



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

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August, 2005

## Environmental Assessment

### Madison Area Wastewater Treatment Project





#### 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 5, 2005, and should be addressed to:

Superintendent  
Attn: Planning, Compliance, and Landscape Architecture  
Madison 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 archeological sites 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." With 3 million visitors annually touring Yellowstone, providing effective sewage treatment is crucial to both accommodating them while also protecting park resources and visitors. Today, Yellowstone National Park contains five sewage treatment facilities with another currently being constructed at Norris. All but one of the existing plants have been recently rebuilt or modernized; the sewage treatment 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 failure. A new wastewater treatment system would not only provide improved wastewater treatment (partial tertiary treatment), but it would also improve visitor services by providing more consistent treatment and would protect park resources by preventing sewage spills (as well as through improved treatment of sewage).

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 sewage 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 visitors (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, but the partially treated sewage is contained within the plant (the

sewage does not reach any surface waters). The plant's aging equipment makes 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 algae blooms and eutrophication when wastewater high in them is released to nearby surface waters (this situation has not occurred in Yellowstone). 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.

Providing adequate sewage wastewater treatment is in line with Yellowstone's "Strategic Plan" for the years 2001- 2005, both by enabling visitors to safely enjoy and be satisfied with the quality of park facilities, and also by protecting Yellowstone's air and water quality (NPS 2000).

### **Existing Conditions**

The existing Madison wastewater treatment plant serves the Madison area campground, the NPS employee housing and maintenance area, and the 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 hauled to a landfill. 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<sub>2</sub> 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 proximity of the sewage treatment plant to the campground (essentially right across the road from each other) means that occasional sewage odors are detectable in the campground. Further, the existing mercury vapor "yard" light is visible from those campsites closest to the road at night. Finally, the sound of sewage treatment equipment is occasionally audible as well.

The Madison area is popular in summer, with about 61 percent of the approximately 2.8 million Yellowstone visitors stopping at the Madison museum (pictured on the front cover), 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 during the summer season.

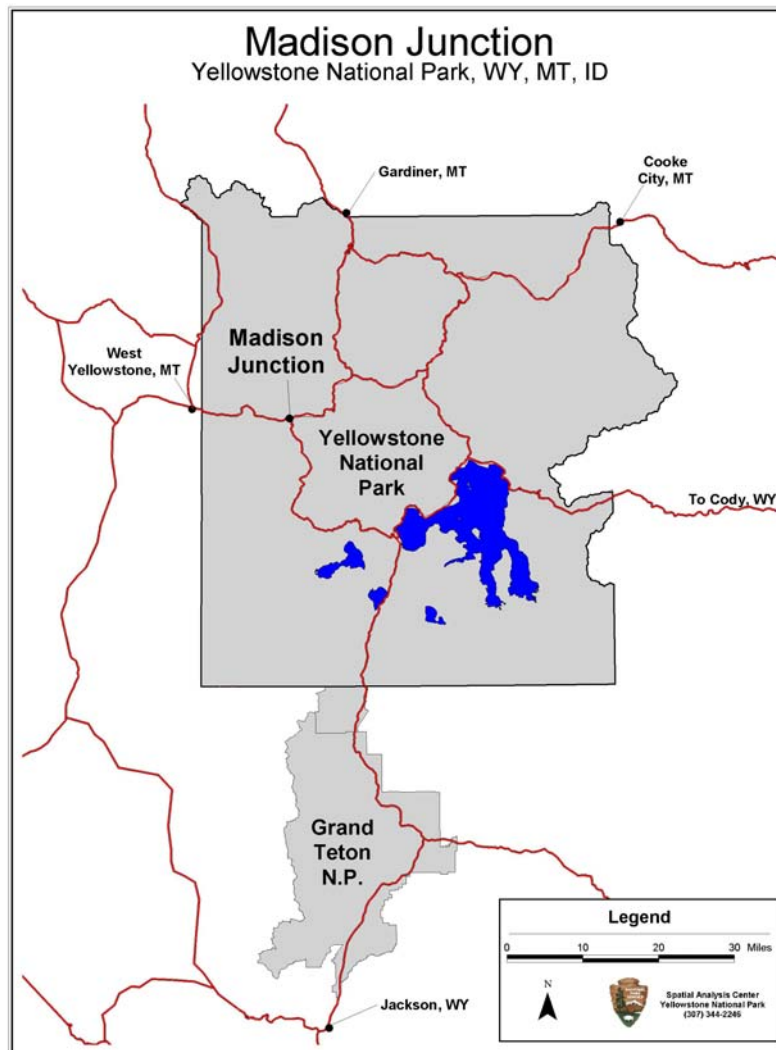
In the winter months, approximately 62 percent of the 60,000 to 90,000 seasonal visitors to the park interior stop at Madison Junction (Littlejohn 1996). Madison is one of only three locations in the park interior which provide a warming hut, food service, and full- service restrooms in winter. Additionally, 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 (or at West Yellowstone, fourteen miles west). 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 archeological 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 more feasible by a new, enlarged wastewater treatment plant.

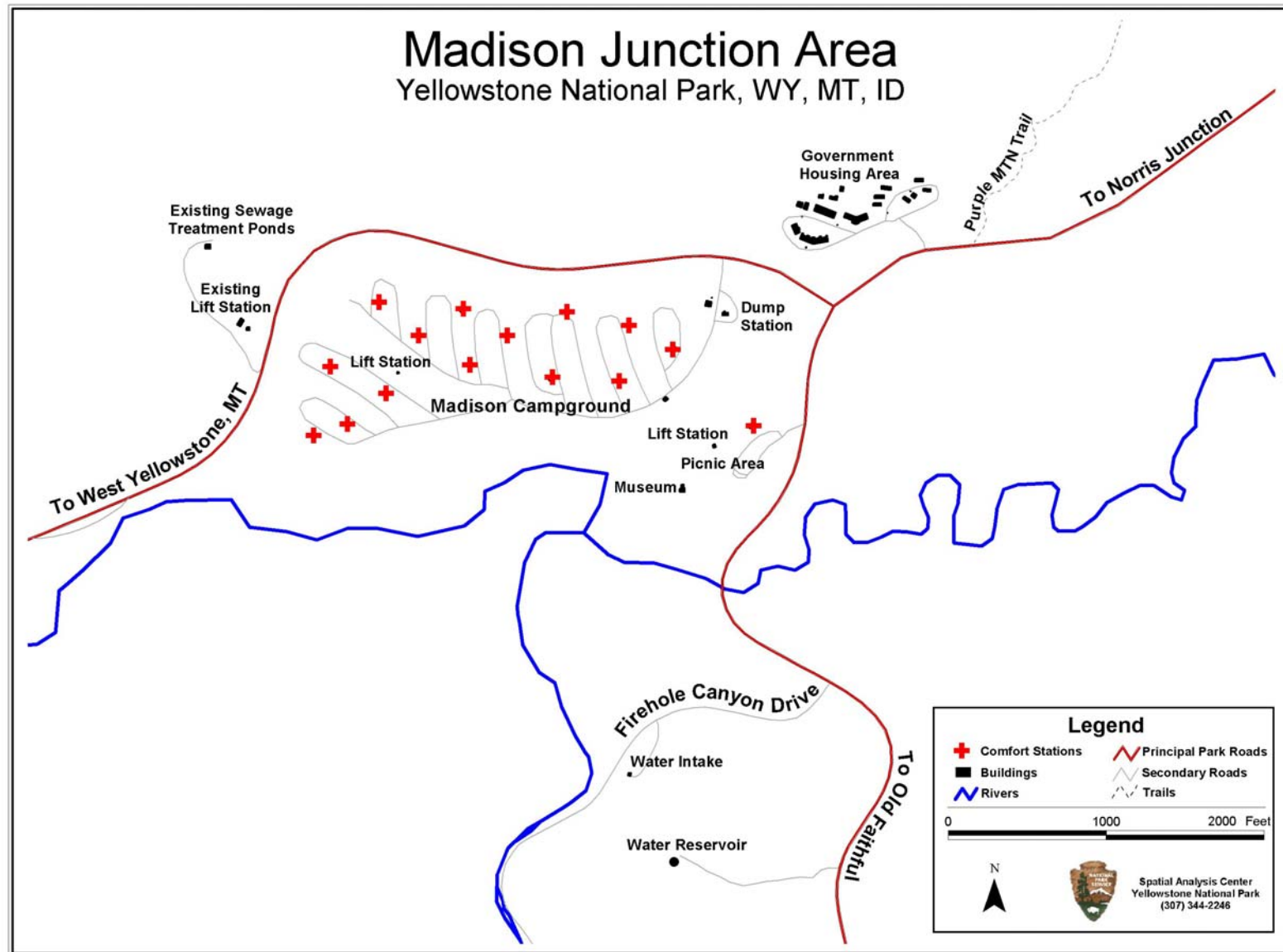
### *Scoping*

Scoping to identify issues, concerns, and alternatives about the proposed Madison Sewage Treatment Plant began in 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, sent to regional newspapers, and mailed as well to tribal representatives. Scoping ended November 1, 2002. Two comment letters were received, both from state or federal agencies expressing support for the project, with no additional impact topics suggested.

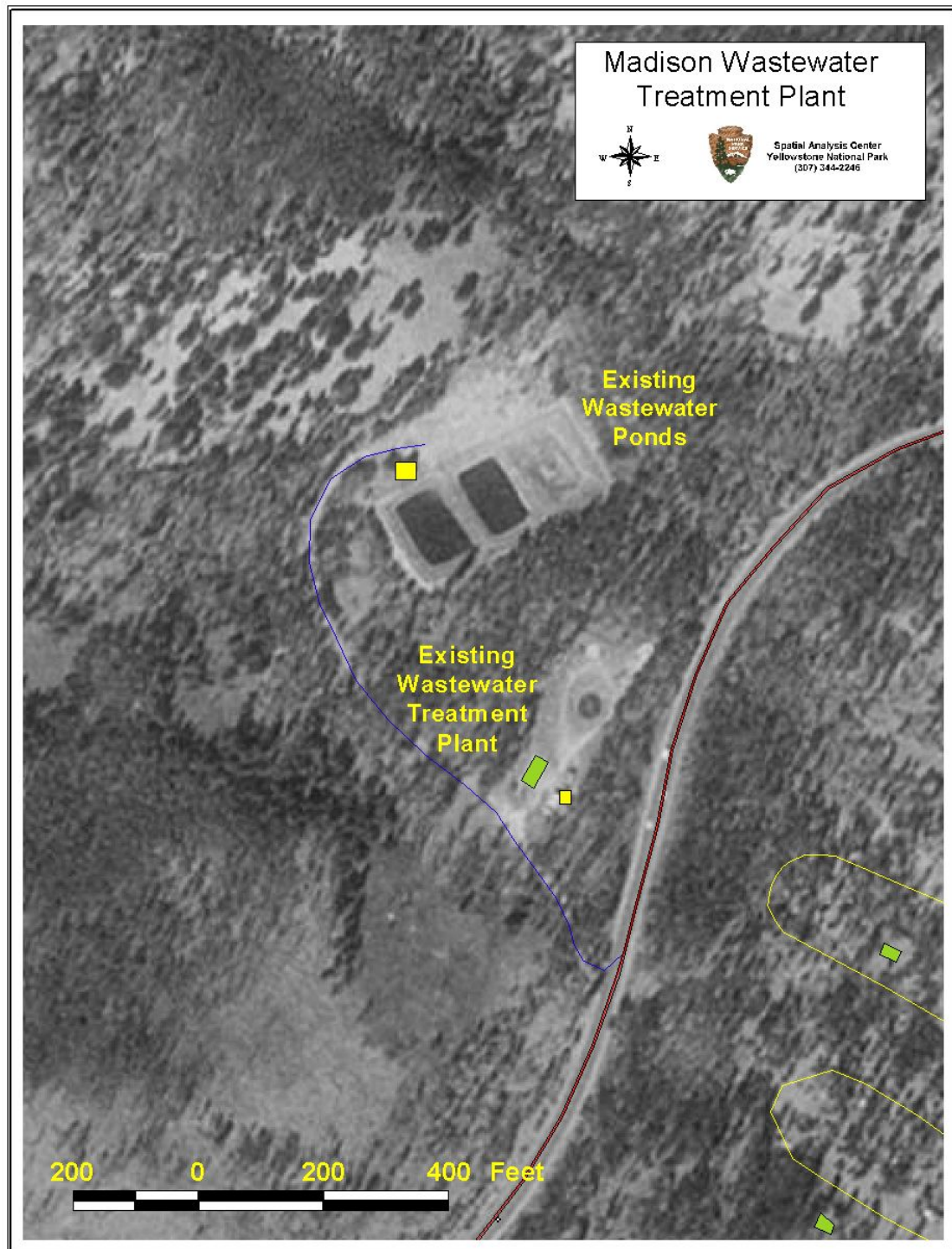
Map 1: Greater Yellowstone Area, showing the project location.



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



Map 3: Existing Madison Wastewater Treatment Plant and Wastewater Ponds, Aerial View.



## IMPACT TOPICS

Impact topics are the resources of concern that could be affected by the range of alternatives in an environmental assessment. Comments received during public scoping from specialists in the NPS and other federal and state agencies identified issues and concerns affecting the proposed action. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics. On the basis of federal laws, regulations, orders, and NPS *Management Policies* (2001a), park managers identified the following impact topics to be considered in this environmental assessment: soils, vegetation and rare plants, wildlife, threatened and endangered species, visual quality (including lightscape management); archeological resources; socioeconomic resources, and visitor use and experience. Several other impact topics were dismissed from further consideration, as the next section discusses.

References are made in the following paragraphs to the two Alternatives, which are described in detail in the next chapter of this EA, “Alternatives Considered.” For purposes of these discussions, Alternative 1—No Action would continue operations under the existing plant, and Alternative 2—Preferred would construct a new sewage treatment plant mainly on the site of the existing one.

### 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

NPS 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 a rare plant, yellow sedge, growing in a small wetland on the northeast corner of the site), 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 ensure that the limits of disturbance do not change and inadvertently, directly or indirectly (by changing the groundwater flow) affect the wetlands. A Statement of Findings for wetlands will not be prepared.

#### 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 (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. As noted above, both creeks and associated wetlands are outside the boundary of the construction site. Further, what few sewage spills do occur at this plant are small and always contained before reaching surface waters. This situation would not change under either alternative in this document. With impacts on water resources and water quality expected to be negligible under either alternative, this impact topic was dismissed from further consideration.

## Soundscapes

Currently, a small amount of noise from the aerator is audible from the road. Selection of “Alternative 1—No Action” would mean this noise would continue, a very minor, very localized, and direct impact upon park resources. Selection of “Alternative 2—Preferred” would entail construction of a new wastewater treatment plant, which 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 would generally stay restricted to the immediate area. However, removing the existing plant, with its noisy aerator, to the more distant percolation ponds would decrease the noise audible from the road. The new plant would have an outdoor aerator that would 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. Under neither alternative would impairment of park resources result. Because the impacts of both alternatives are so minor and localized, this topic was dismissed from further consideration.

## Air Quality

Continued operation of the Madison Wastewater Treatment Plant would cause very minor, short-term, direct, and very 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. Alternative 2—Preferred, 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 would be reduced and further in origin from the campground. Therefore, the preferred alternative would result in a long-term, direct, localized, minor, and beneficial impact to park resources and to the visitors using the campground. Neither alternative would impair Yellowstone’s air quality. Because air quality impacts under either alternative are so minor and localized in nature, and potentially beneficial under Alternative 2, this impact topic was dismissed from further consideration.

## Geologic Resources

Madison sits just inside of the Yellowstone Caldera rim, left from a major volcanic 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 Madison housing area. The Madison Wastewater Plant is in an area of unconsolidated glacial and erosional sediments that are fairly common in Yellowstone and the Northern Rockies. The project would not affect the caldera rim, any feature of the Purple Mountain face, or any earthquake fault exposure. Because neither alternative considered in this EA would have any effects on geologic resources, this impact topic was dismissed from further consideration.

## Hydrothermal Resources

Yellowstone contains the world's greatest concentration of geysers, hot springs, mud pots, and fumaroles in the world. Unevenly distributed around the park, few of such thermal features occur in the Madison campground area. There are some small hot springs along the Madison River and in the Terraced Springs area, both about a mile from the construction site. No hydrothermal resources occur in the project vicinity. Therefore, neither alternative would have any effects on hydrothermal resources, and this impact topic was dismissed from further consideration. However, should any hot water flow (or *high* water flow of any temperature) be uncovered in the course of construction, the park's geologist would be notified immediately and construction work discontinued until the geologist could investigate and determine necessary mitigation measures or project alterations. Further, the contractor shall notify the NPS prior to the start of any digging for the project.

## 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 disproportionate 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" (Council on Environmental Quality 1998). Rather, this project improves the water quality and protection of Yellowstone's resources for all populations. 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 NPS 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; therefore, this impact topic was dismissed from further consideration.



## 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 park's 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.

If selected, the preferred alternative would entail installation of a new water line under the West Entrance Road. This would be a subsurface installation, with the surface regraded back to pre-existing contours and allowed to naturally revegetate. This would be a negligible effect on the West Entrance Road Historic District. Alternatively, should the No Action alternative be selected, there would be no effect on the West Entrance Road Historic District. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5 Assessment of Adverse Effects), the NPS concludes that neither alternative would have an 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. Further, the NPS consulted the Wyoming State Historic Preservation Officer (SHPO) in the scoping phase of this project, and will provide a copy of this EA to the SHPO as well, and will work with the SHPO to mitigate any unforeseen effects. 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 2001a: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 19<sup>th</sup> century, Euro-American explorers documented occupation of areas within the park by a band of Shoshone Indians known as the Sheepaters.

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 Wastewater Treatment Plant site.

Affiliated tribes were consulted in the scoping phase of this project, and will receive notification of this EA's availability. 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 largely 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, if, during the public comment period, any tribe identifies ethnographic resources that this project would impact, the NPS will consult with the tribes to avoid, reduce, or mitigate such impacts. The location of any such ethnographic sites would remain confidential.

#### Historic Resources

The primary historic resource in the Madison area is the Madison museum, pictured on the front cover of this EA. The museum was constructed in the 1920s through the generosity of the Laura Spelman Rockefeller fund, and is now one of three museums in Yellowstone that is a National Historic Landmark. About a mile away from the sewage treatment plant site, the Madison Museum would not be affected under either alternative. Therefore, this impact topic was dismissed from further consideration.

#### Museum Collections

The Madison museum is the closest museum to the wastewater treatment plant site, and contains no collections. No collections would be affected by either of the alternatives in this document. Therefore the topic was dismissed from further consideration.

## ALTERNATIVES CONSIDERED

### Alternative 1: No Action

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. Increasingly frequent repairs would be expected to maintain the deteriorating lift stations, wastewater treatment equipment, and pumps. 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 the need for 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**

	<b>Alternative 1: No Action</b>	<b>Alternative 2: Preferred Alternative</b>
<b>Summary of Alternatives</b>	NPS would continue use of existing wastewater treatment plant.	NPS would construct new wastewater treatment plant at Madison. Most existing sewage treatment facilities would be removed, while a new wastewater treatment building, aeration basin, and sludge settling pond and drying bed would be constructed at site of existing percolation ponds.
<b>Project Objectives</b>		
<b>Provide improved sewage treatment.</b>	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.
<b>Improve visitor services.</b>	The danger of plant failure, along with continuing sight, sound, and odor problems 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.
<b>Protect park resources.</b>	Danger of potential sewage leaks means that this alternative would not accomplish this objective.	The proposed new facility would more consistently 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. Much 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, to the existing percolation ponds. Developments to be removed include the existing aerobic digester, trickling filter, sludge drying beds, and primary clarifier (Figures 1 and 2). Wastewater collection and pumping would continue in rehabilitated facilities at the existing plant site. This new sewage lift station would 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 require bear-proof fencing.

Approximately 100 yards uphill are the existing percolation ponds and winter storage pond. There, the new plant would be constructed (Figures 1, 2, and 3). 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 the percolation ponds a new sludge storage basin would be built. Immediately to the north a new operations building and aeration basin (in one structure) and, separately, sludge drying beds, would be constructed. The aeration basin, percolation ponds, sludge storage basin, and sludge drying beds would all be outside, and therefore would be fenced to exclude bears, using the park's standard bear-proof fencing.

The expanded treatment site would require approximately 2.0 additional acres of land, most of which was disturbed when the existing plant and ponds were constructed. This land would be used for the operations building (which includes the aeration basin), sludge storage basin, and sludge drying beds. The access road would add 0.56 acres to the footprint of the new plant; most of that acreage is already utilized in the current access road. Those portions of the existing sewage treatment plant that would be retained (the existing percolation ponds (1.22 acres) and the lift station and existing influent channel (0.36 acres)) would add another 1.58 acres to the total acreage for the new plant, bringing the total site development proposed under this alternative to 4.1 acres.

The majority of the new development would occur between the access road and the west side of the ponds, and between the ponds and the hill on the north. A small portion of the toe of that hill would be removed, along with a few mature trees on it. The small wetland on the northeast side of the project area would not be affected by this development. Very little development is proposed on the south side—primarily the new lift station and influent structure (already existing). However, there are four areas on the south side that would be temporarily disturbed: 1) the staging area (0.20 acres); 2) the office/trailer parking area (0.11 acres); 3) the existing forcemain easement (0.18 acres); and 4) the water line/power line easement (0.34 acres north of the road plus 0.53 acres south of the road), for a total of 1.36 acres. All of these areas would be covered with topsoil and allowed to revegetate upon project completion. Those portions of the existing plant that would be removed (the aerobic digester, trickling filter, and sludge drying beds) would also be revegetated. This area totals 0.36 acres.

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 75,000 gallons of wastewater per day. The existing plant was designed to accommodate 38,600 gallons per day. The substantial increase in capacity would accommodate 1) sewage from the Madison Campground and Madison housing area using average flow figures derived from typical domestic wastewater and typical campsite wastewater production; and 2) increased flows from proposed shower facilities and new housing construction (although most housing construction replaces older, obsolete housing, and thus does not substantially add to existing flows) (RTW 2003).

Figure 1: Proposed Madison Sewage Treatment Plant Site Layout, overview.

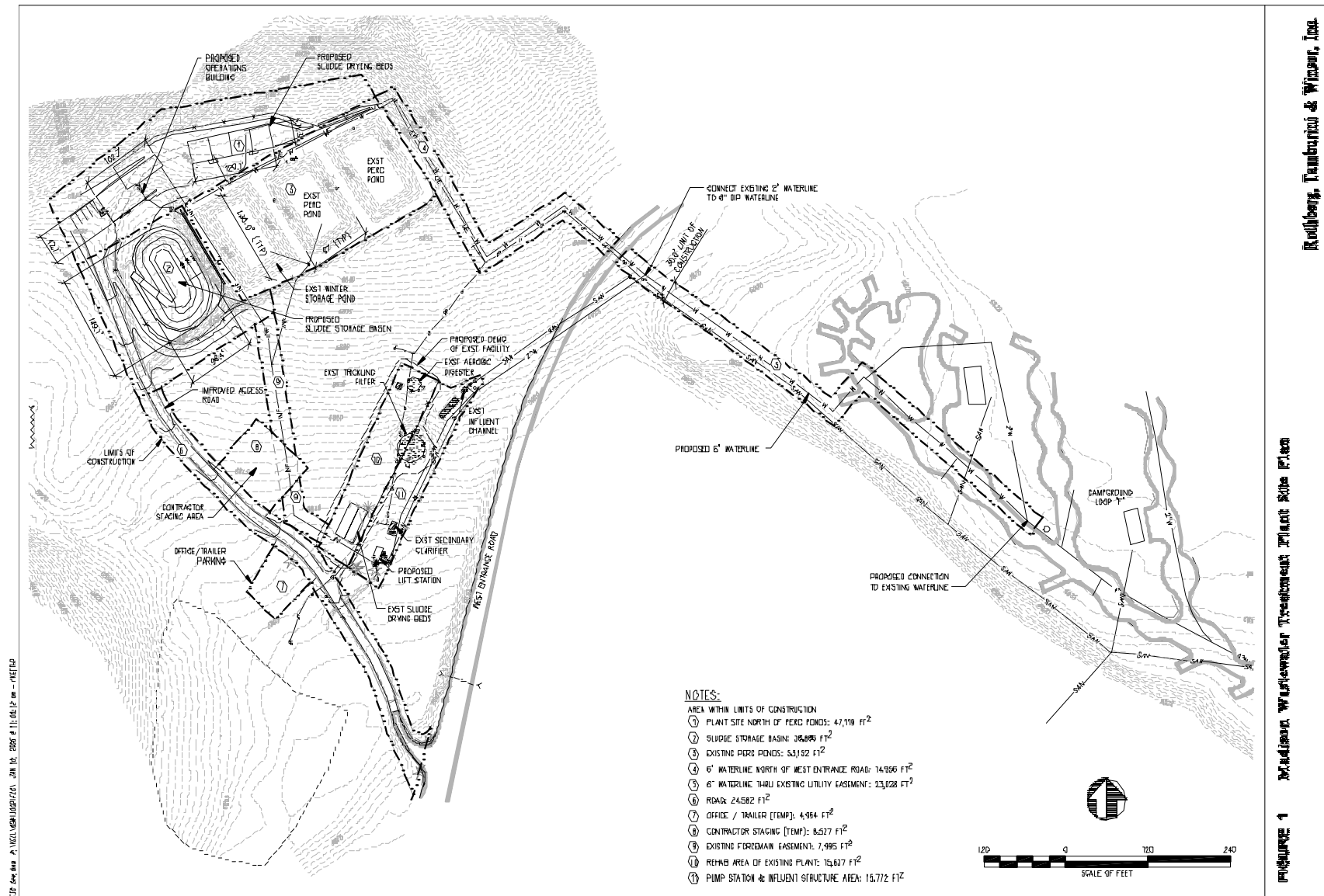


Figure 2: Proposed Madison Wastewater Plant Site Layout, detail.

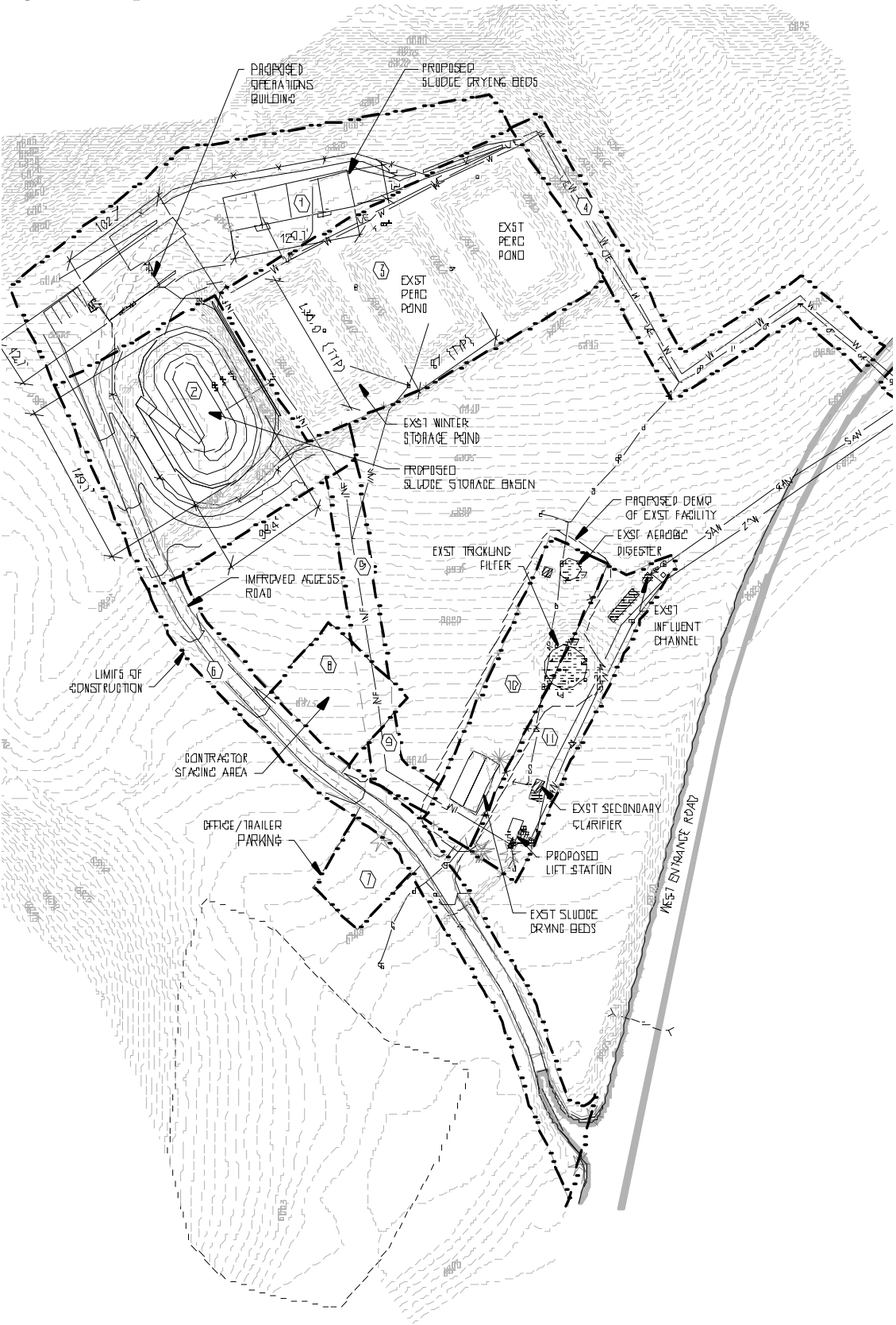
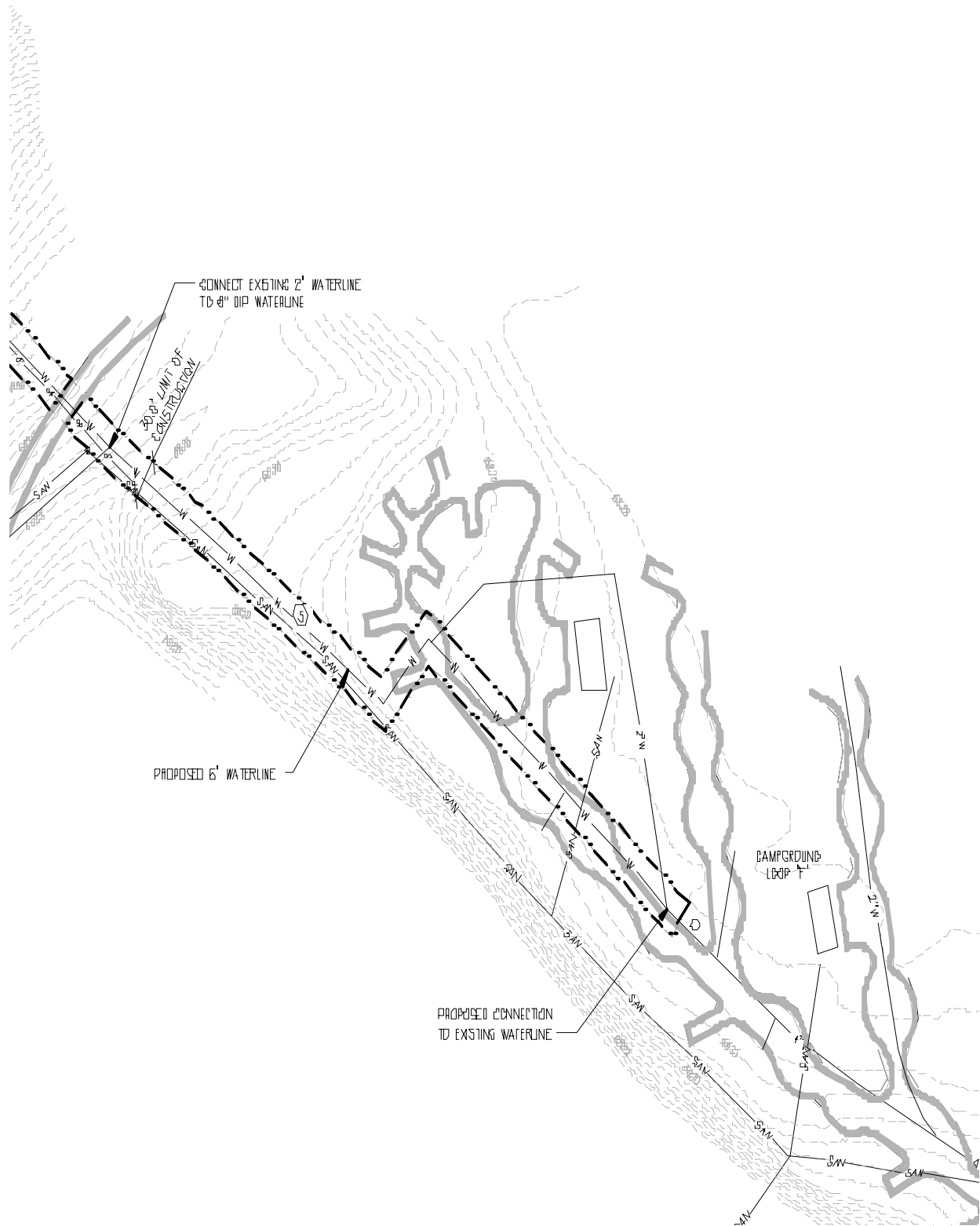


Figure 3: Proposed New Water Line Installation, Madison Wastewater Plant, detail.



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 portion of the building would be about 43 x 43 feet in size, and the generator and electrical room would measure about 16 x 24 feet. The adjoining aeration basin would be about 20 x 60 feet. The sludge storage basin would hold about 400,000 gallons of sludge and would measure about 100 x 150 feet (roughly the same size as the existing percolation ponds). The sludge drying beds would measure about 30 by 120 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 consist of concrete masonry unit double wall — split face block, closed-cell insulation, and structural block. The exterior split-face block would 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 summer 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 mixture of bacteria (called a “mixed liquor”) 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 sewage and mixed liquor would then flow from the aeration basin to the secondary clarifier, which would separate the two. 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. Although the sludge is currently landfilled, it could work as a carbon source in composting, perhaps at the compost facility in West Yellowstone. 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 would operate under the same Water Quality Regulations as the existing facility, which makes filtration and disinfection unnecessary.

The activated sludge plant is estimated to operate six months per year, during the summer visitor season. In winter, most of the plant would be shut down, because sewage volume drops



dramatically. Even though Madison is popular with winter visitors, they generate so little sewage volume that it can be stored for the winter and processed in spring. Storing such wastewater is considerably more economical than continuing operation of the full plant all winter for a relatively minor amount of sewage. Wastewater would be stored in the sludge storage basin during winter. 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 about 13,000 cubic feet with a minimum of about 3,350 square feet surface area.

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

The source of wastewater at the plant would be from domestic sources 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. Because vault toilet sewage is not diluted by water from toilets and kitchen or bathroom sinks, it has a much higher biochemical oxygen demand (BOD) than municipal sewage, and therefore takes much longer to treat effectively. The larger Old Faithful wastewater treatment plant is able to accommodate such high BODs, but even the proposed Madison plant is too small.

Alarm conditions in the field would be sent to the plant's control panel in the new facility. An alarm 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 (at the existing percolation ponds) does not have either electric power or domestic water. Three- phase power would be routed from the existing power line to the proposed plant site as shown in Figure 1, using existing overhead lines from the campground to the point where the lines depart and go uphill to the new plant. At that point, the power line would go underground, and would be laid at the same time, along the same trench, as the new water line (see below). An upgrade in power may also be necessary from the Mesa Pit power substation, about 3 miles south of Madison. If necessary, 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 (the existing line uses a combination of buried and overhead lines to bring power to the Madison area). At the Gibbon River Bridge the conduit would be suspended in the insulated pipe currently in use for power.

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. About 400 gallons of diesel fuel would be stored in a double- walled tank in the generator building to run the generator.

Water would 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 power lines across the road, dog- legging to the west and then north along the eastern edge of the existing percolation ponds, as shown in Figures 1, 2, and 3. The contractor would have a 30- foot wide construction zone along the new line in which to maneuver equipment while laying the new line. Some clearing of trees in that 30- foot corridor along the line would be necessary, although some trees would remain. The line would be “dog- legged” on both sides of the road crossing to block the view of the utility corridor from the road.

### 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. A clarifier may remain to serve as an overflow tank in the event of equipment failure or power outage. Other process structures at the existing wastewater treatment plant would be removed, including the aerobic digester, trickling filter, and sludge drying beds. The ground occupied by these structures—0.36 acres—would be recontoured and reclaimed.

### Staging, Stockpiling, and Disposal Sites, and Contractor Housing

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 Figures 1 and 2, or at the Mesa Pit or Madison landfill site, as needed. All locations are removed from the flow of visitor traffic. The Mesa Pit and Madison landfill sites would not be within view of the Grand Loop Road system, but those at the Madison wastewater site would be partially visible. The contractor may clear all trees less than 8” in diameter at breast height from the two areas labeled “Contractor Staging Area” and “Office/Trailer Parking” as shown in Figure 1. Upon project completion, topsoil would be replaced on both the office/trailer parking area and contractor staging areas, which would then be allowed to revegetate. Together, these two areas consist of 0.31 acres.

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. Nevertheless, a soils shortage of approximately 2,800 cubic yards is estimated. This project would coordinate with scheduled road projects in the park to obtain additional soil from within the park. Most likely, such soils would be obtained from the Gibbon Falls area when the road there is rebuilt, currently planned for 2006- 07. 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 edge of the construction limits for temporary storage and returned as closely as possible to its original location.

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 temporary housing. The contractor would be allowed one or two temporary office trailers, which would both be stationed in the office/trailer parking area as shown in Figure 1.

### Scheduling of Work Activities; Visitor Information and Traffic Delays

The NPS envisions awarding a contract for this project in 2006, with construction occurring from May 2006 through November 2008. 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.

Grizzly bears are known to make dispersed use of the Madison area. 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 would not begin before April 1 each year, ending by November 1.

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

Because most of this project takes place in a confined area, there would be few traffic delays to visitors. The only delays anticipated would be for water line installation under the West Entrance Road, and some minor delays for truck traffic. Typically, most heavy trucks traveling to the construction site that could delay visitor traffic would enter the park between 9 p.m. and 9 a.m. to avoid delaying visitors. Minor delays would also occur when a truck enters or departs the Madison site; the contractor would be required to provide traffic control for safety reasons at such times. Such events would typically only occur about twice monthly.

### 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 I. Per current Wyoming Department of Environmental Quality (DEQ) Regulation Chapter 1, Section 7.a, no new surface discharges (other than dams) would be permitted to discharge into Class I surface water. This project would 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 DEQ 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% full. Silt removal and disposal into approved areas would be accomplished in such a way as to avoid introduction of silt into any wetlands or flowing water bodies.

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. The contractor would be provided a 30-foot wide utility easement for this purpose. Some trees within the corridor would need to be cleared, but some (especially larger trees) would remain. At the road crossing, the contractor would create dog- legs in the water line to minimize views of the utility corridor from it.

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 nearby bridge over the Gibbon River or from the Firehole River at the pullout just above the Firehole Canyon Drive exit. 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 New Zealand mud snails. A maximum of 6,000 gallons of water per day (two typical watering truckloads) would be taken, with the average usage being only about 3,000 gallons per week.

#### 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 sewage treatment plant replacement. 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 would 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 would 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 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.

### **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—Preferred, suitably fits the balance that the environmentally preferred alternative requires. Alternative 2 best preserves and enhances cultural and natural resources over the long-term by providing improved and more reliable sewage treatment, which both protects Yellowstone's resources while also maintaining and improving a safe, healthy and aesthetically pleasing visitor experience. 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. Therefore, Alternative 2 is the environmentally preferred alternative.

Alternative 1, the No Action Alternative, would not strike the balance between public safety and preservation and repair of features. Should the existing plant fail, sewage at Madison would not be adequately treated and the visitor experience at Madison would suffer considerably.

## **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 some of the existing facility from public view. Therefore, upgrading of the existing plant was rejected as an option.

### **Wastewater Treatment Method**

Engineers evaluated but rejected alternative methods of water treatment, including trickling filters, sequencing batch reactors, and membrane filtration. 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 (Rothberg, Tamburini, and Windsor, Inc., 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

#### Soils

The Madison River and the adjacent meadows are important features of the project area. 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.

A subsurface geotechnical investigation conducted at the proposed site of the wastewater treatment plant in 2002 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 spp.*), oatgrass (*Danthonia spp.*), 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 diversity in the vegetation. Meadows are dominated by such species as tufted hairgrass and sedges interspersed with areas of bulrushes (*Scirpus spp.*), arrow-grass (*Triglochin spp.*), and spike-rushes (*Eleocharis spp.*).

During the rare plant survey by park staff, one Wyoming plant species of special concern (Douglas, Heidel, and Beauvais, 2003) was located near the project area. Yellow sedge, *Carex flava*, is a circumboreal species that was not known to occur in the state of Wyoming until located during rare plant surveys in the Gibbon Canyon in 1994. The closest populations of yellow sedge otherwise occur in northwestern Montana and northern Idaho. This wetland species is also considered a rare plant in Idaho, where it is on the state monitor list (Idaho Native Plant Society 2004). The newly discovered population at the Madison Wastewater site represents the furthest south known location within the park and the state of Wyoming. Yellow sedge occurs in wetland seeps on the slopes above the northeast side of the present facility (Whipple 2004).

#### 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.

### *Ungulates*

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 (Eberhardt and Knight 1996, 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).

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

### *Black Bears and Mountain Lions*

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 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 (*Thomomys 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 for amphibians and reptiles 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 (*Sceloporus 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 currucoides*), 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 (*Haliaeetus 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).

#### Wildlife - 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. There are no endangered animal species in Yellowstone, and no threatened or endangered plant species.

#### *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* (U.S. Fish and Wildlife Service, 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<sup>2</sup> (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 (Gunther 1994).

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 (Schleyer 1983). 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 pine nut 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 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 NPS completed thirteen snowtracking transects, totaling 36 miles, within six miles of the project site (the nearest transects to Madison), and found one 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 and 2003).

Using mapped coverages of vegetative habitat types from Yellowstone databases, NPS staff completed a preliminary analysis of primary (or most important) and secondary (of lesser importance) lynx habitat in the Madison Junction area, per guidelines in the Lynx Conservation and Assessment Strategy (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, only 9% of this HUC. Due to the low percentage of primary lynx habitat (i.e., less than 20%), this HUC was not identified as a Lynx Analysis Unit, which means lynx do not commonly occur in this area, due to the low percentage of primary habitat (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). In 2005, close to 200 wolves in about 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 U.S. Fish and Wildlife Service (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.

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.

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.

### Visual Quality, including Lightscape Management

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.

The NPS 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.C.A. § 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 NPS, the Advisory Council on

Historic Preservation, and the National Conference of State Historic Preservation Officers (NPS 1993b). Pursuant to these agreements, this EA will be submitted to the Wyoming State Historic Preservation Office (SHPO) for review and comment.

The only cultural resource topic evaluated under this document is that of archeological resources.

### **Archeological Resources**

The Madison area has significant archeological 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 proposed wastewater treatment plant, including the proposed project area and water line, do not contribute to the significance of this site (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 (other than the campground itself, operated by Xanterra). Even if the proposed laundry/shower building is constructed at some point, the level of economic activity at Madison will remain low.

### **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 four percent of the overall visitation. Around 60,000 persons tour Yellowstone by oversnow vehicle per winter; another 30,000 or so drive the road from Mammoth to Cooke City. Annually about 2.9 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).

## 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 NPS 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, west-central Yellowstone National Park, are primary factors in the analysis of cumulative impacts, and a listing of such plans is included at the end of this chapter.

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, NPS policy (NPS 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 NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the agency must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact 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 master plan or other relevant NPS planning documents.

Impairment may result from NPS 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
Soils	Possible short- term but negligible impacts from sewage spills	There would be minor, direct, long- term impacts to about 2.0 acres of already disturbed soils, with another 1.36 acres disturbed temporarily but revegetated. As partial mitigation, 0.36 acres at the site of the existing sewage treatment plant would be revegetated.
Vegetation & Rare Plants	Negligible impacts.	New plant construction would avoid site of <i>Carex flava</i> . About 2.0 acres of previously disturbed ground would be affected; impacts would be minor, direct, long- term, and localized.
Wildlife	Negligible impacts.	Possible short term, minor, direct, adverse effects on wildlife due to construction activities; probable long- term, minor, direct, beneficial effects due to rehabilitation of existing site.
Threatened & Endangered Species	Negligible/no effects.	This alternative would have minor, direct and indirect, localized, and both short- and long-term effects on grizzly bears—a “may affect, but not likely to adversely affect,” determination. Negligible/no effect on lynx, wolves, and bald eagles.
Visual Quality, including Lightscapes	Continuing minor adverse effect to visitors on West Entrance Road.	Long- term, minor, direct, beneficial effects due to relocation of plant uphill and away from road, and replacement of “yard” light with motion-sensitive or switched outdoor lighting. Short-term, minor, direct, adverse effects due to sight of construction and new partially cleared water line corridor.
Archeological 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, direct, short- term, and localized effects.
Socioeconomic Resources	Negligible effects unless plant fails; potential moderate effect if plant fails due to campground closure.	Short- term, minor, and direct adverse effects on visitors due to construction activities; short-term, minor, direct and indirect beneficial impacts due to construction spending; and long-term beneficial and direct 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	Short- term minor impacts upon visitor experience due to delays and sight of construction; long- term, minor, beneficial impact because risk of complete shutdown is greatly reduced and because visitor safety is

	totally fails and entire Madison area is closed.	improved with better wastewater treatment.
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## *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—No Action on Soils

#### *Impact Analysis*

Operation of the Madison Wastewater Plant would continue under this alternative. Impacts to soils would be negligible because no soils would be disturbed.

### *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 master plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

### Impacts of Alternative 2- - Preferred Alternative, on Soils

#### *Impact Analysis*

Approximately 2.0 acres of previously disturbed soils would be affected by the proposed project permanently, with another 1.36 acres disturbed temporarily but revegetated on existing topsoil moved back into place. This disturbance would be partly mitigated through removal of the previous facility near the roadside and revegetation of that area, 0.36 acres in size. Overall effects would be direct, minor, localized, and long- term.

Standard approved soil retention techniques and structures such as silt fencing would be implemented during and following construction. Silt fencing would be used to protect meadows and wetlands. Snow fencing and construction tape would be used to restrict impacts to construction zones. If unanticipated high flows of water, or any flow of *warm* water, are found during the ground disturbance phases of this project, the contractor will contact the NPS for geological investigation and instructions on how to further proceed on construction. Impacts would be negligible with no impairment.

### *Cumulative Impacts*

Cumulative impacts would be the same as under Alternative 1—No action.

### *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 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 species 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 - No action, 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 contained in the sewage treatment plant, which has little vegetative coverage. Daily activities avoid the hillside where yellow sedge occurs. Effects from continued wastewater plant operation on vegetation and rare plants would be negligible; no rare plants would be impacted.

##### *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 a rare plant inventory as was done at this project's site. All Yellowstone projects must avoid significant 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 master plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

## Impacts of Alternative 2- - Preferred Alternative, 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 was fenced in 2004 to avoid unintended potential construction impacts. Most of the area to be developed by the existing percolation ponds has already been impacted, and has only partial vegetative ground cover. Forest in this area is in various stages of regrowth, from seedlings to small remnant stands of mature lodgepole pine. About two total acres of such partially disturbed land would be cleared under this proposal. Additionally, 1.36 acres would be temporarily disturbed in the staging areas and utility corridors, but allowed to revegetate with the topsoil moved back into place after construction. Where possible, these staging areas will be located in previously disturbed areas to minimize the extent of tree clearing. 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 potential, three primary steps would 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 would be cleaned and inspected to be sure they are not carrying exotic plant seeds; and 3) construction equipment leaving the construction site would be steam- cleaned before departure.

The two acres of clearing would be mitigated in part through revegetation of some of the land upon which the current wastewater plant sits, close to the West Entrance Road. About 0.36 acres would be allowed to revegetate, but is currently partially infested with exotic plants. For that reason, and because more land is being cleared than revegetated, 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 a rare plant inventory as was done at this project's site. All Yellowstone projects must avoid significant 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 by implementing this alternative.

### *Wildlife*

#### Methodology and Intensity Thresholds

Park staff compiled available information on known wildlife. Where possible, they reviewed map locations of sensitive species sightings in the Madison area. They based predictions about short-

and long- term site impacts on existing monitoring data from Yellowstone National Park. Note that threatened and endangered species are considered separately under the impact topic immediately following.

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- - No Action, 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 wastewater plant 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 master plan or other relevant NPS planning documents, there would be no impairment of the park's wildlife resources or values.

## Impacts of Alternative 2- - Preferred Alternative, 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 (Robert Garrot, 2002).

Additionally, removal and rehabilitation of portions of the existing sewage treatment plant would return that area to wildlife use. Over time, lodgepole pine forest would cover some of the former sewage treatment plant area. Until the canopy closes (in the Madison area, this would take about 10- 20 years), elk and bison may prefer the meadow plants that usually establish initially in such rehabilitated areas.

Few small and mid- sized mammals currently use the sewage treatment plant site, due to the disturbance already in place there, the occasional human activity, and the fencing around the plant. While construction of a new wastewater treatment plant would remove about 2.0 acres from wildlife use, the low current levels of use of this area mean that there would be only minor effects on most small and mid- sized mammals. Red squirrels, however, are common in the area, and a few would be displaced. They are, however, common throughout Yellowstone.

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 would occur from human activities associated with construction activities. Removal of trees would 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 would have backup generators, sewage spills would be highly unlikely. This would then be a direct, minor, beneficial, and long- term impact. An erosion control plan specifying actions and placement of silt fences 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 be minor, localized, and direct; long-term effects would be direct, beneficial, localized, and minor.

### *Wildlife-- 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) 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 - No Action, 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 significant impacts on park threatened 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 may affect, but 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 master plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

## Impacts of Alternative 2- - Preferred Alternative, 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 2.0 acres. This would be offset by conservation measures such as better sanitation procedures associated with a functioning sewage treatment system, which would reduce potential human/bear conflicts, and through reclamation of 0.36 acres of land currently disturbed at the existing wastewater plant. Such reclamation, along with consolidation of the treatment plant into one more defined area, would be a mild long- term benefit to the bear, as development would be a little 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. The potential for sanitation problems associated with contractor employees working on the project would be mitigated by two conservation measures. First, the NPS would continue to implement the policies set forth in its 1982 Grizzly Bear Management Program. Second, the NPS would 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 would be 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. However, grizzly bears seldom use the Madison area because it is low- quality bear habitat, so such displacement would be extremely unlikely to occur and would therefore be 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 minor long- term negative impacts on the park's grizzly bear population. Furthermore, potential short- term impacts would be minor (insignificant, discountable, and/or mildly beneficial), localized, and indirect.

#### Gray Wolves.

The proposed project would have no effect on gray wolves, for several reasons. Wolves rarely use the Madison area. 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. 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 would be imposed as needed. In sum, there would be negligible impacts upon wolves under this alternative.

#### Canada Lynx.

The Lynx Conservation and Assessment Strategy (LCAS; Ruediger et al. 2000) provides standards and guidelines used by federal land management agencies to conserve lynx habitat in Lynx Analysis Units (LAUs). Habitats outside LAUs are generally not considered important for lynx recovery. Using mapped coverages of vegetative habitat types from Yellowstone databases, NPS staff mapped lynx habitat and identified LAUs in the park, per guidelines in the LCAS. The proposed project does not occur in an LAU and does not occur in or near mapped lynx habitat. As mentioned previously, park- wide surveys for lynx failed to detect any in the vicinity of the proposed project (Murphy et al. 2004). Further, the project would affect only about 2 acres of regenerating lodgepole, which support snowshoe hares. 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). Finally, disturbance associated with construction and the sewage treatment facilities are unlikely to impede lynx travel. Therefore, no adverse effects from the project on lynx are expected.

#### *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 increasing by only 2.0 acres, much of which was previously disturbed. 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.

### *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 (such as 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- - No Action, on Visual Quality, including Lightscapes

##### *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 NPS fully recognizes the importance of preserving Yellowstone's scenic views and night sky resources.

### *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 master plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

## Impacts of Alternative 2- - Preferred Alternative, on Visual Quality, including Lightscapes

### *Impact Analysis*

This alternative would have a minor, long- term, localized, and direct effect on visual quality and lightscapes along the West Entrance Road. Removing and rehabilitating most of the existing plant would return that area to its native, natural appearance. An attention- grabbing human structure and associated mercury vapor yard light would largely disappear and some of the area would revert to a natural scene. The new plant would feature only motion- sensitive or switched, full cut- off outdoor lighting. A light would remain at the lift station, but it would also be switched or motion- sensitive.

Visitors traveling the West Entrance Road, however, would be able to see some construction occurring at the site. Further, visitors would be able to see a partially- cleared utility corridor when the new water line is installed. While construction would disappear upon project completion, views of the utility corridor would take longer to disappear. By "dog- legging" the new water line on both sides of the road crossing, the contractor would be able to at least partially screen the corridor from visitor view. Further, the contractor would clear only some of the trees in the 30- foot utility corridor, minimizing the appearance of a long utility corridor. Overall, this alternative would result in minor, short- term, localized, and direct impacts on visual quality due to the water line and construction zone impacts, and minor, long- term, localized, and direct improvements upon visual quality.

### *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 both beneficial (long- term) and adverse (short- term).

### *Conclusion*

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

## *Archeological Resources*

### Methodology and Intensity Thresholds

In order for an archeological site 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.

Analyses of the potential intensity of impacts to archeological resources were derived from consulting the park's database of known archeological sites and on- site investigations to determine a project's proximity to archeological resources.

The Madison campground area contains an important archeological site, 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 archeological resources are defined as follows:

- Negligible:** Impact is at the lowest levels of detection--barely measurable with no perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of §106, the determination of effect would be *no adverse effect*.
- Minor:** **Adverse:** disturbance of a site(s) results in little, if any, loss of significance or integrity and the National Register eligibility of the site(s) is unaffected. For purposes of Section 106, the determination of effect would be *no adverse effect*.  
**Beneficial:** maintenance preservation of a site(s). For purposes of §106, the determination of effect would be *no adverse effect*.
- Moderate:** **Adverse:** disturbance of a site(s) does not diminish the significance or integrity of the site(s) to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be *adverse effect*.  
**Beneficial:** stabilization of the site(s). For purposes of §106, the determination of effect would be *no adverse effect*.
- Major:** **Adverse:** disturbance of a site(s) diminishes the significance and integrity of the site(s) to the extent that it is no longer eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be *adverse effect*.  
**Beneficial:** active intervention to preserve the site. For purposes of §106, the determination of effect would be *no adverse effect*.
- 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; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's master plan or other relevant NPS planning documents.

## Impacts of Alternative 1- - No Action, on Archeological Resources

### *Impact Analysis*

Continued operation of the Madison Wastewater Treatment Plant would have a negligible effect on the nearby archeological site. 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 archeological 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 the nearby archeological site.

### *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 master plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

## Impacts of Alternative 2- - Preferred Alternative, on Archeological Resources

### *Impact Analysis*

Construction of a new wastewater treatment plant could disturb artifacts that have not been located. However, the project location is outside of the nearby archeological site, and no artifacts have previously been discovered in this immediate area. Therefore, disturbance of any archeological resources is unlikely. For these reasons, the project is expected to have at most a localized, temporary, minor, and short- term impact on archeological 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 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 the nearby archeological site. 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 archeological resources of 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- No Action, 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 there would have to find alternative campgrounds. While some of these would be elsewhere in the park,



others would be outside it. Some could be turned away entirely. Economic impacts on Xanterra, operator of 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, and supply purchases. 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.

## Impacts of Alternative 2- - Preferred Alternative, 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 \$4.3 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 and installation of the new water line across the West Entrance Road.

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 a 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.

### *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 or at the level of detection. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.
- Minor: Changes in visitor use and/or experience would be detectable, although the changes would be slight and likely short-term. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
- Moderate: Changes in visitor use and/or experience would be readily apparent 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- - No Action, 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, increasingly 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, and would not permit construction of a shower/laundry building.

The potential for complete failure of the sewage system would continue, and could 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 2.9 million annual visitors in the late 1990s, and has remained close to that level since. However, the upward trend could resume at any time in the future.

In the late 1980s, the NPS 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 or upgrading. 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.

## Impacts of Alternative 2- - Preferred Alternative, 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 due to traffic control and small amounts of dust, fumes, and noise. 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 at times to the campground today. Because the new plant would both use better technology and be further removed from the campground, problems with unpleasant odors would 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. Finally, the potential construction of a shower/laundry building that this new treatment plant would make possible would improve the visitor experience, as campers staying at Madison would no longer need to travel to West Yellowstone or elsewhere to shower and clean laundry.

#### *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.

#### **Other Planning Efforts in the West District of Yellowstone**

Other actions would be occurring in the park during the course of this action, immediately prior to it, and continuing after it.

The NPS is proposing to replace the West Entrance Station with a new facility in 2006, 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. Construction of the new facilities there should be complete in 2006.

The NPS plans to replace the comfort station in the Madison picnic area with a new one in 2006.

Yellowstone continues to improve its poor quality roads. The first and second phases of the Norris- Madison road were completed in 2003, with the third phase beginning in 2006. 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 was closed for most of the 2005 summer season to complete the first half of that project. The second half is currently several years away from beginning. 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.

As of this writing, the NPS has completed an Environmental Assessment for an Interim Winter Use Plan, and has begun a long- term planning effort for a permanent winter use plan. Under the Interim Plan, up to 720 snowmobiles are allowed into Yellowstone daily. They must use best available technology, and all visitors are required to use trained guides to tour Yellowstone. The winter of 2003- 04 partly employed such restrictions, resulting in reduced noise and air pollution. These restrictions were fully implemented in the winter of 2004- 05, with continued noise and air pollution reductions.

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. Construction of some housing units occurs 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. One four- plex unit was constructed at West Entrance recently, a new four- plex at Madison was finished in 2004, and construction of a new 8- plex at Mammoth began in 2005. Another 8- plex will be built at Old Faithful in 2005. Most of this housing construction replaces aging and inadequate mobile home housing.

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 30,000 to 40,000- square- foot Visitor Education Center to replace the current Old Faithful Visitor Center. If approved following the completion of an EA, the building would be constructed beginning in 2006- 07. Construction of a new dorm with 14 apartments for concessioner managers began in 2002 and is complete. Renovation of the Old House portion of Old Faithful Inn recently began, and will continue through 2007.

Similarly, a number of projects are being undertaken in the Canyon area. Construction on a new visitor center began in 2004, and NPS will begin construction of a new ranger station/emergency services building 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 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. They were consulted in the scoping phase of planning for this project.

## AGENCIES AND ORGANIZATIONS CONSULTED

Notification of the availability of this Environmental Assessment is being sent to approximately 240 individuals, agencies and groups soliciting comments on the problems, issues, and alternatives addressed. The Environmental Assessment is also posted on <http://parkplanning.nps.gov>.

### *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

<p> Coeur d'Alene Tribe  Confederated Tribes of Salish and Kootenai  Crow Tribe  Crow Tribe/Apsaalooke Nation  Kiowa Tribe  Nez Perce Tribe of Lapwai  Nez Perce Tribe of Nespelem  Nez Perce Tribe of Colville  Eastern Shoshone Tribe  Shoshone- Bannock Tribes  Assiniboine and Sioux Tribes of Fort Peck  Gros Ventre and Assiniboine Tribes  Cheyenne River Sioux Tribe  Crow Creek Sioux Tribe  Flandreau Santee Sioux Tribe  Lower Brule Sioux Tribe  Oglala Sioux Tribe  Rosebud Sioux Tribe  Standing Rock Sioux Tribe  Spirit Lake Sioux Tribe  Sisseton- Wahpeton Sioux Tribe  Yankton Sioux Tribe  <b><u>AGENCIES</u></b>  Beaverhead National Forest  Big Hole National Battlefield  Bridger- Teton National Forest  Custer National Forest  Environmental Protection Agency, Region 8 – Denver  Gallatin National Forest  Glacier National Park  Grand Teton National Park  Grant- Kohrs Ranch NHS </p>	<p> Idaho State Historic Preservation Office  Little Bighorn Battlefield NM  Montana Department of Commerce  Montana Department of Fish Wildlife and Parks  Montana Intergovernment Review  Clearinghouse  Natural Resource Conservation Service - Bozeman and Cody  Shoshone National Forest  Targhee National Forest  Teton County Certified Local Government  Town of West Yellowstone  US Army Corps of Engineers  Western Federal Lands Highway Division  Wyoming Department of Transportation  Wyoming Game and Fish Department  Wyoming State Clearinghouse  Wyoming State Lands and Investments  Wyoming State Library  Wyoming Travel Commission  ACHP Western Office of Project Review  <b><u>ORGANIZATIONS</u></b>  Alliance for Wild Rockies  American Fisheries Society  American Wildlands  Bear Creek Council  Beartooth Alliance  Billings Chamber of Commerce  Bozeman Area Chamber of Commerce  Buffalo Bill Historical Center  Center for Urban Affairs  Cheyenne High Plains Audubon  Citizens for Teton Valley  Cody Chamber of Commerce </p>
<p> Cooke City/Silver Gate Chamber of Commerce  Defenders of the Rockies  Defenders of Wildlife  Fremont County Audubon Society  Gallatin County Commissioners  Gardiner Chamber of Commerce  Great Bear Foundation  Greater Yellowstone Coalition  Hamilton Stores, INC  Idaho Falls Chamber of Commerce  Idaho Wildlife Federation  Jackson Hole Alliance for Responsible </p>	<p> Pinedale Chamber of Commerce  Red Lodge Chamber of Commerce  Riverton Chamber of Commerce  Sacajawea Audubon Society  Sierra Club Idaho Chapter  Sierra Club Northern Plains Regional Office  Sierra Club Teton Group  Sierra Club Utah Chapter  Snake River Audubon Society  Star Valley Development Association  Stone Fly Society  Teton County Commissioners </p>



Planning Jackson Hole Chamber of Commerce Lander Chamber of Commerce Livingston Chamber of Commerce Montana Audubon Council Montana State University Montana State Preservation Office Montana Wildlife Federation National Audubon Society National Parks and Conservation Association Nature Conservancy – Idaho Chapter Nature Conservancy – Montana Chapter Nature Conservancy – Wyoming Chapter National Wildlife Federation Northern Plains Resource Council Northern Rockies Conservation Cooperative Northwestern University Park County (MT) Commissioners Park County (WY) Commissioners Park County Environmental Council	Teton County Historic Preservation Board University of Colorado University of Wyoming Upper Missouri Breaks Audubon Society Utah Audubon Society Utah Wilderness Association Utah Wildlife Federation West Yellowstone Chamber of Commerce Wild Forever Wilderness Society Wyoming Wildlife Federation Wyoming Association of Professional Historians Wyoming Heritage Society Wyoming Outdoor Council Xanterra Yellowstone Association Yellowstone Park Foundation Yellowstone Valley Audubon Society
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## PREPARERS AND CONTRIBUTORS

### Report Preparation

Michael J. Yochim, Outdoor Recreation Planner

### Project Management

Suzanne Lewis, Superintendent

John Sacklin, Management Assistant

Eleanor Clark, Chief, Planning, Compliance, and Landscape Architecture

Nancy Ward, Assistant Chief of Maintenance (Projects)

Dave Cole, Civil Engineer, Facility Management

Tom Olliff, Chief, Branch of Natural Resources

Roger Anderson, Chief, Branch of Cultural Resources

### Contributors—National Park Service

Greg Cody, Branch of Compliance, Denver Service Center

Kerry Gunther, Management Biologist

Hank Heasler, Geologist

Mary Hektner, Chief, Vegetation Section, Yellowstone Center for Resources

Ann Johnson, Archeologist

Sherri Jones, Engineer, Rothberg, Tamburini, and Windsor

Todd Koel, Aquatic Resource Biologist

Terry McEneaney, Management Biologist (Birds)

Kerry Murphy, Wildlife Biologist

Zehra Osman, Landscape Architect

Dale Reinhart, Landscape Architect

Dan Reinhart, Resource Management Coordinator  
Doug Smith, Wolf Biologist  
Rosemary Sucec, Cultural Anthropologist  
Rick Wallen, Bison Biologist  
Jennifer Whipple, Botanist  
PJ White, Ungulate Biologist

## REFERENCES

- Armitage, Kenneth. 1958. "Ecology of the Riffle Insects of the Firehole River, Wyoming," *Ecology* 39(4): 571- 580.
- Biel, Mark J., and Kerry A. Gunther. 1994. "Observations and Conservation Status of Rare Animals Along the Madison to Norris Road in Yellowstone National Park, 1986- 1995." Unpublished report, Yellowstone Park Research Library and Archives, Mammoth Hot Springs.
- Council on Environmental Quality. 1998. "Environmental Justice: Guidance Under the National Environmental Policy Act." Publication ECM98- 2, Executive Office of the President, Washington, D.C.
- Craighead, J.J., J.S. Sumner, and J.A. Mitchell. 1995. *The Grizzly Bears of Yellowstone: Their Ecology in the Yellowstone Ecosystem, 1959- 1992*. Island Press, Covelo, CA.
- Danforth, Rebecca L. and Kerry A. Gunther. 1995. "Evaluation of Bear Activity and Habitat Along the Madison to Norris Road Corridor in Yellowstone National Park." Unpublished report, Yellowstone National Park Research Library and Archives, Mammoth Hot Springs, WY.
- Eberhardt, L. L., and R. R. Knight. 1996. "How Many Grizzlies in Yellowstone?" *Journal of Wildlife Management* 60:416- 421.
- Garrot, Robert, Montana State University professor of biology. 2002. Personal communication with the author, July 2002.
- Green, G. I. and D. J. Mattson. 1988. "Dynamics of Ungulate Carcass Availability and Use by Bears on the Northern Winter Range: 1987 progress report." Pages 32- 50 in R. R. Knight, B. Blanchard, and D. Mattson. *Yellowstone Grizzly Bear Investigations: Annual Report of the Interagency Grizzly Bear Study Team, 1987*. United States National Park Service.
- Guernsey, Debra, Biological Science Technician, Yellowstone Gray Wolf Restoration Project, NPS, Yellowstone Center for Resources. 2004. Personal Communication with the author.
- Gunther, Kerry A. 1990. "Visitor Impact on Grizzly Bear Activity in Pelican Valley, Yellowstone National Park." *International Conference of Bear Research and Management* 8: 73- 78.
- . 1994. "Bear Management in Yellowstone National Park, 1960- 1993," *International Conference of Bear Research and Management* 9(1): 549- 560.
- , NPS Bear Biologist. 2002. Personal communication with the author.
- Hektner, Mary, NPS Management Biologist (Wetlands). 2004. Personal communication with the author.

- Idaho Native Plant Society. 2004. Results of the Twentieth Annual Idaho Rare Plant Conference, February 10-11, 2004. Boise, Idaho.
- Jochimsen, Denim. 2002. "Amphibian and Reptile Survey at Madison Sewage Treatment Plant, Yellowstone National Park." Unpublished report, Yellowstone Park Research Library and Archives, Mammoth Hot Springs.
- Keinath, Douglas, B. Heidel, and G. Beauvais. 2003. *Wyoming Plant and Animal Species of Concern, November 2003*. Wyoming Natural Diversity Database, Laramie, Wyoming.
- Knight, Richard R., and L. L. Eberhardt. 1985. "Population Dynamics of Yellowstone Grizzly Bears." *Ecology* 66(2): 323- 334.
- Koch, E.D., and C.R. Peterson. 1995. *Amphibians and Reptiles of Yellowstone and Grand Teton National Parks*. Salt Lake City, University of Utah Press.
- Littlejohn, Margaret. 1996. "Visitor Services Project, Yellowstone National Park Visitor Study," Visitor Services Project Report 75, Cooperative Park Studies Unit, University of Idaho. Unpublished report at Planning Office, Mammoth Hot Springs, Wyoming.
- Littlejohn, Margaret, Dana Dolsen, and Gary Machlis. 1990. "Visitor Services Project, Yellowstone National Park." Visitor Services Project Report 25, Cooperative Park Studies Unit, University of Idaho. Unpublished report at Planning Office, Mammoth Hot Springs, Wyoming.
- Mattson, David J. 1990. "Human Impacts on Bear Habitat Use." *International Conference of Bear Research and Management* 8:33- 56.
- Mattson, David J., and Jeff Henry. 1987. "Spring Grizzly Bear Use of Ungulate Carcasses in the Firehole River Drainage: Second Year Progress Report." In *Yellowstone Grizzly Bear Investigations, Annual Report of the Interagency Grizzly Bear Study Team, 1986*, 63- 82. NPS, Yellowstone.
- Mattson, David J., and Charles Jonkel. 1990. "Stone Pines and Bears." In *Proceedings of the Symposium on Whitebark Pine Ecosystems; Ecology and Management of a High Mountain Resource*. Compiled by W.C. Schmidt and K.J. McDonald. General Technical Report INT- 270, U.S. Forest Service.
- McEneaney, Terry. 1988. *Birds of Yellowstone: a Practical habitat Guide to the Birds of Yellowstone National Park, and Where to Find Them*. Boulder, CO: Roberts Rinehart.
- McEneaney, Terry. 2000. "An Ornithological and Herpetological Assessment of Federal Highway Projects," Unpublished report, Yellowstone National Park Research Library and Archives, Mammoth Hot Springs.
- McEneaney, Terry, ornithologist. 2002. Personal Communication with the author, August 2002.

- Mealey, Steve P. 1975. "Natural Food Habits of Free Ranging Grizzly Bears in Yellowstone National Park, 1973- 1974." MS Thesis submitted to Montana State University, Bozeman. 158p.
- Mech, L. David. 1970. *The Wolf: the Ecology and Behavior of an Endangered Species*. Minneapolis, MN: University of Minnesota Press.
- Murphy, Kerry. NPS lynx biologist. 2003. Personal communication with the author, August 2003 and July 2002.
- Murphy, K.M., T. Potter, J. Halfpenny, K. Gunther, T. Jones, and P. Lundberg. 2004. The presence and distribution of Canada lynx (*Lynx canadensis*) in Yellowstone National Park, Wyoming. Unpublished final report, Yellowstone National Park, WY.
- National Park Service. 1985. *Development Concept Plan – Old Faithful*. Yellowstone National Park, WY.
- . 1993a. *Yellowstone National Park Hazardous Materials Response Plan*. Yellowstone National Park Research Library and Archives, Mammoth Hot Springs, WY.
- . 1993b. *Programmatic Agreement between ACHP, Wyoming SHPO, Montana SHPO, for Principal Park Road System Improvement*, Yellowstone National Park, WY.
- . 1997 Director's Order #28. *Cultural Resource Management Guideline*, Release No. 5. Washington, D.C., U.S. Government Printing Office.
- . 2000. "Strategic Plan, Yellowstone National park, FY 2001- RY 2005." Superintendent's Office files, Yellowstone National Park.
- . 2001a. *Management Policies 2001*. National Park Service, Department of Interior, 137pp.
- . 2001b. Director's Order #12 *Conservation Planning, Environmental Impact Analysis and Decision Making*, National Park Service, Department of Interior, 123pp.
- . 2003. *Winter Use Plans: Final Supplement Environmental Impact Statement*. Denver Service Center, Denver.
- Nelson Engineering. 2002. "Subsurface Geotechnical Investigation for Waste Water Treatment Plant, Yellowstone National Park, Madison Junction." Unpublished report in Planning Office Files, Yellowstone National Park.
- Peterson, Charles R., Debra A. Patla, and Stephen R. Sullivan. 1995. "Amphibians and Reptiles Along the Grand Loop Highway in Yellowstone National Park: Madison Junction to Norris Campground." Unpublished report, Yellowstone National Park Research Library and Archives, Gardiner, MT.
- Picton, Harold D. 1978. "Climate and Reproduction of Grizzly Bears in Yellowstone National Park." *Nature* 274:888- 889.

Reinhart, D. P. and D. J. Mattson. 1990. "Bear Use of Cutthroat Trout Spawning Streams in Yellowstone National Park." In the *International Conference of Bear Research and Management* 8:343- 350.

Rothberg, Tamburini and Windsor, Inc. 2003 (RTW 2003). *Madison Engineering Design Report*. Denver, Colorado. Yellowstone Planning Office and Maintenance Office files.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. *Canada lynx conservation assessment and strategy*. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI NPS. Forest Service Publication #R1- 00- 53, Missoula, MT.

Schleyer, B.O. 1983. "Activity Patterns of Grizzly Bears in the Yellowstone Ecosystem and their Reproductive Behavior, Predation, and the Use of Carrion," M.S. Thesis submitted to Montana State University, Bozeman. 130pp.

Smith, Doug, NPS wolf biologist. Personal Communication with the author, August 2002.

Truesdale, James T. 2000 "An Archeological Survey, Inventory, and Limited Testing of 48YE365, Madison Campground, Yellowstone National Park, Wyoming." YCR files, NPS, Yellowstone National Park.

U.S. Fish and Wildlife Service. 1993. *Grizzly Bear Recovery Plan*. Missoula, Montana: USFWS.

U.S. Fish and Wildlife Service. 1994. *Final Environmental Impact Statement Summary, The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho*. U. S. Fish and Wildlife Service. 23pp.

Whipple, Jennifer J., NPS Botanist (rare plants) 2004 and 2005. Personal communication with the author.

## 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 13). 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.