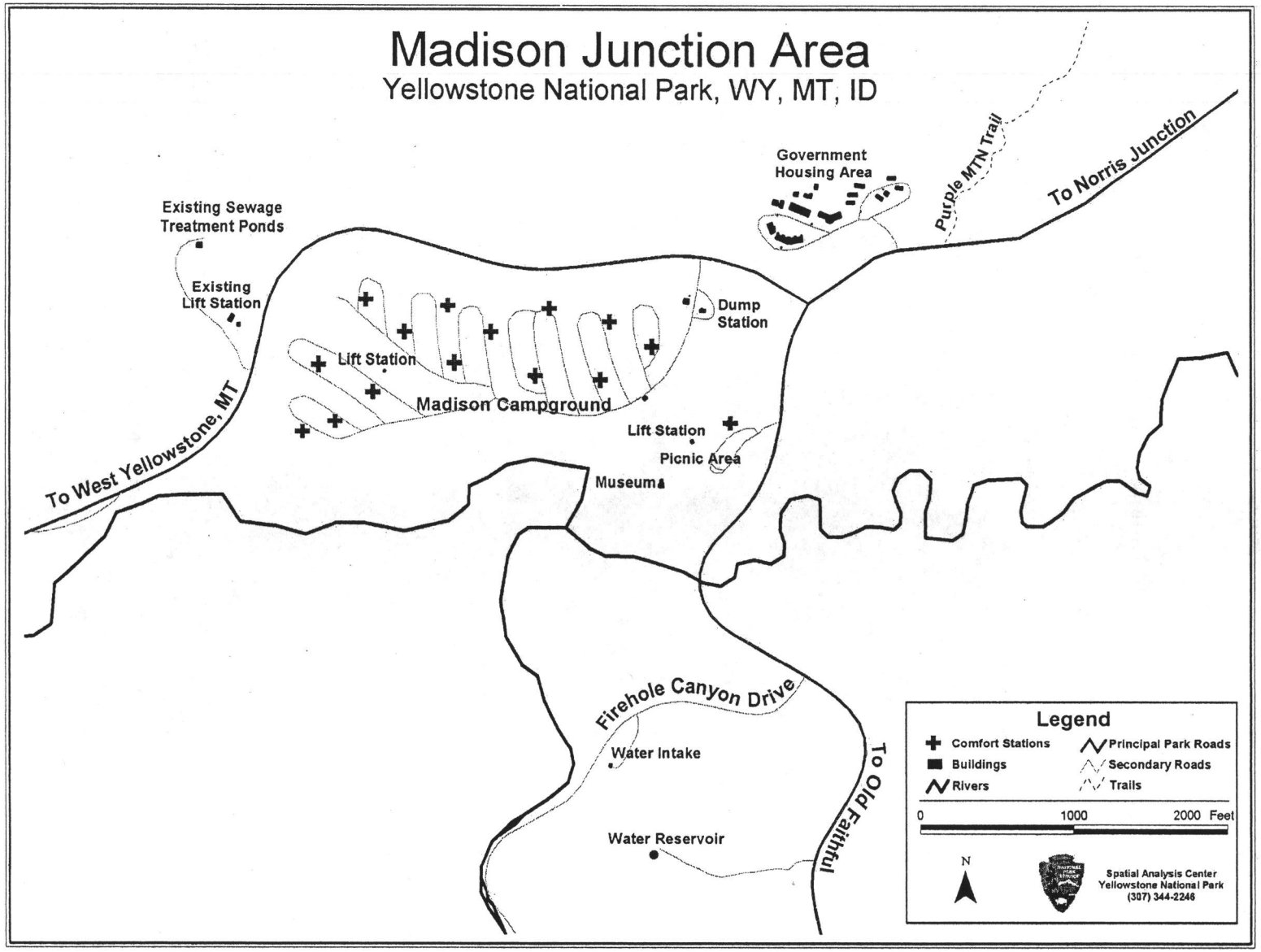
Scoping

Scoping to identify issues, concerns, and alternatives about the proposed Madison Sewage Treatment Plant began in late August 2002 with a mailing to previously identified interested parties asking for help in identifying such issues and concerns. The scoping letter was also posted on the Internet. Scoping ended September 30, 2002. Two comment letters were received, both from state or federal agencies expressing support for the project, with no additional impact topics suggested.

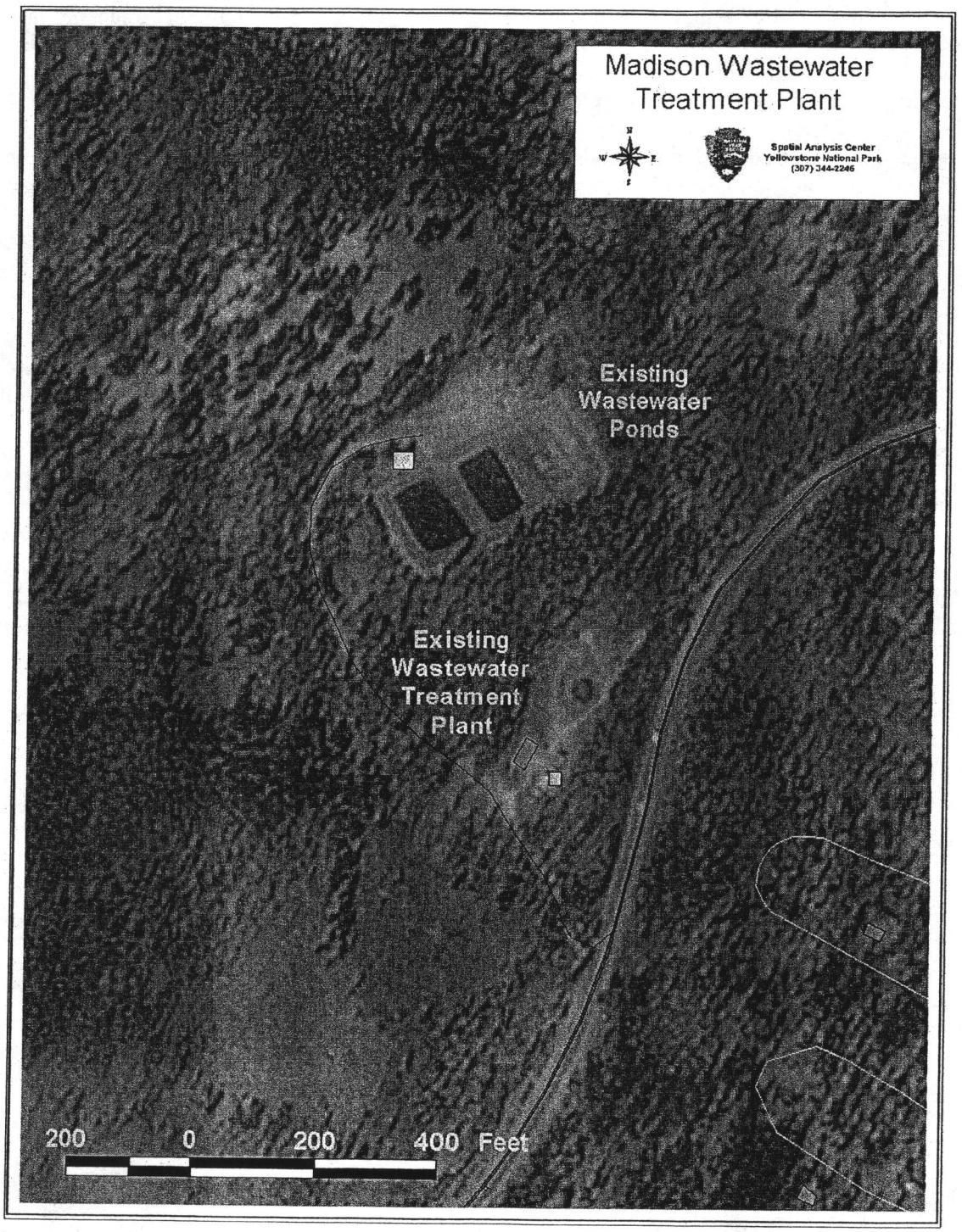
Map 1: Greater Yellowstone Area, showing the project location.



Map 2: Madison Junction Area, showing relation of existing treatment plant and ponds to campground and other developments.



Map 3: Madison Wastewater Treatment Plant, Aerial View.



IMPACT TOPICS

Comments received during public scoping, from specialists in the National Park Service, and other federal and state agencies identified issues and concerns affecting the proposed action. Impact topics are the resources of concern that could be affected by the range of alternatives. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. The following impact topics were identified on the basis of federal laws, regulations, orders, and National Park Service *Management Policies* (2001): geology and soils, vegetation and rare plants, wildlife, threatened and endangered species, wetlands and other waters of the United States, air quality, visual quality, lightscapes, and soundscapes; historical and archaeological resources; socioeconomic resources and visitor use and experience.

Impact Topics Dismissed from Further Consideration

Floodplains

Executive Order 11988, *Floodplain Management,* requires all federal agencies to avoid construction within the 100-year floodplain unless no other practical alternative exists. Because the proposed site for the sewage treatment plant is outside the 100-year floodplain, this topic was dismissed from further consideration. A Statement of Findings for floodplains will not be prepared.

Wetlands and other waters of the United States

Large areas of sedge and hairgrass-dominated wetlands occur on both sides of the Madison River in the Madison Junction area. Beaked sedge (*Carex utriculata)* occupies large portions of the wetland. Baltic rush (*Juncus balticus*), fowl bluegrass (*Poa palustris*), three stamen rush (*Juncus ensifolius*), and ball-head groundsel (*Senecio sphaerocephalus*) make up much of the remaining vegetative cover. A rare plant, *Carex flava,* or yellow sedge, grows in a small wetland on the northeast corner of the site.

National Park Service staff surveyed the vicinity of the Madison wastewater plant and determined the locations of several small wetlands. The site boundaries for the proposed plant were then altered to completely avoid the wetlands (including the site of yellow sedge), and marked on the ground. Consequently, neither alternative would result in the destruction of wetlands (Hektner 2004), and this topic was dismissed from further consideration. Park staff will monitor any construction to insure that the limits of disturbance do not change and inadvertently directly or indirectly (by changing the groundwater flow) affect the wetlands.

Prime and Unique Farmlands

In August 1980, the Council on Environmental Quality (CEQ) directed that federal agencies must assess the effect of their actions on farmland soils classified by the U.S. Department of Agriculture's Conservation Service (NRCS) as prime or unique. Prime farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to the NRCS, none of the soils in the project area are classified as prime and unique farmlands. Therefore, this topic was dismissed as an impact topic in this document.

Water Resources and Water Quality

The Madison River forms about ½ mile south of the project site, where the Firehole and Gibbon Rivers join. Both tributaries arise about twenty miles away as cold, subalpine, spring-fed streams. As they flow toward Madison Junction, though, both rivers receive significant amounts of geothermally-warmed waters, which are rich in iron, sulfur, and other chemical compounds. The addition of this warm, mineral-rich water stimulates floral and faunal productivity, so that the two rivers and the Madison are some of the

most productive rivers in the park. The fishes in these rivers (all introduced species above Firehole and Gibbon Falls) have adapted to the thermal influxes by summering in cold water tributaries and spawning in late fall or winter. The spring melt-off brings the coldest water to both rivers (Armitage 1958).

Two very small, unnamed creeks border the project site, on the east and west sides. The creek on the east side is about six inches wide, and that on the west side about a foot wide. The eastern creek disappears underground just before reaching the West Entrance Road, while the western creek flows into a medium-sized wet meadow on the southwest corner of the site.

What few sewage spills do occur at this plant are small and always contained before reaching open water. This situation would not change under either proposal in this document. Further, neither proposal would impact the two tiny streams bordering the project area. With impacts on water resources and water quality expected to be negligible under either alternative, this impact topic was dismissed from further consideration.

Geologic Resources

The Madison Wastewater Plant is in an area of unconsolidated glacial and erosional sediments that are fairly common in Yellowstone and the Northern Rockies. No thermal features are near or within the project area, and no unusual geologic resources are near or within the project area. Because either alternative would have negligible effects on geologic resources, this impact topic was dismissed from further consideration.

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 the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The proposed action would not have health or environmental effects on minorities or low-income populations or communities as defined in the Council on Environmental Quality's "Environmental Justice: Guidance under the National Environmental Policy Act" (CEQ 1998). Therefore, environmental justice was dismissed as an impact topic.

Indian Trust Resources

Indian trust assets are owned by Native Americans but held in trust by the United States. Requirements are included in the Secretary of the Interior's Secretarial Order No. 3206, "American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and the Endangered Species Act," and Secretarial Order No. 3175, "Departmental Responsibilities for Indian Trust Resources." The Bureau of Indian Affairs (BIA) and the National Park Service have formed a joint agency, the National Interagency Fire Center (http://www.fire.nps.gov/bia), to handle wildfire management on Indian trust lands based on fire management plans approved by the Indian landowner. According to NPS personnel, Indian trust assets do not occur within Yellowstone National Park.

Cultural Landscapes

According to the National Park Service's *Cultural Resource Management Guideline* (NPS 1997:8), cultural landscapes are "settings we have created in the natural world. They reveal fundamental ties between people and the land—ties based on our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Landscapes are intertwined patterns of things both natural and constructed: plants and fences, watercourses and buildings. They range from formal gardens to cattle ranches, from cemeteries and pilgrimage routes to village squares. They are special places: expressions of human manipulation and adaptation of the land." Cultural landscapes

provide a visual chronicle of an area's human history. Human developments may occur spontaneously, such as for a vernacular landscape, or formally, such as for a historic designed landscape.

Adjacent to the area of potential effect is one identified cultural landscape, the West Entrance Road, which was built as part of the designed, planned road system. Although the road's configuration has changed many times over the years, variations in road alignment adhere to the original purpose or function of the road. The entrance roads connect to the Grand Loop Road, which leads to the most important scenic features and wonders of Yellowstone.

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5 Assessment of Adverse Effects), the National Park Service concludes that selection of either alternative would have no adverse effect on the cultural landscape of the West Entrance Road Historic District. The NPS will ensure that any proposed development does not adversely affect the qualities that make the area a cultural landscape. Because this project is not expected to affect the West Entrance Road cultural landscape, this impact topic was dismissed from further consideration.

Ethnographic Resources

The NPS defines ethnographic resources as "the cultural and natural features of a park that are of traditional significance to traditionally associated peoples" (NPS 2001:57).

For at least the last 10,000 years Native Americans occupied the greater Yellowstone area. A number of tribes were historically present in the area on at least a seasonal basis. These tribes may have included the Blackfeet, Crow, Kiowa, Nez Perce, Salish, and Shoshone-Bannock. During the early and middle 19th century, Euro-American explorers documented occupation of areas with the park by a band of Shoshone Indians known as the Sheepeaters.

Today the tribes who are affiliated with Yellowstone National Park, and with whom consultation occurs on a semi-annual basis, are (in addition to the tribes listed above): Assiniboine and Sioux Tribes; Cheyenne River Sioux Tribe, Cour d'Alene Tribe; Crow Creek Sioux Tribe, Flandreau Santee Sioux Tribe, Gros Ventre & Assiniboine Tribes; Lower Brule Sioux Tribe, Northern Arapaho Tribe; Northern Cheyenne Tribe; Oglala Sioux Tribe, Rosebud Sioux Tribe, Sisseton-Wahpeton Sioux Tribe, Spirit Lake Sioux Tribe, Standing Rock Sioux Tribe, and Yankton Sioux Tribe.

An ethnographic overview of Yellowstone National Park was completed in September 2000 and was published in 2002. The overview did not identify ethnographic resources specifically associated with the Madison area, but did identify one historic trail that passed near the area, the Nez Perce (Nee-Me-Poo) National Historic Trail. This trail was taken in 1877 by approximately 700 Nez Perce Indians, who led the U.S. Army on one of the greatest chases in military history. This group of men, women, and children passed through Yellowstone National Park on their flight, skirmishing three times in the park with early park visitors. After brilliantly eluding the Army for over 1,200 miles, they were forced to surrender in October at the Bearpaw Mountains in northern Montana. Their route into the park followed the Madison River up to and along the Firehole River to Nez Perce Creek, which they followed up and across Mary Mountain. While portions of the route they took through Yellowstone are uncertain, it is fairly certain that they passed through the Madison area. Today their route is memorialized as the Nez Perce (Nee-Me-Poo) National Historic Trail. Visitors traveling into Yellowstone from the West Entrance follow this trail for most of the way to Old Faithful (Nabokov and Loendorf 2002). Congress designated it a nationally-significant trail in 1996.

Affiliated tribes have been consulted, and no specific concerns regarding ethnographic resources have been identified for the project area. Because the immediate Madison area has not been identified as having or being one of these or other ethnographic resource(s), and construction of this alternative would

occur on previously impacted land within the developed footprint of the wastewater treatment plant area, this project is expected to have no or negligible impacts on ethnographic resources. Therefore, this topic was dismissed from further consideration.

In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed. Additionally, the National Park Service will ensure that each tribe traditionally associated with the lands of Yellowstone receives a copy of this EA for review and comment. If any tribe identifies ethnographic resources that this project would impact, the NPS will consult with the tribes to mitigate such impacts. The location of any such ethnographic sites would remain confidential.

ALTERNATIVES CONSIDERED

Alternative 1: No Action

The Council on Environmental Quality provides two definitions for no-action alternatives: (1) no action for plans is no change from current management direction (a snapshot in time projected into the future), a continuation of existing conditions and activities without a particular planning context; or (2) no action for projects is to not do the project (Council on Environmental Quality, "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" (40 CFR 1500-1508, *Federal Register* Vol. 46, No. 55, 18026-18038, March 23, 1982: Question 3).

In this case the no-action alternative is to continue use of the existing sewage treatment plant; the NPS would not construct a new plant.

Use of the existing sewage treatment plant would continue without significant modifications. No trees or vegetation would be removed and no additional structures would be built. Frequent repairs would be expected to maintain the deteriorating lift stations, wastewater treatment equipment, and pumps. There would probably be increased maintenance required to minimize the potential of catastrophic failures in the future. General routine maintenance and occasional minor modifications to maintain operations would occur with the existing systems. Future proposals to provide showers or additional comfort stations at Madison Campground would also need to address an enlarged wastewater treatment plant in addition to expanded water storage capacity.

Table 1: Comparative Summary of Alternatives and Extent to Which Each Meets the Project Objectives

	Alternative 1: No Action	Alternative 2: Preferred Alternative
Summary of Alternatives	NPS would continue use of existing wastewater treatment plant.	NPS would construct new wastewater treatment plant at Madison. Existing roadside facilities, except the lift station, would be removed, while new wastewater treatment building, aeration basin, and sludge settling pond and drying bed would be constructed at site of existing percolation ponds.
Project Objectives		
Provide improved sewage treatment.	Because existing plant is aging and in danger of failure, alternative would not accomplish this objective.	New sewage treatment plant would provide partial tertiary treatment. Modern facility would have several safeguards against failure.
Improve visitor services.	The danger of plant failure, along with continuing sight, sound, and smell pollution mean that this alternative would not accomplish this objective.	The modern facility proposed under this alternative would reduce sight, sound, and odor problems and have several safeguards against failure. Therefore, this objective would be accomplished.
Protect park resources.	Danger of potential sewage leaks means that this alternative would not accomplish this objective.	The proposed new facility would prevent sewage spills and would therefore accomplish this objective.

Alternative 2: Preferred Alternative

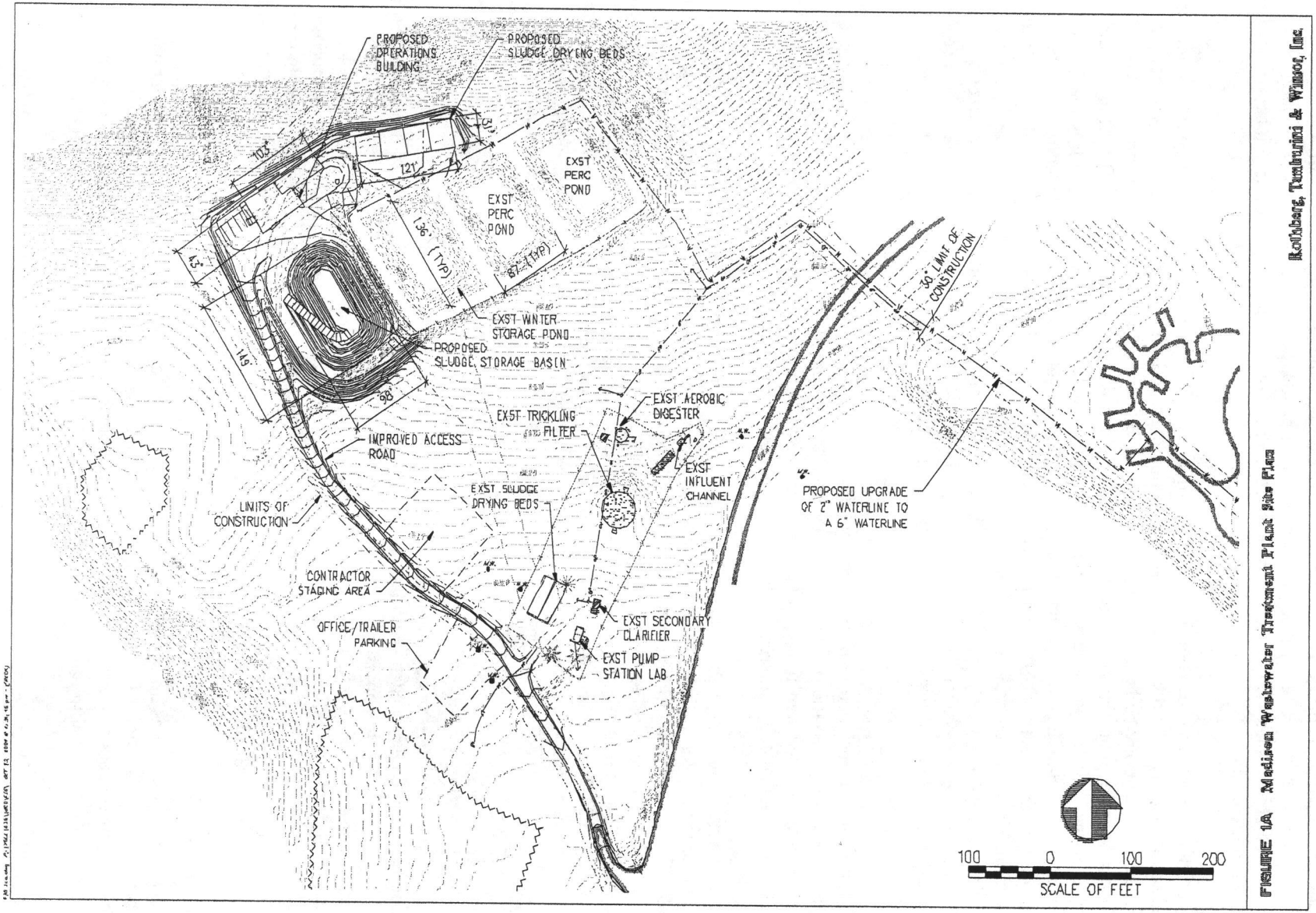
Under this alternative, the NPS would construct a new wastewater treatment plant, to be located mainly on the disturbed area adjacent to the existing percolation ponds, uphill and away from the West Entrance Road. Most of the existing sewage treatment facility next to the road would be removed and rehabilitated to a natural setting.

Wastewater Treatment Plant

This description of proposed action begins at the existing wastewater plant, and is derived from *Madison Engineering Design Report* (Rothberg, Tamburini, and Windsor, Inc., 2003). Most developments at the existing plant would be removed and relocated uphill, at the existing percolation ponds. Developments to be removed include the existing sewage grinder (sometimes called a comminuter), aerator, clarifier, sludge drying tanks, chlorine/storage building, trickling filter, and most of the bear-proof fence. Wastewater collection and pumping would continue in rehabilitated facilities at the existing plant site. This new sewage lift station will incorporate the existing lab building and buried vaults (thus not requiring bear-proof fencing because it would all be enclosed). The existing influent structure would be fitted with a new sewage grinder. The existing winter bypass line between the influent structure and the lab building, and the force main between the existing lab building and the percolation pond site would both remain in service. The influent structure would be uncovered and would require bear-proof fencing.

Approximately 100 yards uphill are the existing percolation ponds and winter storage pond. There, the new plant would be constructed (Figure 1). The two percolation ponds and winter storage pond would be retained, with the winter storage pond converted to a third percolation pond. Immediately to the west of

Figure 1: Proposed Madison Sewage Treatment Plant Site Layout.



the percolation ponds a new sludge storage basin would be built. Immediately to the north a new operations building and aeration basin would be constructed. Sludge drying beds would be located north of the percolation ponds. The aeration basin, percolation ponds, sludge storage basin, and sludge drying beds would all be outside, and would not be enclosed. Therefore, around the entire area a bear-proof fence would be constructed.

The expanded treatment site would require approximately 2.5 additional acres of land, most of which is already disturbed. This land would be used for the operations building, aeration basin, sludge storage basin, and sludge drying beds. The majority of the development would occur between the access road and the west side of the ponds, and between the ponds and the hill on the north. The toe of that hill would be removed, along with the mature trees on it (less than 1 acre total). The small wetland on the east side of the project area would limit development there. No development is proposed on the south side other than a temporary staging area and office/trailer parking area, both of which would be revegetated upon project completion. The project area is almost completely screened from the road by trees that were not burned in the 1988 wildfires. The wastewater plant is well above the floodplain, so it would require no protection from flooding. The site is accessible to automobiles during the periods the plant operates. Winter season snowmobile access would provide adequate operations access during the period the plant is storing wastewater.

The plant would be designed to treat 80,000 gallons of wastewater per day. The existing plant does not have flow monitoring, so the plant would be designed to accommodate average flows as derived from typical domestic wastewater and typical campsite wastewater production (RTW 2003). The plant would be able to accommodate the increased flows coming from proposed shower facilities.

The entire wastewater treatment plant dimensions, for each component, would be as follows. A graveled area, approximately 40 feet by 40 feet, in front of the operations building, would provide parking for four vehicles. The operations building would be about 43 feet square. The adjoining aeration basin would be about 20 ft x 60 ft. The sludge storage basin would hold 400,000 gallons of sludge and would measure about 98 X 149 feet (roughly the same size as the existing percolation ponds). The drying beds would measure about 31 by 121 feet. A bear-proof chain link fence would be constructed around the aeration basin, percolation ponds, sludge storage basin, and drying beds. The operations building and parking area would not be fenced. Equipment gates and a single pedestrian gate would be provided for maintenance access. Routine operations access would be through the operation building.

Wastewater Treatment Building Design

The operations building proposed for the upper area would measure about 43 by 43 feet. A concrete aeration basin would be constructed adjacent to the operations building and would measure about 20 ft by 60 ft. The building would consist of concrete masonry unit double wall — split face block, closed-cell insulation, and structural block. The exterior split-face block will have an integral light brown color. The roof would be factory-finished metal, and dark brown in color. The general architectural style proposed is a single gable clerestory. Other architectural features would include a loading dock and garage door for supply delivery, and ADA accessible office and lab. The operations building would include a clarifier, pump gallery, lab and administration area, and generator room.

Treatment Process

The plant would operate as an activated sludge treatment plant during the visitor season. The proposed treatment is a modification of extended aeration activated sludge, called "Single Basin Nutrient Removal." The operations complexity is higher than a rotating biological contactor, but lower than the other activated sludge and membrane treatment processes discussed in the engineering report.

Wastewater collected from the Madison area would flow through the influent channel and sewage grinder. Next, it would be pumped to the aeration basin, which would contain a mixed liquor of bacteria that would reduce the biochemical oxygen demand and convert the ammonia to nitrogen gas. The design detention time for the aeration basin is 36-58 hours (depending on flow rate). The mixed liquor would then flow from the aeration basin to the secondary clarifier, which would separate effluent from the mixed liquor. Effluent would then be sent (via gravity line) to the evaporation/percolation ponds. Some mixed liquor would be pumped from the clarifier and returned to the aeration basin, with the remaining portion to be wasted to the sludge storage basin, where it would be stabilized under aerobic conditions. Stable sludge would be periodically removed from the storage basin and dried in the sludge drying beds. Water decanted from the sludge storage basin and drained from the drying beds would be returned to the aeration basin for treatment. Should the single basin be taken out of service, sludge could be wasted directly to the sludge drying beds.

The new treatment facility will operate under the same Water Quality Regulations as the existing facility. Filtration and disinfection will not be required.

The activated sludge plant is estimated to operate six months per year, during the summer visitor season. Wastewater would be stored in the sludge storage basin during other times of the year. Stored wastewater would be treated through the activated sludge plant during the following spring. During the fall shut-down, sludge would be pumped from the storage basin and placed in the drying beds. The beds would be loaded at a maximum 4 feet depth, annually. Drying bed volume would be a minimum of 13,413 cubic feet with a minimum 3,353 square feet surface area.

Operators would have access by vehicle to conduct daily process-control lab work, sampling, and minor maintenance tasks. The plant would store wastewater during the winter. No process control or sampling would be required during periods of no discharge. Operator attention during the winter would include periodic checks of blower operation and basin volume. Access by snowmobile would allow completion of these tasks.

The wastewater at the plant would be domestic wastewater collected from facilities at the campground, picnic area, and employee housing. No industrial wastewater is generated in the area or discharged into the Madison sewer system. The Madison plant would not be designed to handle septage from nearby vault toilets (found at some picnic areas); instead, the septage would continue to be hauled to the Old Faithful Wastewater Treatment Plant.

Alarm conditions in the field would be sent to the plant's control panel alarm. A local horn would be sounded and the alarm condition lit on the panel. The control panel alarm system would also send an alarm signal to the Mammoth Hot Springs Communications Center, monitored 24 hours a day.

Power System and Water Line Upgrades

The proposed plant site does not have power or water. Three-phase power would be routed from the power substation, located at Mesa Pit, about 3 miles south of Madison. The new conduit would be buried with a ditch-witch along the roadside where the existing line is buried, and hung on the same poles where it is overhead. At the Gibbon River Bridge it would be suspended in an insulated pipe.

An emergency generator located in the operations building would provide standby power. The generator would be sized and provided for all plant loads, including the lift station.

Water will be brought to the plant site through a new 6-inch line, which would attach at the closest point of the existing distribution system, in the Madison campground, about 200 yards south of the West Entrance Road. Proceeding northwest, the line would then follow the overhead powerlines across the

road, dog-legging to the west and then north along the eastern edge of the existing percolation ponds, as shown in Figure 1. The contractor would have 15 feet on each side of the new line in which to maneuver equipment while laying the new line.

Collection System

No modifications would be made to the existing collection system within the campground, government area, or picnic area. The lift station at the existing sewage treatment center would be converted to handle raw sewage, and its capacity would be increased.

Proposed Removal of Facilities

The existing influent channel and lift station would remain in service at the existing plant site. Other process structures at the existing wastewater treatment plant would be removed. These include the primary clarifier, trickling filter, digester and blower building, and sludge drying beds. The ground occupied by these structures—about one acre—would be recontoured and reclaimed.

Staging, Stockpiling, and Disposal Sites, and Contractor Camp

Staging and stockpiling of construction equipment and materials would be located at the site of the existing or new sewage treatment centers as shown in Figure 1, or at the Mesa Pit or Madison landfill site, as needed. All locations are removed from the flow of visitor traffic and would not be within view of the Grand Loop road system.

The plant has been designed, as best as possible, to balance the soils excavated for the operations building, aeration basin, and drying beds with soils required for fill slopes at the sludge storage basin. A soils shortage is estimated. This project will coordinate with scheduled road projects in the park to obtain additional soil from within the park. Some excavated material may be unsuitable for earthen basin construction, and would be disposed of at the Mesa Pit. Topsoil moved from its native location at the Madison wastewater site would be pushed to the construction limits for temporary storage.

No additional houses or offices would be specifically built for this project, due to its proximity to West Yellowstone, where workers would be able to find housing.

Scheduling of Work Activities; Visitor Information and Traffic Delays

The NPS hopes to award a contract in 2005, with construction occurring from May 2005 through November 2007. Construction would be expected to occur primarily between 7:00 AM and 7:00 PM. Work may be conducted outside these times with contracting officer approval.

The existing sewer system would remain operational during construction. No closures are anticipated to switch from the old to the new system.

Grizzly bears are known use the project area in a dispersed manner. Such use is primarily dependent on the availability of winter-killed carcasses and elk calves in the spring. Because there is no way of knowing when, if, or where this activity would occur, it would be treated on a case-by-case basis. Limitations on contractor activities would be implemented as necessary. Construction will not begin before April 1 each year.

Because most of this project takes place outside of public view, there would be few traffic delays. The only delays anticipated would be for water line installation under the West Entrance road, and perhaps minor delays for some truck traffic.

Permitting

Treated effluent is proposed to be discharged to the waters of the State of Wyoming through percolation ponds into the surrounding groundwater. The state waters within the borders of Yellowstone National Park are classified as Class 1. Per current Wyoming Department of Environmental Quality (DEQ) Regulation Chapter 1, Section 7.a, no new surface discharges (other than dams) will be permitted to discharge into Class 1 surface water. This project will be constructed under a Permit to Construct obtained from the Wyoming DEQ as required in DEQ Regulation Chapter 11, Water Quality Regulations. Additional requirements include submission and approval by DEQ of an operation and maintenance manual. The point of compliance would be down gradient of the percolation ponds.

Construction Stipulations

Measures to mitigate the adverse environmental and cultural resource impacts of this alternative would be incorporated into the project design. These measures are intended to avoid, minimize, or rectify impacts as described in 40 CFR 1508.20. Mitigation measures are analyzed as part of the proposed alternative. These actions have been developed to reduce or eliminate both the immediate (construction phase) and extended (use phase) adverse effects of the proposed action.

Construction zones would be identified with construction tape, silt fencing, snow fencing, or some similar and appropriate material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

A stormwater pollution prevention plan would be prepared and incorporated into design and specifications, to control sediment on site so that it would not enter nearby streams and creeks. The NPS would develop this pollution prevention plan with the Wyoming Department of Environmental Quality under the National Pollution Discharge and Elimination System (NPDES) Stormwater Management Program. Silt fencing would be inspected weekly or after every major storm. Accumulated sediments would be removed when the fabric is estimated to be 75 percent full. Silt removal and disposal would be accomplished in such a way as to avoid introduction of silt into any wetlands or flowing water bodies. Silt would be disposed of in approved areas.

All trenching operations would follow OSHA regulations and park recommendations. These recommendations would minimize disturbance to soils and vegetation due to construction activities, while maintaining a safe working environment.

Any use of or association with hazardous materials would require contractor compliance with applicable federal, state, and local laws, codes, ordinances, and regulations. In addition, the *Yellowstone National Park Hazardous Materials Response Plan* (NPS 1993a) would be followed to mitigate potential hazardous material incidents within the park boundary and similar incidents outside the boundary requiring mutual aid.

A mitigation program designed to minimize fugitive dust from construction activities would be implemented. No chemicals would be used in dust abatement. Dust abatement would include watering of disturbed areas. Water for construction and dust abatement would be pumped from surface waters at the Gibbon River. Water trucks and equipment used for water pumping would be cleaned according to Yellowstone National Park standards for preventing the spread of whirling disease and mud snails.

Reclamation/Revegetation

Reclamation and revegetation following established guidelines set in Appendix A, *Vegetation Management for Construction in Yellowstone National Park,* would be funded and implemented as part of this proposed road improvement project. The park policy is to conserve topsoil and salvage vegetation for reclamation of disturbed areas.

Exotic plant species are found within Yellowstone National Park and threaten to spread further, especially following ground disturbance with construction. Construction methods themselves may increase the spread. The Madison area, particularly the area of the existing sewage treatment plant, is the center of an ox-eye daisy (*Chrysanthemum leucanthemum*) infestation. Preventing further spread of this species will be the focus of exotic plant containment strategies in this area. Construction steps related to limiting exotic plant species spread within the project area and from outside the park will be included in the "Summary of Work" specification section of the construction contract. Primarily, any material imported into Yellowstone National Park for this project would be either inspected by park weed managers and determined to be weed free by park standards, or would be required to be heated to 149 degrees Celsius (300 degrees Fahrenheit) prior to entering the park. Additionally, all ground disturbing equipment entering Yellowstone National Park associated with this project would be required to be pressure cleaned. The equipment would be inspected for transient soil and plant material at park entrance stations before entering the park. The equipment would also be inspected and cleaned before leaving the Madison area, to prevent the spread of its exotics to other areas of the park.

Finally, park weed resource staff would thoroughly survey the area of proposed activity to identify, record, and then control exotic vegetation prior to ground-breaking activity. Control methods may include mechanical or chemical removal of plants. Park resource staff would then subsequently monitor the facilities, identifying all exotic plants as they appear, recording, and controlling exotic plants on an annual basis. These mitigation measures would occur annually from the time of ground disturbance activity and continue for a period of at least 5 years after the completion of the facilities. Other specific efforts to address the potential spread of exotic plant species into areas disturbed by construction are addressed in *Appendix A: Vegetation Management for Construction in Yellowstone National Park.*

Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA, 42 U.S.C.A. § 4321 et seq., Public Law 91-190 (1970)), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that "[the] environmentally preferable [alternative] is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.

- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.

- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources (40 CFR § 1500 et seq.).

Given the above criteria, the National Park Service determined that Alternative 2 suitably fits the balance that the environmentally preferred alternative requires. Alternative 2 best preserves and enhances cultural and natural resources over the long-term. Replacing the failing wastewater treatment system best meets the national environmental policy expressed in NEPA (Sec. 101(b)), to fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

Alternative 1, the No Action Alternative, would not strike the balance between public safety and preservation and repair of features.

ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

Upgrading the Existing Plant

Upgrades to the existing plant would trigger mandatory upgrade of the plant to tertiary cleaning, per Wyoming DEQ Class 1 Water Quality Regulations (Sections 35-11-101 through 35-11-1104). These improvements, including repair or replacement of the worn-out equipment in the existing plant, would cost nearly as much as replacement of the plant, without the benefit of removing the existing facility from public view. Therefore, upgrading of the existing plant was rejected as an option.

Wastewater Treatment Method

Engineers evaluated then rejected alternative methods of water treatment, including trickling filters, sequencing batch reactors, membrane filtration, and extended aeration activated sludge. Trickling filters and sequencing batch reactors would both cost more than activated sludge treatments, and batch reactors have relatively high operational complexity. Membrane filtration can produce effluent that meets all design goals, but has the highest operations complexity, highest capital and highest life-cycle cost of the three alternatives evaluated. For reasons of cost and complexity, extended aeration activated sludge was chosen as the preferred treatment method at Madison (RTW 2003). This process has an acceptable operations complexity and is similar to other treatment plants operated within the Park, has the lowest life cycle cost, and can meet the design treatment goals.

Wastewater Treatment Plant Site

The geography of the Madison area means that any alternative sites would be distant from the existing developed area. The cost of constructing new collection lines, along with the impact of constructing an entirely new development, meant that any alternative sites would have been both too expensive and too destructive of resources. Therefore, no alternative sites were considered.

AFFECTED ENVIRONMENT

Natural Resources

Geology and Soils

Yellowstone National Park is mainly a volcanic plateau varying in elevation from about 1,610 meters (5,300 feet) along the Yellowstone River in Montana to 3,460 meters (11,358 feet) at Eagle Peak along the eastern boundary of the park in Wyoming. Mountains surround the plateau except to the southwest,

where the plateau descends to the lower Snake River plains of Idaho. The park encompasses mountains, canyons and valleys cut by streams flowing from the Continental Divide.

Madison sits just inside of the Yellowstone Caldera rim, left from the major eruption 600,000 years ago. This is one of the few places in the park where the caldera rim still exists and is easily visible to the traveling public; essentially, it is the line of cliffs to the north of Madison, extending both east and west from there. The rim is largely composed of welded tuff, a form of rhyolite. The rim is called Purple Mountain for its purplish appearance, and has a trail ascending it from just north of the government area.

As noted above, the area's topography is that of a river valley (elevation about 6,600 feet), with a second line of cliffs roughly paralleling the caldera rim one or two miles to the south. These are the edge of the Madison Plateau, which was created by the West Yellowstone lava flow about 120,000 years ago. The lava flow is also rhyolite, though not welded.

The Madison River and the adjacent meadows are another important feature of the project area. Sedges, grasses, rushes, and the exotic Canada thistle dominate the meadow. The meadows are somewhat influenced by small amounts of thermal waters that flow in at various locations. Alluvial sediments underlie the valley bottom, with some glacial landslide deposits on the north and south edges of the valley.

Madison is about 10 miles south of the Hebgen Lake fault, which shook in 1959 with an earthquake measuring 7.4 on the Richter scale (sources vary on the exact magnitude between 7.1 and 7.8). The 1994 Uniform Building Code categorized the Madison area as Seismic Zone 4, a zone of potentially strong ground shaking ability.

A subsurface geotechnical investigation conducted at the proposed site of wastewater treatment in 2002 plant revealed that gravel and sand from the alluvium, colluvium, and glacial landslide deposits common in the Madison Valley dominate the wastewater treatment site. Soils on site are sandy with some silt and little fine gravel in a medium dense and moist condition. Below about 11 or 12 feet the consistency changes to very fine silty sand in a soft and very moist condition. Sandy conditions characterize the top 25 feet of the soils on site (Nelson Engineering 2002).

Vegetation and Rare Plants

The dominant vegetation of the Madison area is typical of Yellowstone National Park, being comprised of lodgepole pine forest interspersed with open meadows on the Madison River. During the fires of 1988, the North Fork Fire burned through the Madison area, leaving a mosaic of burned and unburned areas. The burned areas are now dominated by young lodgepole pines, with typical forest understory species such as elk sedge (*Carex geyeri)* and Ross sedge (*Carex rossii)* occurring between the saplings. Understory plants in unburned areas are similar to those in the burned areas, and include species such as elk sedge, grouse whortleberry (*Vaccinium scoparium)*, pussytoes (*Antennaria sp.)*, oatgrass (*Danthonia sp*), and Wheeler's bluegrass (*Poa nervosa)*. Bisecting the forest is the river corridor, with extensive meadows and wetlands. Due to variations in moisture, substrate, and background temperature there is a great diversity in the vegetation. Meadows are dominated by such species as tufted hairgrass and sedges interspersed with areas of bulrushes (*Scirpus sp.)*, arrow-grass (*Triglochin sp.)*, and spike–rushes (*Eleocharis sp.*).

Park staff performed an on-site survey for rare plants, using Wyoming's list of plant species of special concern (May 1995). The results of the survey indicate that *Carex flava*, or Yellow sedge, is found on the hillside on the northeast side of the Madison wastewater plant area. Yellow sedge is a species at the edge of its range in Yellowstone, occurring in moist areas and typically found further north.

Wildlife

Yellowstone has sixty species of mammals, twelve species of native fish, five species of nonnative fish, six species of reptiles, four species of amphibians, and more than 300 species of birds. Among the sixty species of mammals are seven species of native ungulates and two bear species.

A variety of large mammals are known to use the Madison area, including bison (*Bison bison*), elk (*Cervus elaphus*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), grizzly bear (*Ursus arctos*), black bear (*Ursus americanus*), mountain lion (*Felis concolor*), wolves (*Canis lupus*), and coyotes (*Canis latrans*). Park biologists examined the potential for disturbance and habitat loss associated with construction of the proposed Madison sewage treatment plant by examining recent patterns of presence and distribution for these species. Biologists studied wildlife locations using telemetry or visual observations from various research and wildlife management-related studies collected in the last ten years, within ten miles of Madison.

Elk and Bison

Most evident in the area are elk and bison, attracted to the interspersed bottomlands, wetlands or swales, and slopes along the Madison River. The weak thermal influences along the Madison River provide some amelioration of severe winter conditions for these wintering ungulates. The Madison elk herd is non-migratory, and its population is stable at 500-650 animals for the last 30 years. The bison herd migrates to the Hayden Valley area in summer; its population is growing.

Bison eat mostly grasses and sedges, such as are found along the Madison River. Calves are born in the wintering areas generally between about April 15 and May 31 of each year. Bison seek relatively high ground with some forest cover to give birth. Elk cows give birth slightly later in the spring than bison, in various places along meadows and edge areas of both the Madison and Gibbon Rivers. Elk use the meadow immediately west of the gravel percolation pond access road, especially in late winter and spring. After calving, the next most sensitive time of year for elk is during the rut in September and October. At this time bulls seek open meadows and areas of good visibility when procuring and defending harems.

Both bison and elk succumb to winter-kill. Although this does not occur at a consistent rate from year to year, it provides an important food source for scavengers, including coyotes, bald eagles, wolverines, and black and grizzly bears, in late winter and spring. After their emergence from winter dens, grizzly bears in Yellowstone use carrion and weakened ungulates, including calves, as a primary food source (Knight and Eberhardt 1985). The reproductive success of female grizzlies is at least partly dependent on the availability of carrion on spring ranges (Mealey 1975; Picton 1978).

Moose and Mule Deer

Both moose and mule deer are known to use the Madison area, but sightings of both are uncommon.

Black bears

Black bears are dispersed throughout the park. Although there is some habitat overlap with grizzly bears, black bears are more likely to be found in forested cover than grizzly bears, generally found in meadows. Black bears mainly eat grasses and sedges, but they opportunistically feed on fish, insects, roots, and berries, and also scavenge. They are known to frequent and use the habitat adjacent to the proposed project area during the spring, summer, and fall seasons. Although black bears are not listed as a special status species, the park's 1982 Grizzly Bear Management Program applies to both grizzly and black bears.

Mountain Lions

National Park Rangers eliminated mountain lions from Yellowstone at the same time that they killed off wolves, in the 1920s. In the last 30 years, lions have recolonized those parts of Yellowstone that provide suitable prey—namely, the northern range area, where deer are more common.

Mountain lions are infrequently reported in Gibbon Canyon, approximately 8 kilometers (five miles) from the project area. This area is generally summer range for them. Resident mountain lion activity is mostly limited to the Northern Range (the area in the northern part of the park between Mammoth Hot Springs and Lamar Valley) due to the snow depths in much of the park's interior. Lion sightings in the Madison area are uncommon.

Grizzly bears, wolves, and lynx

These species are discussed in the "Threatened and Endangered Species" section below.

Small and mid-sized mammals

Small and mid-sized mammals observed in the general Madison Junction area include the coyote (*Canis latrans*), bobcat (*Lynx rufus*), badger (*Taxidea taxus*), beaver (*Castor canadensis*), red fox (*Vulpes vulpes*), pine marten (*Martes americana*), porcupine (*Erethizon dorsatum*), river otter (*Lontra canadensis*), long-tail weasel (*Mustela frenata*), snowshoe hare *(Lepus americanus*), red squirrel, (*Tamiasciurus hudsonicus*), field mice (*Peromyscus maniculatus*), voles (*Microtus pennsylvanicus*), and pocket gophers (*Thomoys talpoides*).

Red fox are rarely reported but may be present in the meadows near Madison Junction or in the warming hut area in winter. Smaller mammals such as weasels, pine marten, and red squirrels are common in the forests of central Yellowstone. Wolverines, which are very wide-ranging and rarely seen scavengers, have been reported more than once in the Elk Park-Gibbon Meadows areas, about 10 miles from this project area. Riparian species such as river otter, muskrats, and mink are found along the local rivers (Biel and Gunther 1994). Beaver are not generally associated with this river corridor.

Amphibians and Reptiles

The immediate wastewater treatment plant project area was surveyed in 2002, with the surveyors finding seven spotted frogs and two wandering garter snakes in the wetlands immediately west of the gravel access road (Jochimsen 2002). Additionally, Koch and Peterson (1995) found (blotched) tiger salamanders and boreal chorus frogs in the vicinity of the treatment plant. A survey of the Madison to Norris segment of the Grand Loop Road was conducted in 1994 (Peterson, Patla, and Sullivan 1995), and found four species of amphibians, the (blotched) tiger salamander (*Ambystoma tigrinum melanos*), western (boreal) chorus frog (*Pseudacris triseriata macular*), spotted frog (*Rana pretiosa*), and western (boreal) toad (*Bufo boreas boreas*). The surveyors also found three species of reptiles, the (northern) sagebrush lizard (*Scelopus graciosus graciosus*), rubber boa (*Charina bottae*), and western terrestrial (wandering) garter snake (*Thamnophis elegans vagrans*).

Birds

A wide variety of birds can be found at Madison Junction, including Canada geese (*Branta canadensis*), ruffed grouse (*Bonasa umbellus*), sandhill cranes (*Grus canadensis*), great horned owls (*Bubo virginianus*), gray jays (*Perisoreus canadensis*), Clark's nutcrackers (*Nucifraga columbiana*), mountain bluebirds (*Sialia curricoides*), cliff swallows (*Hirundo pyrrhonota*), common ravens (*Corvus corax*), dark-eyed juncos *(Junco hyemalis*), hermit thrush (*Catharus guttatus*), robins (*Turdus migratorius*), ruby-crowned kinglet (*Regulus calendula*), killdeers (*Charadrius vociferus*) and red crossbill (*Loxia curvirostra*). Bald eagles (*Haliaetus leucephalus*) are discussed in the threatened and endangered species section below.

Some bird species that are considered rare or sensitive may occur in the project vicinity. The black-backed woodpecker (*Picoides arcticus*) is primarily found in conifers, particularly spruce-fir forests or mixed lodgepole pine/spruce-fir forests. This bird is rarely observed in the Madison area because the habitat is almost exclusively lodgepole pine. The three-toed woodpecker (*Picoides tridactylus*) is more frequently found in the area, because the habitat required by this species includes primarily coniferous forests, especially disturbed sites with dead or dying trees. Harlequin ducks (*Histrionicus histrionicus*) are typically found in fast-moving waters lined with boulders or cobbles. They have been found on occasion in the Gibbon River Canyon, primarily during the month of May. The trumpeter swan (*Olor buccinator*) is found in areas of the Gibbon and Madison Rivers, primarily from mid-October through February. One previously active swan nest was seven miles downriver, near Seven Mile Bridge, but is no longer active (McEneaney 2002; McEneaney 1988).

Threatened and Endangered Species

There are three threatened animal species present in Yellowstone: the bald eagle, grizzly bear, and Canada lynx. Gray wolves are designated as an experimental, non-essential population with the greater Yellowstone ecosystem (GYE). Within national parks, experimental populations must be treated as threatened populations.

Grizzly Bears

Grizzly bears in Yellowstone National Park have been listed as a Threatened Species under terms of the Endangered Species Act since 1975. In 1983 the Interagency Grizzly Bear Committee (IGBC) was formed to ensure that the six ecosystems identified as grizzly bear recovery areas in the contiguous 48 states were managed in ways that would help grizzly bear recovery. The *Grizzly Bear Recovery Plan* (USFWS 1993) guides the recovery effort.

The greater Yellowstone grizzly bear population is the second largest of the recovery populations and is estimated to have a minimum of 416 bears. Grizzly bears range over 34,416 km^2 (8,504,345 acres) within the Greater Yellowstone Ecosystem; approximately 26 percent of this range (2.2 million acres) is within YNP. Yellowstone's bear management program is directed toward preserving and maintaining the grizzly bear population as part of the park's native fauna, while providing for visitor safety. Recovery and management of the grizzly bear is of the highest priority.

Grizzly bear foraging habits vary seasonally and annually. Upon emergence from hibernation, grizzlies feed primarily on winter-killed ungulates, and some seek out the Madison River valley for such carcasses. Carcasses give way to spawning trout and newborn elk calves in late spring. As spring progresses into summer, the bears forage on roots, bulbs, and tender plants more, while berries become an important food source in late summer. Army cutworm moths, pocket gophers, and other invertebrates supplement their summer diet. Whitebark pine nuts are an important autumn food source in the years the trees bear cones, about twice or thrice per decade (Mattson and Jonkel 1989). Grizzlies are opportunistic; in the years of low whitebark pinenut production or low carcass availability, they will seek out other (usually lower-quality) foods. Such years may bring grizzlies more into conflict with humans.

Roads within or adjacent to bear habitat can affect bear populations, both directly and indirectly. Direct effects include road-killed bears and loss of habitat to paving. Indirect effects include reduction of habitat effectiveness due to human-caused bear displacement from habitat adjacent to road corridors. Roads may also indirectly affect bears if they habituate to humans or through other behavior modifications. Construction activities and their noise and disturbance may additionally displace bears from otherwise good habitat. Researchers have documented human-caused bear displacement from habitat near recreational developments (Mattson and Henry 1987, Reinhart and Mattson 1990), roads (Green and Mattson 1988,

Craighead et al. 1995), backcountry campsites (Gunther 1990), and recreational trails in nonforested areas (Gunther 1990). Bears generally exhibit the strongest avoidance of occupied front-country human developments (Mattson 1990).

Grizzlies are known to frequent and make use of habitat adjacent to the proposed project area during the spring, summer, and fall seasons. The most important grizzly bear foods in the Madison area include winter-killed elk and bison carcasses in spring and elk calves in late spring and early summer. Danforth and Gunther (1995) analyzed grizzly bear activity, bear habitat quality, cub production, bear-human conflicts, and bear management actions in the Madison area in comparison to all other management districts in the park. The Madison area ranked below most other park districts in habitat quality, grizzly bear activity, and bear-human conflicts (eleventh out of thirteen districts) (Danforth and Gunther 1995).

From January 2000 through July 2002 there were 34 grizzly bear, 6 black bear and 3 unknown bear species activity reports within a 3 mile radius of Madison (because bears are not individually marked, it is not possible to determine how many individual bears are accounted for in those sighting reports). These activity reports were based on ground, aerial, track, and scat reports. Winter bear activity in this area was minimal; no sightings were reported (Gunther 2002).

Canada Lynx

The U.S. Fish and Wildlife Service (USFWS) listed the Canada lynx (*Lynx canadensis*) as a threatened species in 2000. Evidence of lynx in Yellowstone National Park comes from about 216 winter tracking surveys, covering 1,043 total miles, conducted during the last three winters and from historic sightings. Only three sightings have been recorded in the last three years parkwide. The National Park Service completed 13 snowtracking transects, totaling 36 miles, within 6 miles of the project site (the nearest transects to Madison), and found 1 possible lynx track in the vicinity of Mary Mountain. The Madison site itself has not been surveyed for lynx sign. Additionally, there are two lynx sightings of unknown reliability recorded by historical (1887-1998) records within the greater Madison Junction area; both sightings were within three miles of Madison Junction, in the Mesa Pit area (Murphy 2002).

Using mapped coverages of vegetative habitat types from the Yellowstone database, National Park Service staff completed a preliminary analysis of primary and secondary lynx habitat in the Madison Junction area, per guidelines in the Lynx Conservation and Assessment Strategy (LCAS, Ruediger et al. 2000). The proposed project occurs within a 5th-order, 114 square mile hydrologic unit (HUC) completely contained in the park. Primary lynx habitat totals 10.4 square miles (9% of HUC). Due to low coverage of primary lynx habitat (i.e., less than 20%), this HUC was not identified as a Lynx Analysis Unit (LAU, Ruediger et al. 2000).

Bald Eagles

Bald eagles are found on occasion in the Madison Junction area, with a formerly occupied nest occurring in the area, but more than a mile from the construction site. The abundant fish in the area's rivers combined with the presence of winter-killed animals attract eagles year-round (McEneaney 2002). The bald eagle management plan for the GYE has achieved the goals set for establishing a stable population in the park. No active nests are known to occur within 1 kilometer (0.6 miles) of the project site.

Gray Wolf

Wolves in the Yellowstone area are designated as an experimental population, and therefore no areas are designated as critical habitat for them (USFWS 1994). Human-caused mortality and availability of prey are the two most limiting factors for wolf populations (Mech 1970). To date most human-caused mortality of wolves in the Greater Yellowstone Area has come from management removals (mostly related to livestock depredations), illegal kills (from poaching), and by collisions with vehicles. Within

Yellowstone National Park, there has been no mortality of wolves due to either management removals or illegal kills. Prey species for wolves are considered abundant in the park, with elk being primary.

As of late 2003, 174 wolves in 15 packs lived in Yellowstone Park, with about another 100 in the surrounding area. At least one member of each pack is radio-collared, allowing park and USFWS personnel to monitor the movements of all packs. Wolves travel widely and do not appear to be disturbed by human presence, except during denning. Wolf pups are generally born in late March to May.

Telemetry surveys during the last five years show that within a 1 mile radius of Madison Junction there were 13 findings of wolves, and within a 3-mile radius there were 67 findings of wolves (Guernsey 2004).

Candidate or Proposed Species

Fluvial Arctic grayling meet the criteria to be a candidate species to add to the list of threatened and endangered wildlife and plants. Based on historical information and angler reports there may be some remnant fluvial grayling in the Madison River near the project area.

Air Quality

Air quality and visibility are generally excellent in Yellowstone, which is a mandatory Class 1 area where air quality degradation is unacceptable under the Clean Air Act of 1977. Acid precipitation is monitored at Tower Ranger Station, and ozone, sulfur oxides, and fine particulates are monitored at Lake Ranger Station. Carbon monoxide conditions are monitored at the West Entrance. Air quality in the Madison area is believed to be excellent, based on data regarding general air quality in Yellowstone. Occasional periods of degradation may occur due to regional haze or forest fire smoke. Localized emissions from campfires and wood burning stoves are occasionally visible.

Visual Quality

Visual quality affects both visitor enjoyment and perception of Yellowstone. The existing sewage treatment plant is easily visible from the West Entrance Road, although most visitors see the area only briefly. The percolation ponds are not visible at all to motorists; even most long-term park employees are unaware of their existence.

Soundscape Management

Sound quality and noise also affect visitor enjoyment and perception of Yellowstone. The park is generally a quiet place where visitors may escape the noise and bustle of modern cities. The Madison area is especially quiet because most visitors stop only briefly in the area. The aerator at the existing plant makes a fairly loud hum, though, which is audible in the campground across the road at times.

Lightscape Management

The National Park Service strives to preserve the natural ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light. The existing sewage treatment plant has a streetlight that is visible from the road. Filtered views of the light are notable from the campground as well.

Cultural Resources

The National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*), and the National Environmental Policy Act (42 U.S.CA. § 4321 et seq.), as well as the National Park Service's Director's Order-28, *Cultural Resource Management Guideline* (1997), *Management Policies* (NPS 2001a), and Director's Order-12, *Conservation Planning, Environmental Impact Analysis and Decision-making* (NPS 2001b), all require the consideration of impacts on cultural resources listed on or eligible for listing on the National Register of Historic Places. The undertakings described in this document are subject to Section

106 of the National Historic Preservation Act, under the terms of the 1995 Servicewide Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. Pursuant to these agreements, this EA will be submitted to the Wyoming State Historic Preservation Office (SHPO) for review and comment.

Cultural resources evaluated include archaeological and historic resources.

Historic and Archaeological Resources

The Madison area has significant archeological and historic resources. Numerous obsidian chips, an Eden point (a kind of spear point), and other traces of Native American use of the Madison River area were found south of the campground. Some rock piles near the current West Entrance Road were also found, possibly resulting from early road construction in the area. Due to these resources, the Madison archeological site (48YE365) was determined to be eligible for listing to the National Register of Historic Places in 1993 (John T. Keck to Robert Barbee, Sept. 2, 1993, in YCR files). An archeological survey, inventory, and limited testing of the site in 2000 determined that the contributing areas to the site were all near the Madison River. The Wastewater Treatment Plant including the proposed project area and water line are non-contributing (Truesdale 2000).

Socioeconomic Resources

Yellowstone plays a prominent role in the social and economic life of the Greater Yellowstone Area. Gateway communities have developed outside the park's five entrances — Cody and Jackson in Wyoming, and Cooke City/Silver Gate, Gardiner, and West Yellowstone in Montana. The Montana gateway communities are on the immediate border of the park or within a few miles. The Wyoming gateway communities are an hour's drive or more from the park's boundary. The Montana gateway communities are relatively small, but both Jackson and Cody have populations of greater than 8,000. West Yellowstone has about 1,200 year-round residents, and Gardiner about 850; the populations of all gateway communities swell in the summer months.

The gateway communities provide food, lodging, medical services, groceries, gasoline, other automotive supplies/services, gifts, souvenirs, and other goods and services to the public. The availability of services varies from community to community. The link between tourism and all the gateway communities is tight; their economic viability depends heavily on the recreation and tourism traffic that is generated by Yellowstone and other public recreation destinations.

The distance from park attractions to surrounding communities necessitates extensive services in the park. The developed areas evolved to serve the needs of the visiting public and the park's administration and operation. Within the park, economic activity is concentrated at six locations along the road system: Old Faithful; Canyon Village; Tower/Roosevelt; Mammoth Hot Springs; Grant Village; and Fishing Bridge, Lake Village, and Bridge Bay. Concessioners provide a wide range of services, including campgrounds, food, gas, lodging, transportation, horse and boat rentals, and medical services. Madison is not a major concessions provider, with only minor concession vending services in the area.

Visitor Use and Experience

Visitor use and economic activities are highly seasonal. June, July, and August are the months of highest use, with 50 percent of the park's visitation arriving in July and August. The shoulder-season months of May and September receive less use, but the volume is still heavy. Use in the winter months is relatively low, accounting for about six percent of the overall visitation. Between 60,000-85,000 persons tour Yellowstone by oversnow vehicle per winter; another 30,000 or so drive the road from Mammoth to Cooke City. Annually about 3 million people tour Yellowstone.

Studies done in 1989 and 1992 estimated that 74 to 81 percent of all park visitors came from outside the surrounding states of Idaho, Montana and Wyoming. Seven percent of park visitors are international, with half of them coming from Canada, and Germany contributing the second largest number. About half of the people coming through Yellowstone's entrances are repeat visitors (Littlejohn, Dolsen, and Machlis 1990).

In 2000 the park received in excess of 2.8 million recreational visits. The West Entrance is the busiest, accounting for about 39 percent of park visitors. The South is next busiest, averaging 24%, followed by the North, with 19%, and the East entrance, with 11%. The Northeast Entrance is slowest, with about 6% of park visitors entering there.

ENVIRONMENTAL CONSEQUENCES

Overview

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental effects or consequences of a proposed federal action and any adverse effects that cannot be avoided should the proposed action be implemented. In this instance, the proposed federal action involves replacing the wastewater facility at Madison Junction, as described in this document.

The intent of this section is to provide an analytical basis for comparison of the alternatives and the impacts that would result from implementation of these alternatives. Impact topics have been selected for the analysis based on the potential for effects on important resources and other key issues identified during planning. This section is based on scientific and analytical review of information collected by the National Park Service and provided by other agencies. Expected impacts are described for both of the alternatives.

Regulatory guidelines for implementation of NEPA require an analysis of the cumulative effects of a proposed action as defined in 40 CFR 1508. These guidelines state that a cumulative effect is "the impact on the environment that results from the incremental effect 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 non-action and proposed action alternatives. The analysis of the cumulative effects includes a discussion of current development plans within Yellowstone National Park and information about development plans for the lands surrounding the park within the Yellowstone ecosystem. Development plans in the immediate project area, south-central Yellowstone National Park, are primary factors in the analysis of cumulative impacts.

Although numerous construction and maintenance projects are planned for the Greater Yellowstone Area during the next 20+ years, the emphasis of these projects is to replace, repair, and rehabilitate existing facilities that are approaching the end of their useful service life. Where new facilities are needed, they would be concentrated in and adjacent to existing developed areas to minimize the creation of new, isolated developments. Although some commitment of previously undisturbed resources is inevitable, as are some adverse cumulative effects, many of the project efforts to be undertaken involve the removal of existing development and the revegetation of other human activity scars.

In addition to determining the environmental consequences of the preferred and other alternatives, National Park Service policy (National Park Service 2001a) requires analysis of potential effects to determine whether or not actions would impair park resources. The following analysis of impacts was based upon whether the impacts would be:

- **beneficial** (a positive change in the condition of the resource, or a change that moves a resource toward its desired condition);
- **adverse** (a negative change in the condition of the resource, or a change that moves a resource away from its desired condition);

- **direct** (an effect that is caused by an action and occurs at the same time and place);
- **indirect** (an effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable);

- **short-term** (an effect which in a short amount of time would no longer be detectable, as a resource returns to its pre-disturbance condition; generally less than 5 years);
- **long-term** (a change in a resource or its condition that does not return to pre-disturbance levels and for all practical purposes is considered permanent).

Impairment

In addition to determining the environmental consequences of the preferred and other alternatives, the National Park Service's "Management Policies" (NPS 2001a) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the National Park System, established by the Organic Act (39 Stat. 535; U.S.C. Title 16 et seq.) and reaffirmed by the General Authorities Act (as amended, 84 Stat. 825), begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service 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 National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service 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 National Park Service 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 would be more likely to constitute an impairment to the extent that it affects 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.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

Table 2: Summary of Potential Impacts of Alternatives

Impact Topic	Alternative 1—No Action	Alternative 2—Preferred
Geology and Soils	Possible short-term but negligible impacts from sewage spills	There would be minor, long-term impacts to about 2.5 acres of already disturbed soils, although about an acre of soils would be rehabilitated at the site of the existing sewage treatment plant.
Vegetation & Rare Plants	Negligible impacts.	New plant construction will avoid site of *Carex flava.* About 2.5 acres of previously disturbed ground would be affected; impacts would be minor.
Wildlife	Negligible impacts.	Possible short term, minor, adverse effects on wildlife due to construction activities; probable long-term, minor, beneficial effects due to rehabilitation of existing site.
Threatened & Endangered Species	Negligible/no effects.	This alternative may affect, but is not likely to adversely affect grizzly bears. Negligible/no effect on lynx, wolves, and bald eagles.
Air Quality	Continuing minor adverse effects due to odors.	Short-term, minor, adverse effects due to dust and construction activities; long-term, minor, beneficial effects due to reduced odors.
Visual Quality	Continuing minor adverse effect to visitors on West Entrance Road.	Long-term, minor, beneficial effects due to relocation of plant uphill & away from road.
Soundscape Management	Continuing minor adverse effect due to aerator noise.	Minor short-term impacts from construction noise. Minor long-term benefit due to relocation of plant uphill & away from road.
Lightscape Management	Continuing minor adverse effect due to mercury vapor "yard" light.	Long-term, minor, beneficial effects due to removal of yard light and installation of motion-sensitive outdoor lighting.
Archaeological and Historic Resources	Although a very small amount of erosion would continue, effects on historic resources would be negligible.	Construction of the new plant would be in the non-contributing portion of site 48YE365, and would be expected to have only minor effects.
Socioeconomic Resources	Negligible effects unless plant fails; potential moderate effect if plant fails due to campground closure.	Short-term, minor, adverse effects on visitors due to construction activities; short-term, minor, beneficial impacts due to construction spending; and long-term beneficial impact due to minimization of plant failure.
Visitor Use and Experience	Continuing minor effects on visitors when plant temporarily shuts down; continuing possible moderate effect if plant totally fails and entire Madison area is closed.	Short-term minor impacts upon visitor experience; long-term, minor, beneficial impact because risk of complete shutdown is greatly reduced and because visitor safety is improved with better wastewater treatment.

Soils

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to soils were derived from the available soils information and park staff's past observations of the effects on soils from both visitor use and construction activities. Impacts to soils that are unique to Yellowstone or to soils that support important vegetation species are more significant than impacts to common soils.

The thresholds of change for the intensity of impacts to soils are defined as follows:

Negligible: Soils would not be affected or the effects on soils would not be detectable.

Minor: Effects on soils would be detectable, although these effects would be localized and short-term. There could be some slight physical disturbance, some removal of soil material, and/or some compaction. Mitigation measures proposed to offset adverse effects would include ensuring that topsoil is preserved, ground is reshaped into the natural contours, the ground is de-compacted, and that there is no unnatural erosion of soils.

Moderate: Effects on soils would be readily detectable, localized, and possibly long-term. Measurable effects could include physical disturbance, removal of large amounts of soil, compaction, and/or unnatural erosion of soils. Mitigation measures proposed to offset adverse effects would be extensive and would include measures to ensure that topsoil is preserved, ground is reshaped into the natural contours, ground is de-compacted, and that there is no unnatural erosion of soils.

Major: Effects on soils would be widespread, readily detectable, and long-term. Significant measurable effects would include the physical disturbance and removal of large amounts of soil, severe compaction, and the unnatural erosion of soils. Mitigation measures proposed to offset adverse effects would be extensive.

Impacts of Alternative 1 on Soils

Impact Analysis

Operation of the Madison Wastewater Plant would continue under this alternative. Impacts to soils would be negligible.

Cumulative Impacts

Construction projects will occur in the western portion of Yellowstone National Park, disturbing various amounts of soils and causing minor amounts of erosion. When added to such erosive events, continued operation of the Madison Wastewater Plant would cause a negligible impact to soils.

Conclusion

When combined with other past, present, and foreseeable future actions that would result in impacts to soils, this alternative would contribute a negligible amount of soil loss to the cumulative scenario. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Soils

Impact Analysis

Approximately 2.5 acres of previously disturbed soils would be affected by the proposed project. This disturbance would be partly mitigated through removal of the previous facility near the roadside and revegetation of that area, about one acre in size. Overall effects would be direct, minor, very localized, and long-term. Topsoil at the site would be treated (or has already been) with herbicide for two years before the project, and for five years after, to control noxious weeds.

Standard approved erosion control techniques and structures such as silt fencing would be implemented during and following construction. Silt fencing will be used to protect meadows and wetlands. Snow fencing and construction tape will be used to restrict impacts to construction zones. Impacts would be negligible with no impairment.

Cumulative Impacts

Construction projects will occur in the western portion of Yellowstone National Park, disturbing various amounts of soils and causing minor amounts of erosion. When added to such erosive events, construction of a new wastewater plant at Madison would cause a minor impact to soils.

Conclusion

The effects of Alternative 2 on soils would be direct, local, long-term, and minor. As per the definition provided under Alternative 1 above, this alternative would not impair Yellowstone's geology or soils.

Vegetation and Rare Plants

Methodology and Intensity Thresholds

Park staff performed an on-site survey for rare plants (species of special concern), using Wyoming's list of rare plants. One rare plant was identified on the northeast side of the proposed project area, *Carex flava,* or yellow sedge. Additionally, available information on park native vegetation and unique plant communities was used to analyze the effects of the alternatives.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: No rare plant species or uncommon plant communities would be affected. Individual native plants might be affected, but impacts would be localized, short-term, and of no consequence to the species.

Minor: Native vegetation would be affected, but impacts would occur in a relatively minor portion of the species' occurrence(s) within the park. Mitigation measures to offset adverse effects would be proposed. Rare plants or uncommon plant communities could be present and individual plants could be affected, but proposed mitigation measures to avoid adverse impacts to the species or community would be effective.

Moderate: A sizable segment of native vegetation within the park would be affected, and proposed mitigation measures would be extensive. Rare plant species or uncommon plant communities could be affected, and proposed mitigation measures to offset adverse effects could be extensive.

Major: Effects on native vegetation within the park, potentially including rare plants or uncommon plant communities would be extensive and long-term. Proposed mitigation

measures to offset the adverse effects would be extensive, and success of the mitigation measures would not be guaranteed.

Impacts of Alternative 1 on Vegetation and Rare Plants

Impact Analysis

Continued operation of the Madison Wastewater Plant would have a negligible effect on vegetation and rare plants. Other than routine maintenance, repair, and upkeep activities, no disturbance would occur. Minor short-term impacts may occur to vegetation from inadvertent untreated sewage leaks from the sewage treatment plant, but such leaks are uncommon and very small. Daily activities avoid the hillside where yellow sedge occurs. Effects from continued wastewater plant operation on vegetation and rare plants would be negligible.

Cumulative Impacts

As with the effects on soils, construction projects in the western part of Yellowstone will continue. These projects will have a varying effect on rare plants and vegetation. Within Yellowstone, all projects must undergo the rare plant inventory that was done at this project's site. All Yellowstone projects must avoid moderate or major impacts on rare plants. Because Alternative 1 would not disturb vegetation or rare plants, it would have a negligible effect on vegetation.

Conclusion

When combined with other past, present, and foreseeable future actions that would result in impacts to vegetation and rare plants, this alternative would cause negligible effects on them. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Vegetation and Rare Plants

Impact Analysis

Construction of the proposed wastewater plant would avoid the northeast hillside and its population of Yellow sedge, which has been fenced to avoid unintended construction impacts. Most of the area to be developed by the percolation ponds has already been impacted, and has only partial ground coverage. Still, one stand of trees, less than an acre in size, would be cleared under this proposal. Disturbing ground to build the new plant may proliferate the spread of exotic weeds that already occur in this area, as well as potentially introduce new exotic plants to this area. To reduce the exotic plant infestation in the area, three primary steps will be taken: 1) herbicidal treatment of the area would occur for two years before the project (such treatments are ongoing) and five years thereafter; 2) equipment entering the park will be cleaned and inspected to be sure they are not carrying exotic plant seeds; and 3) equipment leaving the construction site will be cleaned before leaving.

The acre of clearing would be mitigated in part through revegetation of the land upon which the current wastewater plant sits, close to the West Entrance Road. This land is already partially infested with exotic plants. For that reason, even though the acreage to be revegetated is similar to that which would be cleared, full mitigation would not be possible, and impacts upon vegetation under this proposal would be direct, localized, minor, and long-term.

Cumulative Impacts

Construction projects in the western part of Yellowstone will continue. These projects will have a varying effect on vegetation and rare plants. Within Yellowstone, all projects must undergo the rare plant inventory that was done at this project's site. All Yellowstone projects must avoid moderate or major impacts on rare plants. Given the small acreage that would be permanently disturbed by this project and the non-disturbance of the Yellow sedge on site, this alternative would have a minor effect on vegetation and rare plants.

Conclusion

Impacts on vegetation and rare plants would be minor, direct, local, and long-term. According to the criteria specified under Alternative 1, no impairment to vegetation and rare plants would result as a result of this alternative.

Wildlife

Methodology and Intensity Thresholds

All available information on known wildlife was compiled. Where possible, map locations of sensitive species sightings in the Madison area were reviewed. Predictions about short- and long-term site impacts were based on existing monitoring data from Yellowstone National Park. Note that threatened and endangered species are considered separately under the impact topic immediately following wildlife.

The thresholds of change for the intensity of impacts to wildlife are defined as follows:

Negligible:	Wildlife would not be affected or the effects would be below the level of detection.
Minor:	Effects to wildlife would be detectable, although the effects would be localized, short-term, and of little consequence to the species' population. Mitigation measures to offset adverse effects would be proposed.
Moderate:	Effects to wildlife would be readily detectable, localized but long-term, with consequences potentially at the population level. Mitigation measures proposed to offset adverse effects would be extensive.
Major:	Effects to wildlife would be obvious, long-term, and would have substantial consequences to the wildlife population(s) in the park. Mitigation measures proposed to offset adverse effects would be extensive.

Impacts of Alternative 1 on Wildlife

Impact Analysis

Continued operation of the Madison Wastewater Plant would have a negligible effect on wildlife. Other than routine maintenance, repair, and upkeep activities, very little disturbance occurs; only short-term displacement occurs from the presence of personnel and equipment during the course of performing routine maintenance. Wildlife may be attracted to odors associated with untreated sewage that overflows during treatment failures. Effects from continued entrance operation on wildlife would be negligible.

Cumulative Impacts

Continuing construction projects in the western part of Yellowstone would occur. Each project's effects on wildlife must be evaluated independently and cumulatively. All moderate or major impacts on park wildlife must be mitigated. Current wastewater treatment plant operation has a negligible effect on park wildlife; continued operation of it would be expected to have a similar effect.

Conclusion

When combined with other past, present, and foreseeable future actions that would result in impacts to wildlife, this alternative would have negligible effects on them. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Wildlife

Impact Analysis

There would be short-term, direct, localized, and minor impacts on wildlife during the period of construction, and long-term, minor, direct, localized, but beneficial impacts to wildlife upon construction completion. Wildlife could be temporarily displaced from habitat adjacent to the site due to construction equipment and activity during construction. No increases in wildlife mortalities are expected, as potentially disturbing construction activities would be temporary and confined to the project area. Wildlife should reestablish migration and use patterns following construction (personal communication, Robert Garrot, Montana State University professor of biology, 2002).

Additionally, removal and rehabilitation of the existing sewage treatment plant would return that area to wildlife use. Over time, the area can be expected to return to mature lodgepole pine forest. In the next 30 years, the area will acquire the appearance of a meadow with seedling or sapling lodgepole pine gradually closing the canopy. Until the canopy closes, elk and bison may find the meadow plants preferential.

Effects on birds would be the same as on other wildlife. The proposed construction areas do not support current nesting sites for large and medium-sized birds, such as sandhill cranes, osprey, bald eagles, peregrine falcons, or trumpeter swans. Smaller-sized birds may have nesting or feeding activities interrupted by construction activities. Some short-term displacement will occur from human activities associated with construction activities. Removal of trees will eliminate a small number of potential perch and nesting sites. Bird species using the Madison area as habitat are expected to return once construction stops. No effects on Neotropical migratory birds are expected.

Actions related to this project would not impair fisheries or aquatic resources. Because the new plant will have backup generators, no sewage spills would be anticipated, so no sewage will be entering the meadows along the Madison River. This will then be a direct, minor, beneficial, and long-term impact. An erosion control plan specifying actions and placement of sediment traps to prevent most sediment from reaching any water bodies within the project area would be in place for this contract. Measures would be in place to prevent spread of exotic species or diseases to fisheries resources by the sanitation of water trucks and water intake equipment used for dust abatement. There would be no change on any rivers or creeks that would impede fish passage.

No amphibians or reptiles were found in the immediate project area, although both spotted frogs and garter snakes occur in the wetland on the southwest side of the project area (Jochimsen 2002). No impacts

are expected in this wetland, but negligible short-term adverse impacts may occur to any amphibians and reptiles that inhabit areas proposed for disturbance. Temporary or permanent displacement may occur and travel corridors may be interrupted, but all species in the area are common. There would not be any impairment to amphibian or reptile resources.

As with all Yellowstone construction projects, the NPS would direct the contractor to manage food and garbage so that they are not available to grizzly or black bears. Contractor staff would have to attend bear/food management orientation sessions and abide by the normal bear management guidelines.

Cumulative Impacts

Although a variety of construction projects will continue in Yellowstone, the majority within the park are replacements of existing roads or structures. All projects must minimize and, if needed, mitigate their effects on wildlife. This project's effects on wildlife are expected to be temporary and minor.

Conclusion

According to the criteria specified under Alternative 1 above, Yellowstone's wildlife would not be impaired as a result of this alternative's choice. Effects on this alternative on wildlife for the short-term would minor, localized, and direct; long-term effects would be direct, beneficial, localized, and minor.

Threatened and Endangered Species

Methodology and Intensity Thresholds

Yellowstone National Park biologists familiar with each of the threatened and endangered species present in Yellowstone were consulted for their knowledge and opinion on potential project impacts. These experts consulted records of threatened and endangered species sightings within three miles of the Madison developed area, historic records of sightings, and their detailed knowledge of the life habits of the species in question. The evaluation of effects included direct, indirect, interrelated, interdependent, and cumulative impacts as defined by the Endangered Species Act (ESA).

Consultation with the U.S. Fish and Wildlife Service (USFWS) will occur for this proposed project. During consultation (called §7 Consultation), any mitigation proposed by the park for impacts to threatened or endangered species would include avoidance, minimization, and conservation measures as defined by the ESA.

The thresholds of change for the intensity of impacts to threatened and endangered species are defined as follows:

Negligible: No federally listed species or its proposed or designated critical habitat would be affected. A "negligible effect" corresponds to a "no effect" determination by the park for §7, ESA purposes. Informal consultation with the USFWS might occur, but would not be required.

Minor: Effects are either (1) insignificant, discountable, or beneficial for individual members of the species, or (2) effects are localized, temporary, and of little negative consequence to individuals of the species, particularly for effects that relate to human disturbance or habitat modification affecting breeding, sheltering, or feeding of individuals. In situation #2, given implementation of mitigation (conservation) measures proposed by the park, a "minor effect" corresponds to a determination by the park of "may affect, but not likely to adversely affect" the species (or adversely modify proposed or designated critical habitat) for §7, ESA purposes. The USFWS must concur with this determination during consultation.

Moderate: Effects are readily detectable, localized, and are often long-term in nature. A "moderate" effect corresponds to a determination by the park of "may affect, likely to adversely affect" the species (or adversely modify proposed or designated critical habitat) for §7, ESA purposes and requires formal consultation with the USFWS. Mitigation resulting from consultation would include conservation measures proposed by the park and terms and conditions required by the USFWS to avoid and minimize the adverse effects to individuals that are certain to occur.

Major: Effects are readily detectable at the population level and are long-term in nature. A "major effect" corresponds to a determination by the park of "may affect, likely to adversely affect" the species (or adversely modify proposed or designated critical habitat) for §7, ESA purposes and requires formal consultation with the USFWS. Numerous mitigation (conservation) measures proposed by the park and terms and conditions required by the USFWS would result in significant changes to the project in order to avoid and reduce the adverse impacts to the species. However, if it is determined that the project (even after implementing the avoidance, minimization, and conservation measures) would jeopardize the continued existence of the species, the USFWS could issue reasonable and prudent alternatives to the project.

Impacts of Alternative 1 on Threatened and Endangered Species

Impact Analysis

Continued operation of the Madison Wastewater Plant would result in negligible effects on wolves, lynx, and bald eagles, and minor (insignificant) effects on grizzly bears present in Yellowstone. Other than infrequent maintenance and repair activities, no disturbance would occur. Sewage spills could present attractants to animals, but the spills would be small and localized, staying within the boundaries of the current plant.

Cumulative Impacts (as defined by NEPA)

Continuing construction projects in the western part of Yellowstone would occur, but each project's effects on wildlife will be independently and collectively evaluated; all moderate or major impacts on park endangered species will be minimized. The NPS consults with the U.S. Fish and Wildlife Service whenever park projects have effects on threatened and endangered species. Current wastewater plant operation has either negligible or minor effects on the park's four threatened species; continued operation of it would be expected to have a similar effect.

Conclusion

When combined with other past, present, and foreseeable future actions that would result in impacts to threatened or endangered species, this alternative would have no effects on lynx, bald eagles, and wolves. This alternative is not likely to adversely affect grizzly bears. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Threatened and Endangered Species

Impact Analysis

Selection of this alternative would have negligible to minor (insignificant or beneficial) effects on the four threatened species found in Yellowstone.

Bald Eagles.
This alternative would have no effect on bald eagles. No disturbance of nesting eagles would take place because the project area is over a mile from the nearest active bald eagle nest. No nest trees would be cut or modified--and few nest trees occur in the Madison area. Foraging eagles would not be disturbed because the project is greater than 1,000 feet from the Madison River (McEneaney 2002).

Grizzly Bears.
The proposed project may affect, but is not likely to adversely affect grizzly bears.

Effects of development on grizzlies can be divided into direct and indirect effects. Direct impacts include loss of habitat that is permanently altered, such as by the construction of wastewater treatment facilities. The actual loss of habitat to bears from the wastewater treatment development contained in this proposal would likely be insignificant, amounting to about 2.5 acres. This would be offset by conservation measures such as better sanitation procedures associated with a functioning sewage treatment system, which will reduce potential human/bear conflicts, and through reclamation of about one acre of land currently disturbed at the existing wastewater plant. Such reclamation along with consolidation of the treatment plant into one defined area will be a long-term benefit to the bear, as development will be more compact with a consequent decline on its impact on bear habitat.

There are two primary bear-related concerns caused by indirect effects associated with the proposed project. There is slight potential for a short-term increase in bear-human conflict and subsequent human-caused grizzly bear mortality in the Madison area if there are sanitation problems associated with contractor employees working on the project. As two conservation measures, the National Park Service will implement the policies set forth in its 1982 Grizzly Bear Management Program and will conduct mandatory "Living in Bear Country" education/orientation sessions for all contract employees working on the project. During previous large construction projects within the park, pre-construction orientation sessions with contractors have been successful at ensuring compliance with bear sanitation regulations and minimizing the potential for bear-human conflicts and related human-caused bear mortalities.

A second indirect concern is that there is potential for short-term displacement of grizzly bears from habitat adjacent to the project site during the construction phase due to the additional noise and traffic associated with construction activity. Grizzly bears seldom use the Madison area because it is low-quality bear habitat, so such displacement is extremely unlikely to occur and therefore discountable. Furthermore, most grizzly use of this area is in spring, before construction is likely to begin. Long-term displacement of bears from the area after construction should be no greater than what is caused by the present operation of the existing facility and therefore should cause no additional impacts to bears.

The proposed alternative would have negligible long-term negative impacts on the park's grizzly bear population. Furthermore, potential short-term impacts would be minor (insignificant, discountable, and/or beneficial), localized, and indirect.

Gray Wolves.
The proposed project would have no effect on gray wolves. Wolves rarely use the Madison area. The project stipulations outlined for grizzly bears would include an orientation on wolves. As with bears, if

wolf activity occurs in the project area, restrictions on a contractor's activities will be imposed as needed. The proposed construction is not expected to increase wolf mortality or impact elk or any other species preyed upon by wolves. It is not expected to be a barrier to traveling wolves (Smith 2002). While some wolves may hear and see construction activities, wolves travel widely and have not appeared to alter their habits even when being viewed by hundreds of visitors. In sum, there would be negligible impacts upon wolves under this alternative.

Canada Lynx.
This alternative would have no effect on Canada lynx. The Madison area does not occur in a Lynx Analysis Unit and few, if any, lynx occur in the area. Because the new buildings would be small in size and would occur in close proximity to an existing developed area, movements of lynx that might pass through the area would not be impeded. Net loss of habitat for snowshoe hares, the primary prey of lynx, would be insignificant (personal communication, Kerry Murphy, management biologist, Yellowstone National Park, 2003).

Cumulative Impacts (as defined by NEPA)

This alternative proposes only to replace an existing development with a new one, with the size of disturbed areas closely approximating the size of reclaimed areas. Continuing construction projects in the western part of Yellowstone would occur, but each project's effects on threatened and endangered species will be independently and collectively evaluated. The park will work with the USFWS to minimize adverse effects on threatened species during informal or formal consultation.

Conclusion

There would be no effects on bald eagles, gray wolves, and lynx. The project may effect, but is unlikely to adversely affect, grizzly bears. Pursuant to the impairment provisions listed under Alternative 1, this alternative would not impair any threatened or endangered species found in Yellowstone.

Air Quality

Methodology and Intensity Thresholds
Analyses of the potential intensity of impacts to air quality were derived from the available air quality information and reports on air quality in western Yellowstone. Park staff's knowledge of air movements and vehicle emissions in the Madison area complemented written information. The thresholds of change for the intensity of impacts to air quality are defined as follows:

Negligible:	No changes would occur or changes in air quality would be below or at the level of detection, and if detected, would have effects that would be considered slight and short-term.
Minor:	Changes in air quality would be measurable, although the changes would be small, short-term, and the effects would be localized.
Moderate:	Changes in air quality would be measurable and would have consequences, although the effect would be relatively local.
Major:	Changes in air quality would be measurable, would have substantial consequences, and be noticed regionally.
Impairment:	a major, adverse impact to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing

> legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

Impacts of Alternative 1 on Air Quality

Impact Analysis

Continued operation of the Madison Wastewater Treatment Plant would cause minor, short-term, direct, and localized impacts on air quality in the park or region. Odors from the existing plant would continue to present minor irritation to campground users. However, such odors result in no degradation of air quality, and are transitory in nature.

Cumulative Impacts

The majority of construction projects in the western part of Yellowstone have only temporary impacts on air quality. The near violations of the Clean Air Act that have occurred at the West Entrance have been largely eliminated through increasing use of less polluting best available technology snowmobiles (National Park Service 2003). Continued operation of the Madison Wastewater Treatment Plant would not contribute to any air quality degradation in Yellowstone.

Conclusion

When combined with other past, present, and foreseeable future actions that would result in impacts to air quality, this alternative would have negligible effects. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Air Quality

Impact Analysis

This alternative would have minor, short-term, direct, and localized effects on air quality in Yellowstone. Dispersed dust and mobile exhaust emissions would be caused by truck traffic and equipment activity, but would not be in sufficient quantities to degrade park air quality. All contractor activities would comply with state and federal air quality regulations, and contractors would operate under applicable permits. Odors from the new plant will be reduced and further in origin from the campground. Therefore, the preferred alternative will result in a long-term, direct, localized, minor, and beneficial impact to park resources and to the visitors using the campground.

Cumulative Impacts

Because this alternative would have a long-term beneficial (though minor) benefit on air quality, as detailed above, it would not have adverse cumulative impacts on it.

Conclusion

In general, this alternative's actions would not impair the park's air quality, but should instead improve it. While there would be minor, localized, direct, and short-term adverse impacts due to construction dust and fumes, there would be long-term, direct, localized, and minor benefits due to reduced odor problems in the wastewater treatment and campground areas.

Visual Quality, including Lightscapes

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to the visual quality of the landscape were derived from the available information on viewsheds and lightscapes (the impact of lighting on the night sky) in the Madison area and park staff's past observations of the effects on visual quality and lightscapes from both visitor use and construction activities. The thresholds of change for the intensity of impacts to visual quality are defined as follows:

Negligible: No changes in the visual quality of the landscape, including nighttime lighting, would result or any changes would be below the level of detection.

Minor: Effects on the visual quality of the landscape, including nighttime lighting (as measured through night photography), would be detectable, but the effects would be small, localized, and temporary. Mitigation measures (including the use of full cut-off lighting fixtures for nighttime lighting effects) would be proposed to offset any adverse impacts.

Moderate: Effects on the visual quality of the landscape, including nighttime lighting (as measured through night photography), would be readily apparent. Such effects would be long-term but localized within the area. Mitigation measures proposed to offset adverse effects, including full cut-off fixtures and reduction in luminance for nighttime lighting effects, would be extensive.

Major: Effects on the visual quality of the landscape, including nighttime lighting would be obvious, long-term, noticeable throughout the immediate area, and readily apparent in night photography for lighting effects. The visual quality of the park's landscape and nighttime dark skies would be substantially affected. Mitigation measures proposed to offset adverse effects would be extensive and difficult.

Impacts of Alternative 1 on Visual Quality

Impact Analysis

Continued operation of the Madison Wastewater Treatment Plant would result in direct, localized, long-term, and minor effects on visual quality in that area. Most people do not enjoy the sight of a wastewater treatment plant. Because the Madison Wastewater Plant is visible from the West Entrance Road, and is not a natural feature (thus drawing one's attention), this alternative would have a continuing adverse, although minor, impact on the visual quality within the West Entrance Road corridor. Similarly, the mercury-vapor yard lamp present in the existing wastewater treatment plant would be retained, and illumination of this area, which is remote from other lighted areas, would continue.

Cumulative Impacts

Continuing construction projects in the western part of Yellowstone would occur, but each project's effects on visual quality and night sky resources must be independently and collectively evaluated. The National Park Service fully recognizes the importance of preserving Yellowstone's scenic views.

Conclusion

When combined with other past, present, and foreseeable future actions that would result in impacts to lightscape management, this alternative would have minor effects. Because there would be no adverse

impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Visual Quality

Impact Analysis

This alternative would have a minor, long-term, localized, direct, and beneficial effect on visual quality and lightscapes along the West Entrance Road. Removing and rehabilitating the existing plant will return that area to its native, natural appearance. An attention-grabbing human structure and associated mercury vapor yard light would largely disappear and the area would revert to a natural scene. For a few decades after construction, the old sewage plant area would resemble a meadow that will gradually succeed to lodgepole forest. The new plant will feature only motion-sensitive, full cut-off outdoor lighting.

Cumulative Impacts

Although a variety of construction projects will continue in Yellowstone and the West Yellowstone area, the majority within the park consists of replacements of existing roads or structures. All projects must minimize their effects on visual quality. This project's effects on visual quality within the Madison area and Yellowstone National Park are expected to be minor but beneficial.

Conclusion

Alternative 2 would have direct, local, minor, and long-term improvements on the park's visual quality. Pursuant to the criteria listed under Alternative 1, this alternative would result in no impairment of visual quality.

Soundscape Management

Methodology and Intensity Thresholds

The natural soundscape is an intrinsic resource or value of park lands, and includes all of the sounds of nature absent any sounds from human sources. Impacts on the natural soundscape are complex, as with many other resources and values. Complexity is a blend of the geographic source, frequency, and magnitude of human-made sound. Audibility (i.e., whether a sound can be heard at all within the natural soundscape), sound level (i.e. amount of sound energy or "loudness" of the sound), and time factors (i.e., duration, frequency of occurrence, and timing) of noise all determine whether a noise is an impact on the natural soundscape. The definition of impact levels takes these factors into account, and are defined as follows:

Negligible:	An action that does not affect the natural soundscape or the potential for its enjoyment, or that affects the natural soundscape or potential for its enjoyment, but with infrequent occurrence and only for short duration at low sound levels. At this impact level, unique soundscape characteristics (such as bubbling hot springs or geysers) are not affected.
Minor:	An action that may affect the natural soundscape or potential for its enjoyment in zones of use where human-made sounds are expected. In those zones, the duration, frequency of occurrence, and sound level of the intruding noise are all considered no more than minor. Noise is rarely audible more than 50% of the time in these zones, and levels are rarely 50 dB or greater at 100 feet, or 10 dB or

greater at 1,000 feet. Relatively few acres are affected in management zones where noise is not expected to be audible, and in those zones effects are infrequent with short duration and at low levels.

Moderate: An action that may affect the natural soundscape or potential for its enjoyment in zones of use where human-made sounds are expected. In those zones, either the duration, frequency of occurrence, or sound level of the noise is considered moderate, but no impacts from any of these upon the natural soundscape are considered major. Specifically, noise is audible 50% or more of the time in a minority of the area of these zones, and/or levels are often 50 dB or greater at 100 feet or 10 dB or greater at 1,000 feet. A relatively disproportionate area is affected in management zones where noise is not expected to be audible, and/or in those zones effects are more than infrequent or of more than short duration or low level.

Major: An action with an easily recognizable adverse effect on the natural soundscape or potential for its enjoyment. In zones where man-made sounds are expected, a noise is major if it is audible for more 50% or more the time in half of such zones. Alternatively, if any one of the noise's duration/frequency/levels are considered major, the overall impact is considered to be major. A relatively disproportionate area is affected by noise in management zones where noise is not expected to be audible, or where any of duration/frequency/level in those zones is considered moderate or greater.

Impacts of Alternative 1 on Soundscapes

Impact Analysis

Continued operation of the Madison Wastewater Treatment Plant would cause minor, direct, local, and long-term adverse impacts on soundscapes in the park or region. Noise emanating from the existing sewage treatment plant is audible at times from the areas of the campground nearest it.

Cumulative Impacts

Continuing construction projects in and around Madison and the western portion of Yellowstone will slightly elevate noise levels, but most construction projects are temporary in nature, along with their noise.

Conclusion

When combined with other past, present, and foreseeable future actions that would result in impacts to soundscapes, this alternative would have minor, direct, local, and long-term effects. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Soundscapes

Impact Analysis

Construction of this alternative would result in long-term, direct, minor, local, and beneficial impacts on the park's soundscape, but short-term, direct, minor, local, and adverse impacts on soundscapes. During

the construction phase, construction equipment would generate some noise. Such noise, like the traffic noise, would generally stay restricted to the immediate area.

Removing the existing plant, with its noisy aerator, to the more distant percolation ponds will decrease the noise audible from the road and campground. The new plant will have an outdoor aerator that will be approximately equal in volume to the existing one, but further removed from visitor areas. Therefore, there should be a net reduction of noise produced in the area.

Cumulative Impacts

Like most construction projects, some temporary noise creation would result as construction of the new treatment plant proceeds. Unlike most construction projects, however, this alternative would reduce overall noise creation on a long-term basis. Therefore, this project would have minor, but positive cumulative effects.

Conclusion

Alternative 2 would have minor, direct, local, and short-term adverse noise impacts, but minor, direct, local, and long-term reductions of noise. Pursuant to the criteria specified under Alternative 1, this alternative should act to improve the park's soundscape; impairment would not result.

Historic and Archaeological Resources

Methodology and Intensity Thresholds

In order for a historic site, structure, or building to be eligible for the National Register of Historic Places it must meet one or more of the following criteria of significance:

- A: it is associated with events that have made a significant contribution to the broad patterns of our history;
- B: it is associated with the lives of persons significant in our past;
- C: it embodies the distinctive characteristics of a type, period, or method of construction; or represents the work of a master; or possesses high artistic value; or represents a significant and distinguishable entity whose components may lack individual distinction; or
- D: it has yielded, or may be likely to yield, information important in prehistory or history.

A historic building or structure must also possess integrity of location, design, setting, materials, workmanship, feeling, and association.

Section 106 (§106) consultation (as described in the National Historic Preservation Act of 1966, as amended) with the appropriate State Historic Preservation Officer (SHPO) will occur for a proposed project. The Advisory Council on Historic Preservation is invited to participate if a proposed project is considered a major undertaking.

Analyses of the potential intensity of impacts to historic resources were derived from a review of the List of Classified Structures, research in the park archives to determine the potential eligibility of the historic resource(s), and on-site investigations to determine a project's proximity to historic resources.

Most of the Madison campground area is within archeological site 48YE365, which has been determined eligible for listing to the National Register of Historic Places. However, the entire wastewater treatment plant area, including the new water line, falls outside that site.

The thresholds of change for the intensity of impact to historic resources are defined as follows:

Negligible: Historic resources would not be affected or the effects would be below the level of detection. A "negligible effect" corresponds to a "no effect" determination by the park for §106 purposes. Informal consultation with the SHPO might occur, but would not be required.

Minor: Effects to historic resources would be detectable (e.g., minor replacement of deteriorated historic fabric with new, in-kind material, or minor external alterations that do not affect the character-defining features of the structure or building), although the effects would result in little, if any, loss of significance or integrity. The National Register eligibility of the historic resource would not be affected by the project. A "minor effect" corresponds to a "no adverse effect" determination by the park for §106 purposes. Consultation with the SHPO would occur.

Moderate: Effects to historic resources would be readily detectable, would have the potential to diminish the significance or integrity of the site, structure, or building, and may jeopardize its National Register eligibility. A "moderate effect" corresponds to either an "adverse effect" or a "no adverse effect" for §106 purposes depending on mitigation measures proposed. Mitigation measures resulting from consultation could include such items as conservation measures to stabilize the site, structure, or building; Historic American Building Survey (HABS) level photography and/or as-built construction drawings; large-scale, in-kind replacement of historic fabric or use of simulated materials to replicate historic fabric; reuse of portions of the historic structure or building; and/or design of the new structure or building to preserve elements of form and function of the historic structure or building.

Major: Effects to historic resources would be obvious, long-term, and would diminish the significance and integrity of the site, structure, or building to the extent that it is no longer eligible for listing in the National Register. A "major effect" would correspond to an "adverse effect" for §106 purposes.

Impacts of Alternative 1 on Historic and Archeological Resources

Impact Analysis

Continued operation of the Madison Wastewater Treatment Plant would have a negligible effect on site 48YE365. Official vehicle traffic into the wastewater treatment plant area would continue, causing a minor amount of erosion that could expose new artifacts. However, such trips are limited to less than a handful daily, and the wastewater treatment plant is outside of the archeological site. There would be only sporadic repair work to existing collection lines and the treatment facility under this alternative. There would be limited potential for disturbance to known or unknown historic, prehistoric, and ethnographic resources. None of this work would be performed in areas that have not already been disturbed from construction of the current wastewater facility.

Cumulative Impacts

As visitor use of Yellowstone increases, more and more recreationists will use public lands. Increasing visitation to these lands could result in a greater occurrence of cultural sites being damaged. Yellowstone has recorded damage at many historic sites. Adding to this deterioration are the effects of time and weathering on historic resources that are not maintained regularly or archaeological sites that have not been stabilized. The cumulative impact of Alternative A, when combined with other past, present, and foreseeable future actions, would be negligible, because little, if any change would occur to site 48YE365.

Conclusion

Regional population pressures and increasing visitation in public lands would increase the chance of the discovery and damage of cultural sites. The cumulative effect of this alternative, when combined with other past, present, and foreseeable future actions, is expected to be negligible. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Historic and Archeological Resources

Impact Analysis

Construction of a new wastewater treatment plant could disturb artifacts that have not been located. However, the project location is distant from site 48YE365, and no artifacts have previously been discovered in this immediate area. Therefore, disturbance of any historic or archeological resources is unlikely. For these reasons, the project is expected to have at most a localized, temporary, minor, and short-term impact on historic and archaeological resources in Yellowstone.

Construction zones would be kept to the minimum necessary through fencing around the zones. No construction activities would be allowed outside of such zones, and construction contracts will specify this, along with penalties for violation thereof. If construction activities discover previously unknown archeological resources, all work immediately on or adjacent to the site would stop until the park archeologist could identify and document the resources, and until the Wyoming SHPO and NPS could develop an appropriate mitigation strategy.

Cumulative Impacts

Loss of historic and archeological resources, due to a variety of causes, continues in the Yellowstone area. It is highly unlikely that this project would contribute to that loss, because the project does not contribute to the significance of site 48YE365. Thus, the cumulative effects of this project would be negligible or minor.

Conclusion

Alternative 2 would result in minor, direct, local, and short-term impacts upon the historic and archeological resources of site 48YE365 and the Madison area. Pursuant to the criteria specified under Alternative 1, any impairment of historic resources would be avoided.

Socioeconomic Resources

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to socioeconomic resources were derived from park staff's observations of the effects on such resources from both visitor use and construction activities. The thresholds of change for the intensity of impacts to socioeconomic resources are defined as follows:

Negligible: No effects would occur or the effects to socioeconomic conditions would be below or at the level of detection. The effect would be slight and no long-term effects to socioeconomic conditions would occur.

Minor: The effects to socioeconomic conditions would be detectable, although short-term. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.

Moderate: The effects to socioeconomic conditions would be readily apparent and likely long-term. Any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful.

Major: The effects to socioeconomic conditions would be readily apparent, long-term, and would cause substantial changes to socioeconomic conditions in the region. Mitigation measures to offset potential adverse effects would be extensive and their success could not be guaranteed.

Impacts of Alternative 1 on Socioeconomic Resources

Impact Analysis

Continued operation of the Madison Wastewater Treatment Plant would have negligible impacts upon the regional socioeconomic resources. Only one or two persons are employed in the day-to-day operation of the plant. However, if the plant were to completely fail, the Madison Campground would have to be closed. If that were to happen, the visitors who camped at Madison would have to find alternative places to camp. While some of these would be at other campgrounds in the park, others would be outside the park. Some could be turned away entirely. Economic impacts on Xanterra, the park's concessioner who operates the campground, would be adverse. Economic impacts upon the regional economy would be less noticeable, but would still be adverse. Under this option, failure of the treatment plant is a possibility, though not likely. If it were to happen, however, socioeconomic impacts would be moderate, long-term, regional, and both direct and indirect.

Cumulative Impacts

While various projects continue in and around Yellowstone, most projects tend to stimulate the local economy through construction spending, rental income, supply purchase, etc. Continuing use of the Madison Wastewater Treatment Plant would not result in such stimulation, and would result in a negligible impact overall to the regional economy. Failure of the treatment plant, though, would be a slight blow on the local and regional economy.

Conclusion

Continuing usage of the Madison Wastewater Treatment Plant would have negligible effects on the regional economy, unless the plant were to fail completely. The cumulative effect of this alternative, when combined with other past, present, and foreseeable future actions, is expected to be negligible, unless (again) the plant fails. Even if that were to happen, impairment of park resources or values would be unlikely, because the ten other campgrounds in Yellowstone could serve most campers. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Socioeconomic Resources

Impact Analysis

The project is likely to have short-term, direct, localized, and minor impacts (both adverse and beneficial) on socioeconomic resources, and direct, local, beneficial, and long-term effects. Short-term costs to visitors and others would be more than offset by short- and long-term benefits.

Short-term benefits would include economic gains for businesses and individuals within the Greater Yellowstone Area. Direct benefits would flow from construction-related expenditures (the approximate cost of the project is $3.8 million) such as purchase and transport of building materials and employment of construction workers. Some new construction-related, temporary jobs may be created within the regional economy due to this project. These benefits would be affected by the location of the contractor's base of operations, sources of materials, and source of the labor supply. Indirect benefits would occur in proportion to the amount of direct expenditures that occur within the region and the degree to which these funds are re-circulated within the regional economy.

Community businesses would benefit from expenditures within the local economy by the contractors and their employees. For instance, many construction employees might reside in West Yellowstone or stay in local motels, as the rental housing market may not be sufficient to satisfy the demand. Some new jobs may be created within the local economy due to construction activities. These jobs and other construction-related spending by contractors and their employees would provide benefits to the local communities.

Possible disturbance to park visitors, park staff, park residents, and association businesses in the Madison area from construction activities would be temporary and would only continue during the life of the project. Construction would not impact traffic flow, other than the addition of occasional truck traffic.

The tourism segment of the regional economy would be made more secure by improvements to the wastewater systems within Yellowstone National Park. Failure of the treatment plant would be extremely unlikely, so the continued operation of the Madison Campground would be secure. Park operations would improve because of reduced maintenance costs and a safer, dependable functioning of the sewer system.

Cumulative Impacts

While various projects continue in and around Yellowstone, most projects tend to stimulate the local economy through construction spending, rental income, and/or supply purchases. This project would have such effects on the nearby economy, and would result in slight long-term stimulation to the economy because continued operation of the campground would be guaranteed.

Conclusion

Alternative 2 would have direct and indirect, local, short- and long-term, and minor positive impacts on the area's socioeconomic resources. Pursuant to the criteria specified under Alternative 1, this alternative would have minor long-term beneficial impacts on the local economy. No impairment would result.

Visitor Use and Experience

Methodology and Intensity Thresholds

Analyses of the potential intensity of impacts to visitor use and experience were derived from available information on visitor use of Yellowstone Park and the Madison area, including statistics kept by the Yellowstone Visitor Services Office. The thresholds of change for the intensity of impacts to visitor use and experience are defined as follows:

Negligible: Visitors would not be affected or changes in visitor use and/or experience would be below the level of detection.

Minor: Changes in visitor use and/or experience would be detectable, although the changes would be slight and likely short-term. The visitor may or may not be aware of the effects associated with the alternative.

Moderate: Changes in visitor use and/or experience would be readily apparent and likely long-term. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.

Major: Changes in visitor use and/or experience would be readily apparent and have important long-term consequences. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

Impacts of Alternative 1 on Visitor Use and Experience

Impact Analysis

Continued operation of the Madison Wastewater Treatment Plant would have direct, minor, local, and short-term impacts on park visitors. However, complete failure of the plant would have direct, moderate, local, and long-term impacts on park visitors.

Without improvements in the wastewater treatment system, continued expensive and yet inadequate maintenance activities would be required to keep the wastewater treatment facility open. These maintenance activities would negatively affect the visitor experience on an unpredictable basis due to temporary closures for repairs.

Continuing the current situation in the project area would not improve visitor experiences and would expose visitors and staff to continued inconveniences. Although the cost of a new wastewater facility would be avoided in the short-term, that savings would be achieved at much greater operational expense in the long run. On-going maintenance and safety problems providing sewage disposal would not be resolved. The current system cannot be relied upon to provide dependable service for the foreseeable future.

The potential for complete failure of the sewage system continues, which would result in the closure of the popular campground. Closure of the area would inconvenience visitors on tours that depend on the availability of clean restrooms at the Madison Picnic area. Additionally, failure of the treatment plant would probably result in the closure of the historic Madison museum, as well as the amphitheater and the educational opportunities found at both.

Cumulative Impacts

Visitation to Yellowstone increased throughout the early 1990s, but leveled off at about 2.8 million annual visitors in the late 1990s, and has remained close to that level since. However, the NPS expects the upward trend to resume if the economic conditions of the mid 1990s return.

In the late 1980s, the National Park Service began to modernize its wastewater treatment plants. The Canyon, Fishing Bridge, and Old Faithful Plants have been rebuilt or renovated, and a new treatment plant is being constructed at Norris. The Madison plant is the last one needing replacement. Continued operation of it would have a minor cumulative impact.

Conclusion

The cumulative effect of this alternative, when combined with other past, present, and foreseeable future actions, is expected to be minor. Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation for Yellowstone National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Impacts of Alternative 2 on Visitor Use and Experience

Impact Analysis

Selection of this alternative would have short-term, localized, direct, and minor impacts upon Yellowstone's visitor use and experience. However, long-term, direct, localized, and minor benefits for visitors would include improved safety for them and a decreased likelihood of campground closure due to wastewater treatment failure. The prevention of sewage spills would decrease the chance for visitors to encounter contamination.

The West Entrance Road would experience a minor increase in volumes of heavy truck traffic during the project construction period. Visitor traffic would be affected by this use within the park, and would be affected by short-term delays during installation of the new water main to the sewage treatment plant. Visitors traveling through construction areas would also experience short-term inconveniences. Dust, fumes, and noise would be possible. There would be some increased hazards because of construction work. Staging areas for construction equipment and building supplies would not intrude on visitor experiences, as all of these would be located on service roads closed to public travel.

Wastewater treatment generates some noise from blowers and creates varying degrees of odor. Odors from the existing plant sometimes travel to the campground today. Because the new plant will both use better technology and be further removed from the campground, problems with unpleasant odors will greatly decrease, if they would be present at all. Construction of the new plant would remove the danger of closure to the entire Madison area that failure of the existing plant presents. Additionally, more effective treatment of the sewage would improve the overall safety of the park experience.

Cumulative Impacts

Given the possible trend toward increasing visitation, selection of this alternative would guarantee improved wastewater treatment for Madison area visitors. Selection of this alternative would have long-term, beneficial, and direct impacts on the visitor use and experience of Yellowstone.

Conclusion

This alternative would have minor, long-term, direct, and local beneficial improvements to the visitor use and experience, with short-term, direct, local, and minor adverse impacts upon it. Pursuant to the criteria listed under Alternative 1, this alternative would not impair the visitor experience in Yellowstone.

Other Planning Efforts in the West District of Yellowstone

Other actions would be occurring in the park during the course of this action. As of this writing, the National Park Service has completed an Environmental Assessment for an Interim Winter Use Plan, and will soon begin a long-term planning effort for a permanent winter use plan. Under the Interim Plan, up to 720 snowmobiles will be allowed into Yellowstone daily. They must use best available technology, and all visitors will be required to use trained guides to tour Yellowstone. The winter of 2003-04 partly employed such restrictions, resulting in reduced noise and air pollution.

The National Park Service is proposing to replace the West Entrance with a new facility in 2005, as well as to expand the Chamber of Commerce building in West Yellowstone to more adequately serve park visitors. In so doing, the NPS hopes to resolve the many structural, geographic, visitor service, office, and health and safety problems of the current entrance.

The NPS is also building a new sewage treatment plant at Norris, along with a new water treatment system. The water treatment plant will replace two wells currently used for water treatment in the area, and the wastewater treatment plant will replace two failed or failing leach fields.

Yellowstone continues to improve its poor quality roads. The first phase of the Norris-Madison road was completed in 2003, with the second phase beginning in 2005. These projects will replace the poor-quality, 20-foot wide road with a high-quality 30-foot roadbed. The road from Norris to Mammoth will undergo the same improvement upon the completion of the Madison-Norris road. The Dunraven Pass road from Canyon to Tower was closed in 2004 for a similar upgrade, and will be closed for most of the 2005 summer season to complete that project. The road from Canyon to Fishing Bridge was improved during the summer of 2004. Environmental assessments have been or will be prepared on all these road projects. Road improvements always follow existing alignments and/or revegetate former roads when new alignments are chosen.

The Finding of No Significant Impact (FONSI) for the Yellowstone Employee Housing Plan (part of the service-wide housing initiative) was signed in December 1992, and the FONSI for the Mammoth Housing Plan was recently approved. Construction of some housing units is proposed each year. In 11 developed areas, approximately 125 year-round and 347 seasonal housing units would be upgraded, replaced, or newly constructed if the plan was fully implemented. Current funding levels allow replacement or rehabilitation of only a few housing units annually. Work at East Entrance is complete and one four-plex unit was constructed at West Entrance. Construction of a new four-plex at Madison began in 2004. Work began in Lake and in Tower in 1997 and was completed in 1998. The concessioner is also upgrading employee housing at several developed areas, including a building with 14 apartments recently completed at Old Faithful. At Grant Village, housing to replace trailers may be constructed.

At Old Faithful a number of projects are ongoing or scheduled to implement the approved Development Concept Plan--Old Faithful (NPS 1985). Construction is complete on the new sewage treatment plant. Construction of employee housing (three multiple units) to replace deteriorated quarters began in 2001 and will continue as funding becomes available. Planning is currently underway for a new 40,000-sq. foot Visitor Education Center to replace the current Old Faithful Visitor Center. If approved following the completion of an EA, the project is currently scheduled for construction in 2006-07. Construction of a new dorm for concessioner managers began in 2002 and is complete. Renovation of the Old House portion of Old Faithful Inn recently began. Similarly, a number of projects are being undertaken in the Canyon area. Construction on a new visitor center began in 2004, and a new ranger station/emergency services building will also begin shortly.

Developments continue to occur on private land within the town of West Yellowstone. The town is surrounded by the Gallatin National Forest, which effectively limits the extent of development in town. Some development occurs on private land in the Hebgen Lake area, but such private land is again limited in extent, being interspersed among U.S. Forest Service (USFS) lands.

For the following reasons, Alternative 2 would have negligible cumulative effects upon the resources of the Yellowstone area: 1) It would only replace an existing wastewater treatment plant with another within Yellowstone National Park; 2) It would remedy some air and noise pollution problems; 3) It would provide consistent and improved wastewater treatment; and 4) It would improve the visual quality and night sky resource in the Madison area.

CONSULTATION AND COORDINATION

Based on this EA, if the project would significantly affect the human environment, a notice of intent (NOI) to prepare an environmental impact statement (EIS) would be issued. Conversely, a finding of no significant impact (FONSI) would be issued if it is determined that there would be no significant impact from this project.

Consultation with the USFWS on threatened and endangered species under 50 CFR Part 402, which implements the Endangered Species Act (16 U.S.C.A. § 1531 et seq.), would be completed. As part of the consultation process, the NPS would seek USFWS concurrence with its determination of effect on threatened and endangered species.

Contractor activities would comply with state and federal air quality regulations, and contractors would operate under applicable permits.

The undertakings described in this document are subject to Section 106 of the National Historic Preservation Act, under the terms of the 1995 Servicewide Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. This document will be submitted to the Wyoming State Historic Preservation Officer (SHPO) for review and comment.

Native American tribes traditionally associated with Yellowstone National Park would be contacted for input and comment on this project.

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AGENCIES AND ORGANIZATIONS CONSULTED

This Environmental Assessment is being sent to approximately 240 individuals, agencies and groups soliciting comments on the problems, issues, and alternatives addressed. A press release was issued on WHEN? The Environmental Assessment is posted on Yellowstone National Park's web page,

http://www.nps.gov/yell/technical/planning.

Agencies/Libraries That Will Receive This Environmental Assessment:

US Fish and Wildlife Service - Cheyenne, WY
Wyoming Office of Federal Land Policy
Wyoming State Historic Preservation Office
Billings, MT Public Library
Bozeman, MT Public Library
Cody, WY Public Library
Jackson, WY Public Library
West Yellowstone, Montana, Public Library
Yellowstone National Park Research Library

Tribes, Agencies, and Organizations That Will Be Notified Of This Environmental Assessment:

Northern Arapaho Tribe	Idaho Department of Commerce
Blackfeet Tribe	Idaho Department of Parks and Recreation
Northern Cheyenne Tribe	Idaho Fish and Game Department
Coeur d'Alene Tribe	Idaho State Historic Preservation Office
Confederated Tribes of Salish and Kootenai	Little Bighorn Battlefield NM
Crow Tribe	Montana Department of Commerce
Crow Tribe/Apsaalooke Nation	Montana Department of Fish Wildlife and Parks
Kiowa Tribe	Montana Intergovernment Review Clearinghouse
Nez Perce Tribe of Lapwai	Natural Resource Conservation Service - Bozeman
Nez Perce Tribe of Nespelem	and Cody
Nez Perce Tribe of Colville	Shoshone National Forest
Eastern Shoshone Tribe	Targhee National Forest
Shoshone-Bannock Tribes	Teton County Certified Local Government
Assiniboine and Sioux Tribes of Fort Peck	Town of West Yellowstone
Gros Ventre and Assiniboine Tribes	US Army Corps of Engineers
Cheyenne River Sioux Tribe	Western Federal Lands Highway Division
Crow Creek Sioux Tribe	Wyoming Department of Transportation
Flandreau Santee Sioux Tribe	Wyoming Game and Fish Department
Lower Brule Sioux Tribe	Wyoming State Clearinghouse
Oglala Sioux Tribe	Wyoming State Lands and Investments
Rosebud Sioux Tribe	Wyoming State Library
Standing Rock Sioux Tribe	Wyoming Travel Commission
Spirit Lake Sioux Tribe	ACHP Western Office of Project Review
Sisseton-Wahpeton Sioux Tribe	**ORGANIZATIONS**
Yankton Sioux Tribe	Alliance for Wild Rockies
AGENCIES	American Fisheries Society
Beaverhead National Forest	American Wildlands
Big Hole National Battlefield	Bear Creek Council
Bridger-Teton National Forest	Beartooth Alliance
Custer National Forest	Billings Chamber of Commerce
Environmental Protection Agency, Region 8 –	Bozeman Area Chamber of Commerce
Denver	Buffalo Bill Historical Center
Gallatin National Forest	Center for Urban Affairs
Glacier National Park	Cheyenne High Plains Audubon
Grand Teton National Park	Citizens for Teton Valley
Grant-Kohrs Ranch NHS	Cody Chamber of Commerce

Cooke City/Silver Gate Chamber of Commerce	Pinedale Chamber of Commerce
Defenders of the Rockies	Red Lodge Chamber of Commerce
Defenders of Wildlife	Riverton Chamber of Commerce
Fremont County Audubon Society	Sacajawea Audubon Society
Gallatin County Commissioners	Sierra Club Idaho Chapter
Gardiner Chamber of Commerce	Sierra Club Northern Plains Regional Office
Great Bear Foundation	Sierra Club Teton Group
Greater Yellowstone Coalition	Sierra Club Utah Chapter
Hamilton Stores, INC	Snake River Audubon Society
Idaho Falls Chamber of Commerce	Star Valley Development Association
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Jackson Hole Alliance for Responsible Planning	Teton County Commissioners
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Montana State University	Utah Audubon Society
Montana State Preservation Office	Utah Wilderness Association
Montana Wildlife Federation	Utah Wildlife Federation
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Nature Conservancy – Montana Chapter	Wyoming Wildlife Federation
Nature Conservancy – Wyoming Chapter	Wyoming Association of Professional Historians
National Wildlife Federation	Wyoming Heritage Society
Northern Plains Resource Council	Wyoming Outdoor Council
Northern Rockies Conservation Cooperative	Xanterra
Northwestern University	Yellowstone Association
Park County (MT) Commissioners	Yellowstone Park Foundation
Park County (WY) Commissioners	Yellowstone Valley Audubon Society
Park County Environmental Council	

APPENDIX A: Vegetation Management for Construction in Yellowstone National Park

Revegetation efforts within the park have focused on careful management of topsoil as the only available growing medium and seed source. This is based on a park policy that seed obtained from sources outside the park would contaminate the park gene pools. Although it is a conservative method, the topsoil management approach has worked well.

The park has an interagency agreement with the Bridger Plant Material Center to assist in the formation of a park seed bank. The park has also tested mulches and can make this information available upon request.

All construction work within the park involving ground disturbance will meet the following criteria for revegetation accepted by the park.

1. All construction will be limited to that area necessary to complete required work. No activity, including vehicle or material use or storage, will be allowed outside the predetermined zone. If vehicles are to be traveling through an area numerous times, the same tracks will be used to prevent compaction in other areas. Compacted zones will be treated (raking, aerating, and replacement of topsoil) to assist revegetation. No one will drive up topsoil at any time.

2. Excavation and improvement will be handled in manageable sections that reflect changes in the soil and vegetation. Trenching routes and disturbance zones will be flagged and approved by the park. All flagging and debris will be removed from the area after work is completed.

3. Sections will be rehabilitated as soon as possible. Topsoil will not be stockpiled over the winter or for longer than three months in sagebrush/rabbitbrush zones or longer than six months in grass-dominated zones. Any deviation must be approved by the NPS.

4. Topsoil refers to the uppermost soil horizon; it is usually found in the top 5 to 15 centimeters (2 to 6 inches). Topsoil will be removed and replaced from the same area. Care will be taken to ensure that topsoil and fill material are not mixed and are stockpiled in separate areas (e.g., topsoil to the right of the trench and fill to the left).

5. Vegetation over 0.9 meters (three feet) in height will be removed before the removal of topsoil and in a manner that least disturbs the topsoil. No one will drive upon, gouge, or compact topsoil as vegetation is removed. Topsoil will be removed before stumps are pushed. The park must approve any deviation from this process.

6. After large trees are removed, topsoil will be removed from an area in a single cut, including any vegetation that is 0.9 meters (three feet) tall and under. Grubbing is not permitted.

7. Irregular land surfaces are recommended for a natural effect. Some rock outcropping and boulders may be left in place to create natural pockets for revegetation (see item 11). Deadfall snags may be stockpiled for later use on slopes that are very steep to provide catch points for soil.

8. Topsoil will not be used as bedding material. Separate bedding material will be obtained from sources approved by the park.

9. Topsoil will be replaced on-site in a mixture of topsoil and vegetation associated with the topsoil and will be reworked over the site in a manner that preserves the seed source while spreading the soil over the area.

10. No topsoil will be imported from outside the park or moved internally within the park unless approved by the NPS. Any imported fill will be checked for exotic plants.

11. Trees and shrubs will be avoided if possible during trenching or excavation. Any trees removed during construction will be removed from the site unless specified by the park.

12. If replacement seed is required for revegetation in an area, the park will provide seed at cost to the contractor. Advance notice of six months to one year is required on projects exceeding 93 square meters (1,000 square feet).

13. Boulders unearthed during construction may be reburied or left exposed (with lower third buried) depending upon the location and extent of rock naturally occurring in the area.

14. If a trench is required, the surface of the trench will be left mounded to allow for settling along the line.

15. If mulch is required in sensitive areas due to visibility or exotic plant infestation, the park will specify the type and depth of mulch to be used. Nitrogen may be added in small quantities to any wood product used on slopes to balance nitrogen lost through decomposition.

16. No fertilizer will be used in any revegetation work unless requested by the park.

17. If relocated due to road reconstruction, junction boxes or cans will be placed in the field and approved by the park. Locations should be well screened by vegetation, topography, or large boulders.

18. All access to the site and stockpiling or staging areas will be identified by the contractor and approved by the park. These areas will be revegetated using approved techniques upon completion of the project.

19. All debris will be removed from the site to an approved pit or hauled away as approved by the park.

20. Final review and inspection will be made by the park before the work is accepted.