

**– ENVIRONMENTAL ASSESSMENT –
NORTH HIGHWAY 89 PATHWAY PROJECT**



Prepared For

**Jackson Hole Community Pathways
320 South King Street
Jackson, WY 83001**

Prepared By

research & consulting inc.

B i o t a



**PO Box 8578, 140 E. Broadway Ste. 23, Jackson, Wyoming 83002
PO Box 880, 73 N. Main Ste. 3, Victor, ID 83455**

Feb 06, 2009

EXECUTIVE SUMMARY

Jackson Hole Community Pathways of Teton County, Wyoming is proposing to construct a shared-use pathway along US Highway 26/89/191, between the Town of Jackson and the southern boundary of Grand Teton National Park. The pathway would be primarily located on National Elk Refuge land within the Wyoming Department of Transportation highway easement. In addition, portions of the pathway may also extend beyond the limits of the highway easement, and constructing these sections would require a compatibility determination, per the National Wildlife Refuge Improvement Act, in order to evaluate the proposed use of Refuge lands as a compatible wildlife-dependent recreational use.

The proposed project would implement an important portion of the Town of Jackson and Teton County Pathways Master Plan. Since the onset of Teton County pathway development in the late 1980's, over 25 miles of shared-use pathways have been constructed. As indicated in the Pathways Master Plan, a complete pathways system would include 75-80 miles of a regional network with links to public lands, transportation origins, local destinations, and cultural and historical sites (JHCP 2007). Grand Teton National Park is simultaneously proposing an additional 42 miles of shared-use pathways within Park boundaries. A primary goal of the Jackson Hole Community Pathways Master Plan is to create connectivity to the Grand Teton National Park pathways.

The purpose of the proposed North Highway 89 pathway is to provide a safe, accessible, and connected facility for non-motorized recreation and transportation in proximity to a major highway and National Wildlife Refuge. The pathway would provide a vital connection between the Town of Jackson and Grand Teton National Park while simultaneously providing users with a safe, scenic, educational, enjoyable, and alternative form of travel and recreation. The proposed project would implement an important portion of the Town of Jackson and Teton County Pathways Master Plan and provide a direct pathway connection from pedestrian improvements along North Cache Street to planned non-motorized pathways in Grand Teton National Park. This pathway connection is desirable from both a regional trail network and a local recreational perspective.

The need for the proposed pathway along US Highway 26/89/191 is due to limited opportunities for safe, non-motorized travel, and limited interpretative opportunities for people choosing this form of travel and recreation. The posted speed for US Highway 26/89/191 is 55 miles per hour and it is heavily traveled by motor vehicles, especially during the summer, with recorded peak daily traffic counts of 17,000 in 2007. Currently, non-motorized travelers and recreationists use sub-standard shoulders (two to four feet wide) directly adjacent to the highway. Without implementing the proposed pathway project, the safety of non-motorized users of the highway shoulders remains questionable, particularly because of the local trend toward increased traffic and visitation. Opportunities to learn about the local landscape and the noteworthy wildlife resources using the National Elk Refuge and crucial wildlife winter ranges in the vicinity of the project area are presently provided only at the Flat Creek bridge turnout on the northern edge of Jackson and the Grand Teton National Park turnout above the National Fish Hatchery. Although several other turnouts are available, and motorists sometimes pull over on shoulders to view wildlife, interpretive resources are presently limited to a single display installed in November

2008 on the east side of US Highway 26/89/191, between the Flat Creek Inn and the National Museum of Wildlife Art.

This Environmental Analysis has been, in part, prepared to aid National Elk Refuge management in reaching a compatible use determination. Under the National Wildlife Refuge System Administration Act, public accommodations, use permits, and easements may be granted when it is determined that the use is compatible with the major purposes for which the area was established and not inconsistent with public safety. Providing increased opportunities for families to experience compatible wildlife-dependent recreation is an administrative priority. Compatible uses may include fishing, hunting, wildlife observation, wildlife photography and environmental education and interpretation.

Four alternatives were identified for this EA: Alternative A – a no action alternative, which represents the continuation of current management conditions; Alternative B – a pathway alignment along the entire length of the east side of the highway, which is the action proposed by Jackson Hole Community Pathways; Alternative C – a pathway alignment mainly along the west side of the highway; and Alternative D – a pathway alignment along portions of both the east and west sides of the highway. The alternatives emphasize resolution of conflicts between pathway users and vehicular traffic while maximizing natural resource protection and the recreational and educational opportunities available.

Pathway scoping revealed that impacts to native wildlife utilizing habitats on and in the vicinity of the pathway project area were important to the public, as well as state and federal agency representatives. Analysis of wildlife species of special concern, including review of relevant scientific literature and interviews with local wildlife experts, determined that direct and indirect project-related impacts would be negligible to mule deer, elk, moose and sage-grouse, or not applicable at all in the case of gray wolves. Marginally greater impacts due to possible loss of breeding and foraging opportunities would result in minor impacts to common small mammals and migratory birds and raptors as a result of any of the action alternatives. Adverse minor impacts to wetland associates including reptiles and amphibians, and waterfowl, shorebirds and cranes would only be associated with eastern pathway alignments, and are progressively greater for the cross-over alignment (Alternative D) and an east side alignment (Alternative B). Any of the action alternatives would have incrementally minor contributions to overall cumulative effects on greater sage-grouse and resident waterfowl, shorebirds, and cranes. Contributions to overall cumulative effects on all other sensitive wildlife species from any of the action alternatives would not exceed negligible.

All of the alternatives would have varying degrees of negligible and minor impacts to soil, vegetation, wetlands, water resources, species of special concern, educational and recreational opportunities, user safety and access, construction and maintenance costs, and visual resources. Direct, indirect, and cumulative impacts to soil, vegetation, and water resources would not exceed negligible under any of the alternatives, although quantitative impacts would be greatest under Alternatives B and D. This is due, in part, to the length of proposed pathway being considerably longer under Alternatives B and D. Alternative A and C would have no direct or indirect wetland effects. Alternatives B and D would not impact wetlands directly, but may have negligible indirect wetland effects. There would be limited potential to enhance educational and recreational opportunities under Alternative A and successively greater potential under

alternatives C, D, and B, respectively. In terms of user safety and access, Alternative A would have a clearly discernable (minor) adverse impact on safety since a large portion of non-motorized travelers would be forced to continue using the highway shoulder. The action alternatives would all have perceptible beneficial impacts (negligible to minor) to safety since they address the need for separated pathways. Alternative B would be the safest in terms of potential vehicle conflicts, at-grade crossing, and safe, direct access to destinations. Alternative C would be the least safe in terms of potential vehicle conflicts and the many destinations on the east side of the highway would not be directly accessible. Alternative D would be ranked between Alternatives C and B in terms of intersection safety and user access. None of the alternatives would have adverse environmental justice impacts. Under the action alternatives, the same access improvements that apply to the general public would also apply to low-income and minority persons living in or using the project area. Alternative A (no action) is not expected to impact visual resources, while under the action alternatives there would be slight but detectable alterations to scenic views.

This environmental assessment is available on the Jackson Hole Community Pathways Web site at <http://www.tetonwyo.org/pathways/> and is being distributed for public and agency review and comment for a period of 31 days in accordance with the National Environmental Policy Act. If you wish to comment on the environmental assessment, you may mail comments to the name and address below, or e-mail them to bschilling@ci.jackson.wy.us. Comments, including names and addresses of respondents (unless otherwise requested) will be available for public review.

Please send comments by March 9, 2009 to:

Jackson Hole Community Pathways
Attn: Brian Schilling
P.O. Box 1687
Jackson, WY 83001

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– ENVIRONMENTAL ASSESSMENT – NORTH HIGHWAY 89 PATHWAY PROJECT

CHAPTER 1: PURPOSE AND NEED

1.1 OVERVIEW

Jackson Hole Community Pathways of Teton County, Wyoming is proposing to construct a shared-use pathway along US Highway 26/89/191, between the Town of Jackson and the southern boundary of Grand Teton National Park. The pathway would be primarily located on National Elk Refuge land within the Wyoming Department of Transportation highway easement. In addition, portions of the pathway may also extend beyond the limits of the highway easement, and constructing these sections would require a compatibility determination, per the National Wildlife Refuge Improvement Act, in order to evaluate the proposed use of Refuge lands as a compatible wildlife-dependent recreational use.

The proposed project would implement an important portion of the Town of Jackson and Teton County Pathways Master Plan. Since the onset of Teton County pathway development in the late 1980's, over 25 miles of shared-use pathways have been constructed. As indicated in the Pathways Master Plan, a complete pathways system would include 75 to 80 miles of a regional network with links to public lands, transportation origins, local destinations, and cultural and historical sites (JHCP 2007). Grand Teton National Park is simultaneously proposing an additional 42 miles of shared-use pathways within Park boundaries. A primary goal of the Jackson Hole Community Pathways Master Plan is to create connectivity to the Grand Teton National Park pathways.

Teton County (through Jackson Hole Community Pathways, and in partnership with the US Fish and Wildlife Service and the National Elk Refuge) has recently been awarded a grant by the Alternative Transportation in Parks and Public Lands program (administered by the Federal Transit Administration) to construct a shared-use path adjacent to the National Elk Refuge. In addition, the Town of Jackson has agreed to contribute additional funds from a Scenic Byways grant toward planning and design of the pathway.

In early 1995 the Teton County, Wyoming Board of County Commissioners and Friends of Pathways funded a study that examined alternatives for locating and constructing a non-motorized pathway along US Highway 26/89/191, from the Town of Jackson north to the community of Moose, Wyoming located in Grand Teton National Park. The recommendation of the Final Conceptual Study: Moose – Jackson Scenic Pathway was that a separated pathway along the entire length of the east side of the highway would provide the best combination of safety, convenience, cost and recreational opportunities (VLA 1997). The study included a public scoping component in which the Wyoming Department of Transportation and the Highway Patrol expressed unanimous support for a pathway separated from the highway because of safety concerns. It should be noted that the length of highway corridor considered in the

conceptual study extends beyond the project area considered in this environmental assessment (EA) and that the alternatives vary slightly. First, the west side alignment that is analyzed in the concept study does not include a crossing north of town - it is strictly a west side alignment from Jackson to Moose, Wyoming. Second, the crossover alignment analyzed in the 1997 study included an at-grade crossing rather than an underpass north of the Flat Creek Bridge.

1.2 PROJECT AREA DESCRIPTION AND LOCATION

The project area consists of a linear corridor along US Highway 26/89/191 that extends from the south side of Flat Creek Bridge within the Town of Jackson to the southern boundary of Grand Teton National Park. On the east side of the highway, the actual southern boundary of Grand Teton National Park is unclear and may fall within the main channel of the Gros Ventre River. On the west side of the highway, the southern boundary of Grand Teton National Park is just north of Nichol Springs Road (Figure 1). For the first 2.5 miles of the project area, the highway easement extends from the centerline 75 feet to the east and 100 feet to the west. Just north of the National Museum of Wildlife Art, the right-of-way changes to 100 feet from the centerline on both sides of the highway. Portions of the east side of the project area in the vicinity of Fish Hatchery Hill extend beyond the highway easement onto land administered by the National Elk Refuge. At the top of Fish Hatchery Hill, the highway easement ends and the pathway section from here to the southern boundary of Grand Teton National Park would be entirely on land administered by the National Elk Refuge. The legal description for the project area is Sections 2, 10, 11, 15, 22, 27, and 28, T41N, R116W and Section 35, T42N, R116W; Jackson, Teton Village, and Gros Ventre Junction, Wyoming Quadrangles.

The highway corridor, including the pathway project area, has been generally categorized by cross section type (Figure 1; VLA 1997). Cross Section Type A is characterized by a steep hillside road cut on the west, and relatively gentle fill slopes on the east. In the southern-most portion of the project area, the fill slopes drop off steeply to the east onto flatter grades and isolated wetland areas. Cross Section Type B has a natural slope angle on the west and a gentle fill slope to the east. Cross Section Type C occurs at the grade transition near the Fish Hatchery and is characterized by fill slopes on both sides of the highway. Cross Section Type D occurs within the northern portion of the project area and is characterized as flat with the highway slightly elevated above adjacent topography. There is a small portion of the highway as it crosses the Gros Ventre River riparian area that is best characterized by Cross Section Type C.

1.3 PURPOSE AND NEED

The purpose of the proposed North Highway 89 pathway is to provide a safe, accessible, and connected facility for non-motorized recreation and transportation in proximity to a major highway and National Wildlife Refuge. The pathway would provide a vital connection between the Town of Jackson and Grand Teton National Park while simultaneously providing users with a safe, scenic, educational, enjoyable, and alternative form of travel and recreation. The proposed project would implement an important portion of the Town of Jackson and Teton County Pathways Master Plan and provide a direct pathway connection from pedestrian improvements along North Cache Street to planned non-motorized pathways in Grand Teton National Park. This pathway connection is desirable from both a regional trail network and a local recreational perspective.

The need for the proposed pathway along US Highway 26/89/191 is due to limited opportunities for safe, non-motorized travel, and limited interpretative opportunities for people choosing this form of travel and recreation. The posted speed for US Highway 26/89/191 is 55 miles per hour and it is heavily traveled by trucks and motor vehicles, especially during the summer, with recorded peak daily traffic counts of 17,000 in 2007. Currently, non-motorized travelers and recreationists use sub-standard shoulders (2 to 4 feet wide) directly adjacent to the highway. Without implementing the proposed pathway project, the safety of non-motorized users of the highway shoulders remains questionable, particularly because of the trend toward increased traffic and visitation. Opportunities to learn about the local landscape and the noteworthy wildlife resources using the National Elk Refuge on the east and crucial wildlife winter ranges on the west are presently provided only at the Flat Creek bridge turnout on the northern edge of Jackson, the Grand Teton National Park turnout above the National Fish Hatchery, and the turnout on the east side of the highway, between Flat Creek Inn and the sleigh ride facility. Although several other turnouts are available, and motorists sometimes even pull over on shoulders to view wildlife, no interpretive resources are presently available at these locations.

This EA has been, in part, prepared to aid National Elk Refuge management in reaching a compatible use determination. Under the National Wildlife Refuge System Administration Act, public accommodations, use permits, and easements may be granted when it is determined that the use is compatible with the major purposes for which the area was established and not inconsistent with public safety. Providing increased opportunities for families to experience compatible wildlife-dependent recreation is an administrative priority. Compatible uses may include fishing, hunting, wildlife observation, wildlife photography, and environmental education and interpretation.

1.4 SCOPE OF THE ANALYSIS

The analysis focuses on the evaluation of potential adverse and beneficial effects associated with alternative pathway alignments within the context of project objectives and issues identified during the scoping process. Design of the shared-used pathway itself is limited by space and all proposed alignments would seek to balance the need to separate the pathway and the road for safety and user experience reasons while designing the pathway to minimize new disturbance.

The following objectives have been identified for this EA:

- Provide a safe, accessible, non-motorized connection between the Town of Jackson and Grand Teton National Park (Jackson Hole Community Pathways Master Plan 2007).
- Enhance opportunities to participate in wildlife-dependent recreation compatible with the mission and purpose of the National Elk Refuge.
- Meet trust responsibilities of the US Fish and Wildlife Service and the National Elk Refuge by minimizing adverse effects to NER resources such as elk, migratory birds, and threatened and endangered species (National Wildlife Refuge System Administration Act of 1966, as amended, 16 USC 673, 668dd et seq., 601 FW 3.7a, 44 Stat. 1246).
- Provide a high-quality pathway user experience, which is a major priority and key component of facility design (Pathways Master Plan 2007).

- Increase partnership and cooperation among the National Elk Refuge, Town of Jackson, Teton County, Grand Teton National Park, Wyoming Department of Transportation, Federal Transit Administration, and Federal Highway Administration by promoting complementary transportation goals and wildlife-dependent priority uses of the National Elk Refuge.

1.5 SCOPING AND RELEVANT ISSUES

1.5.1 Internal Scoping

The Town of Jackson and Teton County, Wyoming, in cooperation with Biota Research and Consulting, conducted two internal scoping meetings. Internal scoping meetings occurred on two occasions, May 28, 2008 and June 25, 2008. Meeting attendees included Gordon Gray and Brian Schilling representing Jackson Hole Community Pathways; Steve Kallin and Eric Cole, representing the National Elk Refuge; and Hamilton Smith and Tom Campbell, representing Biota Research and Consulting. The June meeting dealt specifically with all agency and public scoping comments, from which a list of issues to be analyzed in this document was finalized. The July internal scoping meeting dealt specifically with finalizing the pathway alignments to be considered through alternatives analysis.

1.5.2 Public and Agency Involvement

The purpose of the public scoping process was to identify issues and concerns related to the project and to identify the range of issues that would be addressed in the Environmental Analysis. In preparation for public scoping, a mailing list of approximately 60 agencies, interested organizations, and individuals was compiled. A scoping notice was prepared in March 2008 and mailed to those on the list. The Jackson Hole Community Pathways issued a press release announcing the initiation of the scoping period for the project and the date for the public scoping open house. Advertisements were published in the Jackson Hole Daily News (March 7, 10, and 11, 2008) and in the Jackson Hole News and Guide (February 20, and 27 and March 5, 2008) and the open house was announced on a local radio station.

The scoping notice included a brief description of the purpose and need for this project, the actions proposed, the alternatives considered to date, the EA completion process, and a solicitation for public participation in a scheduled open house. The notice also contained a one-page response form for readers to complete and return to Jackson Hole Community Pathways. The response forms were designed so that respondents could provide comments on the project and to ensure that future mailings were sent to anyone indicating an interest in the project.

The public scoping open house was held on March 11, 2008, in Jackson, Wyoming. The open house consisted of an open forum and exhibits pertaining to the North Highway 89 Pathway. Representatives from the Jackson Hole Community Pathways, the National Elk Refuge, Biota Research and Consulting, Inc., the Teton County Engineering Department, and Darin Martens (Landscape Architect) were present to answer questions and solicit comments on the project. A total of 37 individuals attended the workshop. Interested parties were asked to submit written comments by March 31, 2008.

Grand Teton National Park, Teton County, Wyoming Planning and Development Office, and the Teton Conservation District provided formal written responses indicating support for the proposed project. All three responses expressed preference for an alignment along the east side of the highway and provided mitigation and best management practice suggestions. The US Fish and Wildlife Service provided written response indicating that no threatened, endangered, or candidate species are expected to occur in the project area. The Service did identify three issues of concern: 1) migratory bird nests and potential construction-related disturbance, 2) sage grouse habitat, and 3) mountain plover habitat.

1.5.3 Relevant Scoping Issues

Public comments were organized into six separate issues. The Environmental Analysis has addressed these issues in one of two ways: (1) they were analyzed in detail through the development of an alternative or as part of an impact topic; or (2) they were not analyzed in detail and the reader is provided with rationale for its dismissal.

The first issue addresses suggestions that access to the National Museum of Wildlife Art, Flat Creek Inn, Kelly, and Antelope Flats be considered. The issue of access to the National Museum of Wildlife Art and Flat Creek Inn has been addressed in this document through the development of alternatives that include highway underpasses near the museum and/ or the motel. The issue of access or connectivity to Kelly and Antelope Flats has been addressed as part of the impact topic “User Safety and Access”. The impact analysis for this topic is contained in Chapter 4 (“Environmental Consequences”) of this document.

The second issue addresses safety concerns, including the need for signage and pathway separation, and concerns about potential traffic and parking congestion related to existing turnouts. There was specific concern that some turnouts, such as the turnout located at the south boundary of Grand Teton National Park, may become park and ride locations for pathway users. Grand Teton National Park has indicated that it may impose its own mitigation measures or parking regulations in the event this happens (see Appendix A: Agency Correspondences). Jackson Hole Community Pathways and/ or the National Elk Refuge may also impose parking regulations at other turnout locations along the pathway corridor. Mitigation measures specific to the Jackson Hole and Greater Yellowstone Area Visitor Center parking lot are located in Section 2.7.5 of this document (Mitigation Measures for the Action Alternatives – Public Safety). Additional safety-related issues are considered under the impact topic “User Safety and Access”. The impact analysis for this topic is contained in Chapter 4 (“Environmental Consequences”) of this document.

The third issue addresses concerns about general impacts to natural and biological resources, specifically: wetlands, greater sage-grouse habitat, migratory bird nesting sites, mountain plover and mule deer habitat, and elk migration. Effects related to all of these issues are analyzed under the impact topics “Soils”, “Vegetation”, “Water Resources”, “Wetlands”, and “Wildlife Species of Special Concern” in Chapter 4 (“Environmental Consequences”). It was also specifically suggested that winter closures of the pathway for wildlife protection not be analyzed in this environmental assessment. Seasonal closure of this pathway segment is considered an appropriate management action to minimize potential impacts and maximize benefits to important wildlife habitat and migration corridors. Furthermore, seasonal pathway closure is

necessary to avoid conflicts between winter trail users and wildlife and ensure consistency with the mission of the National Elk Refuge (National Wildlife Refuge System Administration Act of 1966, as amended, 16 USC 673, 668dd et seq., 601 FW 3.7a, 44 Stat. 1246) and the Pathways Master Plan (JHCP 2007).

The fourth issue addresses suggestions related to the need for educational opportunities such as interpretive displays. The issue of educational opportunity is closely related to wildlife-dependent recreational opportunity, which is an element of the purpose of and need for this EA (Section 1.3). The issue is addressed under the topic of “Educational/ Recreational Opportunities”, and the effects of the alternatives on this issue are analyzed in Chapter 4 (“Environmental Consequences”).

The fifth issue addresses comments related to shared-use pathway conflicts. Comments within this category pertained to disability access, Nordic skiing and horseback riding needs, and pet restrictions. The pathway project would, by design, ensure access to people with disabilities because pathway construction would comply, to the greatest extent practicable, with the Architectural Barriers Act Accessibility Guidelines for Outdoor Developed Areas (ATBCB 2007). The interdisciplinary team evaluated Nordic skiing and associated trail grooming, and these activities were deemed incompatible due to the necessary winter pathway closure. Project area space constraints do not provide sufficient area to facilitate safe and enjoyable equestrian uses due to proximity to the highway, inadequate pathway space, parking limitations, and potential noxious weed issues. Although National Elk Refuge pet regulations have historically permitted leashed pets on the section of Elk Refuge Road open to the public, pets would not be allowed along the pathway proposed in this document. The project proposed herein is a new public use of Refuge lands and recent research and leash violation rates in Teton County suggest that the allowance of pets would conflict with Refuge management objectives.

The sixth issue addresses concerns about the need for project proponents to coordinate with Grand Teton National Park and the Town of Jackson because the proposed pathway would connect to the Grand Teton National Park pathways network at the northern project boundary and to Town of Jackson roadside improvements on the east side of North Cache Street at the southern project boundary. The project proponents recognize the need to coordinate with Grand Teton National Park and the Town of Jackson during the planning process and these coordination efforts are documented throughout this document, including development of the alternatives (Chapter 2), Section 1.5.2 (Public and Agency Involvement), and Appendix A (Agency Correspondences).

1.6 IMPACT TOPICS DISMISSED FROM DETAILED STUDY

Some impact topics were dismissed from further study after discussions with resource specialists, input from federal and state agencies, and after internal and public scoping was completed. Rationale for dismissing the following impact topics is provided below:

Air Quality – The action alternatives would promote non-motorized modes of transportation and beneficial impacts to air quality would not vary measurably among the alternatives. The relative contribution of any of the action alternatives to cumulative effects on air quality would be

beneficial and would not exceed a minor threshold. Any adverse impacts to air quality would be related to pathway construction, localized, short-term, and comparable for all alternatives.

Wild and Scenic Rivers – No rivers within the area of potential effect are designated by congress or proposed for designation as part of the National Wild and Scenic Rivers System.

Prime and Unique Farmland – Prime and Unique Farmlands are not addressed as an impact topic because soils in the project area are not classified as prime and unique farmlands by the Natural Resource Conservation Service.

Noise – Noise was eliminated as an impact topic because beneficial impacts from reduced motorized traffic would be limited in scope and likely offset by projected traffic increases. Potential adverse impacts would be related to pathway construction, localized, and short-term.

Socioeconomics – Public safety and project costs are analyzed as separate impact topics. Pathway user safety and access were concerns identified during public scoping, and project cost differences are essential to developing viable alternatives. Additional socioeconomic topics, including changes in community cohesion, local employment opportunities, and property values have been dismissed from detailed analysis. These resources are either unlikely to be affected, or unlikely to be adversely affected by the proposed alternatives. While it is recognized that the proposed pathway, as part of an integrated pathways system, would likely improve quality of life, expand visitor opportunities, increase the potential to attract employees, and raise localized property values, the direct, indirect, and cumulative benefits are not expected to vary considerably among action alternatives. Furthermore, in so far as the purpose of this document is to support the decision-maker in reaching a compatible use determination, a detailed socioeconomic analysis is not considered relevant to the selection of an alternative.

Cultural Resources – Consultation with the State Historic Preservation Officer has been initiated. Records indicate that a survey has not been conducted for the entire area of potential effect. As recommended, prior to groundbreaking under any alternative, consultation would continue in compliance with Section 106 of the State Historic Preservation Act (see Appendix A).

1.7 RELATIONSHIP OF THE PROPOSED PROJECT TO PREVIOUS PLANNING EFFORTS

As stated in the National Environmental Policy Act (NEPA), all major federal actions or actions supported by public funds that may have considerable impact on the environment must be preceded by a statement describing all impacts of the action and alternatives to that action. This EA was prepared in compliance with NEPA requirements, as well as the Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and the National Historic Preservation Act (NHPA).

National Elk Refuge

The National Elk Refuge was established by various Acts of Congress, executive orders, and other documents to provide, preserve, restore, and manage lands for wintering elk, birds, and other big game animals. Public recreational use is permitted when compatible and when it will not interfere with the primary purposes for which the Refuge was established.

Documents authorizing the National Elk Refuge are codified in Title 16, USC; 673, 673a, and 673b. Other applicable laws, regulations, and policies include the National Wildlife Refuge Administration Act of 1966 as amended (16 U.S. C. #668dd-668ee); Federal Water Pollution Control Act (Clean Water Act) as amended (33 U.S.C. # 1251-1376); Archaeological Resources Protection Act of 1979; and Antiquities Act of 1906. Specific authority to allow actions within an existing right of way are provided by PI 89-669; 80 Stat. 927, National Wildlife Refuge System Administration Act, 16 USC 668dd.

The National Wildlife Refuge System Improvement Act of 1997

Under this Act, which amends the National Wildlife Refuge System Administration Act of 1966, public accommodations, use permits, and easements may be granted when it is determined that the use is compatible with the major purposes for which the area was established and not inconsistent with public safety. Providing increased opportunities for families to experience compatible wildlife-dependent recreation is an administrative priority. Compatible uses may include fishing, hunting, wildlife observation, and environmental education.

Pathways Master Plan: Town of Jackson & Teton County, Wyoming 1997

The Pathways Master Plan addresses the policy, strategy, and implementation of a fully developed and managed pathway system in the Town of Jackson and Teton County, Wyoming. The project proposed herein is listed as one of the top five-year capital pathway priority projects. The plan states that, “A key issue for winter trail use is the designation of winter closure areas for wildlife. Winter trail use must be managed to avoid conflicts with these areas.” In addition to identifying measures to reduce wildlife conflicts, the plan includes system maintenance policies, design guidelines, construction specifications, and pathways maintenance and implementation recommendations, including public safety measures.

The Jackson / Teton County Comprehensive Plan

Pathways elements are contained in Chapters 1 (Community Vision), 3 (Community Character), 4 (Natural and Scenic Resources), 7 (Community Facilities), and 8 (Transportation) of The Jackson / Teton County Comprehensive Plan (Third Printing 2003). In chapter 1, the pathways system is identified as an alternative transportation network. In chapter 3 the pathways system is identified as a corridor that connects neighborhoods. In Chapter 4 the pathways system is identified in terms of access points to public lands and natural resources. In chapter 7 the pathways system is identified in terms of the implementation of a community facility. In Chapter 8 the pathways system is again identified as an alternative transportation network.

Grand Teton National Park Transportation Plan Environmental Impact Statement (EIS)

In the pathways component of this EIS, the National Park Service is proposing to construct 22.5 miles of multi-use pathway outside of existing road corridors and 18 miles of multi-use pathway inside of existing road corridors. The pathway along U.S. Highway 26/89/181 from the south boundary of the Park to Antelope Flats will be constructed as a separated pathway located outside of the road corridor.

Bison and Elk Management Plan and EIS for The National Elk Refuge, Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway

Issues addressed in the EIS include bison and elk use levels on the National Elk Refuge and Grand Teton National Park, population control, habitat management, disease management, and winterfeeding.

Conceptual Study of Jackson-Moose Scenic Pathway

This 1997 study (VLA) examined alternatives for locating and constructing a non-motorized pathway along Highway 26/89/191 from the Town of Jackson, north to Moose, Wyoming in Grand Teton National Park. The study included site analysis, conceptual planning, public involvement, environmental assessment, and a final planning recommendation (see Section 1.1, Overview)

Architectural Barriers Act Accessibility Guidelines for Outdoor Developed Areas

These guidelines specify technical requirements to be applied during the design, construction, additions to, and alterations of outdoor developed areas by federal agencies when adopted as standards pursuant to the Architectural Barriers Act. Compliance with the guidelines ensures that accessibility is considered for all newly constructed and altered trails and other outdoor elements, but it is recognized that natural environments may not always be compatible with fully accessible facilities.

American Association of State of Highway Transportation Officials (AASHTO) Standards

These standards, which provide guidelines for the design, development, maintenance, and operation of bicycle facilities, are generally adhered to unless there is a reason to follow alternative design guidelines.

CHAPTER 2: ALTERNATIVES

2.1 DEVELOPMENT OF ALTERNATIVES

Managers and specialists from Jackson Hole Community Pathways, the National Elk Refuge, and non-governmental engineering and environmental parties worked together as an interdisciplinary team to develop a full range of alternatives. The alternatives were developed through discussions and consideration of public comments and the project's purpose and need. The alternatives emphasize resolution of conflicts among natural resources, vehicular traffic, and pathway users while maximizing the recreational and educational opportunities available.

2.2 ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

Disturbance - A pathway width of 20 feet is assumed for all proposed pathways. This assumption is conservative and takes into account a maximum disturbance width of 20 feet during the majority of construction. After construction, reclamation and revegetation efforts would reduce disturbances to the edges of the 10-foot wide finished pathway. The maximum disturbance width may not hold true where a proposed pathway crosses steeper slopes, and these areas may require additional construction engineering and reclamation. For example, cut-slopes and retaining walls may create final disturbance footprints in excess of 20 feet in localized areas.

Pathway Separation - Each alternative generally tries to balance conflicting objectives to maximize pathway separation from the highway for maintenance, user safety and recreational experience reasons, and to minimize pathway separation from the highway to reduce natural and biological resource impacts. From a maintenance and safety perspective, a minimum of 15 feet between the road edge and pathway edge is desirable, more if possible. Each of the proposed alignments would follow the natural topography of the land wherever possible, thereby minimizing grading damage and subsequent impacts to soils, vegetation, and wildlife habitat. Alignments proposed under the action alternatives would also seek to avoid utilities, fences, vehicle pullouts, wetlands, and other sensitive areas.

Flat Creek Bridge Crossing - The Flat Creek Bridge currently has two pedestrian walkways, one on either side. These walkways are separated from the traffic lanes by a 3-foot high concrete barrier. All of the action alternatives would include expansion of existing non-motorized facilities on the Flat Creek Bridge from 5 feet to 10 to 12 feet wide.

Interpretive Displays - Amenities would be developed in consultation with National Elk Refuge staff and would encourage use of the pathway as an "outdoor classroom" accessible to all ages and abilities.

Pathway Lighting – Lighting, if any, would be minimal and confined to highway underpasses.

Cultural Resources - Each alternative would be implemented in compliance with Section 106 of the National Historic Preservation Act in coordination with the State Historic Preservation Officer and the Federal Transit Administration (See Appendix A)

Wyoming Department of Transportation Highway Improvement Project - Under State Transportation Improvement Project N104076, Wyoming Department of Transportation is planning highway improvements along 3.75 miles of US Highway 26/89/191 between Jackson and the southern boundary of Grand Teton National Park. It is probable but uncertain that the existing shoulder widths along the highway would remain unchanged (2 to 4 feet-wide) under all alternatives. It is also anticipated that the Wyoming Department of Transportation would adhere to construction best management practices and revegetate any disturbed areas associated with the improvement project.

2.3 ALTERNATIVE A – NO ACTION

Under Alternative A, Jackson Hole Community Pathways would not construct a separated shared-use pathway from the south side of Flat Creek Bridge in the Town of Jackson to the southern boundary of Grand Teton National Park. Current management conditions and traffic growth would continue in the project area. Existing shoulders along the highway would likely remain inadequate for non-motorized transportation uses (2 to 4 feet-wide). Eight feet is considered a minimum shoulder width by the Federal Highway Administration based on design speed and traffic volume.

2.4 ALTERNATIVE B – EAST SIDE ALIGNMENT (PROPOSED ACTION)

Alternative B is the action proposed by Jackson Hole Community Pathways. Under the proposed action, the alignment would be located along the east side of US Highway 26/89/191 for its entire length, beginning at the southeast side of Flat Creek Bridge where it would link pedestrian improvements along North Cache Street, and ending at the southern boundary of Grand Teton National Park (Figure 2). At present, the actual southern boundary of Grand Teton National Park on the east side of the highway is unclear and may fall within the main channel of the Gros Ventre River. For the purpose of this analysis, the project area boundary on the east side of the highway is defined here to include the Gros Ventre River Bridge crossing. An east side alignment would consist of approximately 6.25 miles of new pathway. The section of pathway between the Town of Jackson and Fish Hatchery Hill would be constructed within the highway easement. The alignment would negotiate Fish Hatchery Hill through a series of switchbacks that extend beyond the US Highway 26/89/191 easement and onto land administered by the National Elk Refuge. At the top of Fish Hatchery Hill the highway easement ends and the pathway section from here to the southern boundary of the Park would be entirely on land administered by the National Elk Refuge.

Several infrastructure features either exist or would be constructed as part of an east side alignment, including:

- **Turnouts:** Six existing turnouts are located along the east side of US Highway 26/89/191
- **Highway Approaches:** Four highway approaches are present, including the National Fish Hatchery entrance; the sleigh ride entrance across from the National Museum of Wildlife Art; a two-track road located midway between Fish Hatchery Hill and the Gros Ventre River, which accesses the South Park Water Users irrigation diversion on the National Elk Refuge; and a two-track road along the south side of the Gros Ventre River.

- **Highway Crossings:** One underpass is proposed that would provide pathway users with access to the National Museum of Wildlife Art located on the west side of US Highway 26/89/191.
- **Bridge Crossings:** Bridges across Flat Creek and the Gros Ventre River are present within the project area, as well as a culvert irrigation ditch crossing on the south side of the Gros Ventre River. The Flat Creek Bridge is discussed in Section 2.2 (Elements Common to All Action Alternatives). The Gros Ventre River Bridge is approximately 260 feet in length with 5.5-foot wide shoulders. Due to engineering constraints, it is likely that a separate bicycle/ pedestrian bridge would be located along the east side of the highway under this alternative. The bridge would be approximately 250 to 260 feet in length, situated near the existing roadway, and located to minimize crossing distance yet span upland to upland.

2.5 ALTERNATIVE C – WEST SIDE ALIGNMENT

Under Alternative C, the pathway would begin on the southeast side of Flat Creek Bridge, where it would connect to pedestrian improvements being made along North Cache Street in the Town of Jackson. The pathway would cross Flat Creek Bridge along the east side of US Highway 26/89/191, then cross the highway via an underpass and continue along the west side of the highway to the southern boundary of Grand Teton National Park, just north of the Nichol Springs Road (Figure 2). The total length of new pathway proposed under this alternative would be approximately 3.97 miles.

Several infrastructure features either exist or would be constructed as part of a west side alignment, including:

- **Turnouts:** There are two existing turnouts along the west side of US Highway 89: one near Flat Creek in the southern portion of the project area and the second just south of Fish Hatchery Road.
- **Highway Approaches:** Six highway approaches are present, including four commercial accesses around the Flat Creek Inn commercial area, one at the National Museum of Wildlife Art entrance, and one residential area located at the top of Fish Hatchery Hill.
- **Highway Crossings:** One underpass would be proposed to provide pathway users with access to the to the west side of US Highway 26/89/191 immediately north of the Town of Jackson.
- **Bridge Crossing:** One bridge crossing of Flat Creek.

2.6 ALTERNATIVE D – CROSSOVER ALIGNMENT

Alternative D was developed to respond to conflicting concerns regarding safety, commercial access, and natural resource protection. The pathway would begin on the southeast side of Flat Creek Bridge, linking to pedestrian improvements being made along North Cache Street. A crossover to the west side of the highway would be achieved via an underpass located somewhere in the southern portion of the project area; the precise location of which would depend upon construction constraints, and perceived wetland and wildlife resource protection. The pathway would continue north until crossing under the highway to the east side via a second

underpass located between the Flat Creek Inn and the National Museum of Wildlife Art entrance. The pathway would then continue north along the east side of US Highway 26/89/191 to the southern boundary of Grand Teton National Park (Figure 2). The total length of new pathway proposed under this alternative would be approximately 6.27 miles, which is nearly the same as Alternative B (East Side Alignment).

Several infrastructure features either exist or would be constructed as part of a crossover alignment, including:

- **Turnouts:** There are four existing turnouts along the west side of U.S. Highway 26/89/191.
- **Highway Approaches:** Seven highway approaches are present, including four commercial accesses around the Flat Creek Inn commercial area; one at the sleigh ride entrance to the National Elk Refuge; the National Fish Hatchery entrance; a two-track road located midway between Fish Hatchery Hill and the Gros Ventre River which accesses the South Park Water Users irrigation diversion on the National Elk Refuge; and a two-track road along the south side of the Gros Ventre River.
- **Highway Crossings:** Two underpasses would be required, one immediately north of the Town of Jackson and a second between Flat Creek Inn and the National Museum of Wildlife Art entrance.
- **Bridge Crossings:** Same as Alternative B (East-side Alignment)

2.7 MITIGATION MEASURES FOR THE ACTION ALTERNATIVES

All action alternatives would adhere to best management practices, which would be implemented, as appropriate, before, during, and after construction to reduce short- and long-term resource impacts. Many best management practices are design-specific and would be developed when the full design is complete and proposed construction details are known. Specific practices would include, but are not limited to the following mitigation measures:

2.7.1 Soils

- Pathways and interpretive displays would be located to minimize impacts to vegetation, avoiding shrubs and trees where possible.
- Silt fences and sedimentation fences would be installed where appropriate during grading and construction to reduce soil erosion.
- Where appropriate, materials such as straw bales, fabric barriers, and sandbags would be used to prevent soil and debris from entering storm drain inlet areas.
- Whenever possible, staging and stockpile areas would be located in previously disturbed areas and away from visitor use areas to minimize ground disturbance.
- If necessary, dust abatement would be employed to reduce dispersal of airborne soil.

2.7.2 Vegetation

- Pathways and interpretive displays would be located to minimize impacts to vegetation, avoiding shrubs and trees where possible.
- A noxious weed control plan would be developed in cooperation with Teton County Weed and Pest prior to construction.
- A revegetation plan for disturbed areas would be developed that includes the use of native seeds and plants, and entail monitoring to ensure successful plantings.
- Whenever possible, disturbed vegetation would be salvaged and preserved for reuse.
- Pathway boundaries would be delineated to protect vegetative resources.

2.7.3 Water Resources

- A stormwater pollution prevention plan would be developed that specifies site-specific measures to reduce and control erosion, sedimentation, and compaction, thereby reducing water quality degradation.
- Stormwater pollution controls would be integrated into design, construction, and operation of new facilities, parking areas, and other paved surfaces in order to concentrate and capture surface runoff.
- Pathways and interpretive displays would be sited to minimize impacts to vegetation, avoiding shrubs and trees wherever possible.
- Hazardous waste material would be immediately removed from the project area.
- Equipment would be inspected for hydraulic and oil leaks prior to and during use to prevent soil and water contamination.
- Whenever possible, construction would be scheduled during dry periods and when surface and groundwater levels are reduced in order to minimize soil contamination and compaction.

2.7.4 Wildlife (including Threatened and Endangered Species)

- The pathway would be closed to all uses, including maintenance from October 1 through April 31. Recognizing that migration periods may fluctuate each year, the pathway closure should be managed adaptively in cooperation with the National Elk Refuge to minimize conflicts. Signage and, if necessary, gates would be erected to discourage/eliminate pathway use during the closure period.
- Pathway signage and interpretive displays would be located and sized to minimize potential adverse impacts to migrating elk or elk being intentionally hazed towards the elk-jump entrances into the National Elk Refuge.
- An additional elk-jump entrance to the National Elk Refuge would be constructed in the vicinity of the sleigh ride facility, per consultations from National Elk Refuge and Wyoming Game and Fish Department personnel.
- Mitigation measures would be developed and implemented to minimize disturbance to nesting trumpeter swans. Any proposed interpretive displays would maintain a minimum

distance of 300 yards from the present location of the Middle Pond nest. Native vegetative screening similar to the existing tall shrub species growing along the boundary fence would be planted 100 yards north and south of the southernmost elk-jump, along the pathway within the US Highway 26/89/191 right-of-way in the vicinity of the Flat Creek Marsh to reduce direct, line-of-site viewing of the Middle Pond nest. Vegetation would be composed of native shrubs that are unpalatable to ungulate species so as to not attract browsers to this portion of the highway right-of-way. In addition, vegetative screening would be designed in accordance with National Elk Refuge and Wyoming Game and Fish Department biologists to avoid conflicts with effective use of the elk jump.

- All domestic pets would be prohibited from using the proposed pathway. Teton County would be responsible for enforcement of pet regulations.
- Equestrian use of the pathway would be prohibited, and no parallel trail facilities would be constructed for equestrian use.

2.7.5 Public Safety

Safety would be addressed in highway turnouts, parking lots, and approaches through adherence to the current edition of the American Association of State of Highway Transportation (AASHTO) Guide for the Development of Bicycle Facilities. Design considerations provided in the guidelines that minimize risks to public safety include signing, sight distance, design speed, lighting, roadway intersections, other intersection design issues, grade, and pathway separation.

Parking issues surrounding potential use of the Jackson Hole and Greater Yellowstone Visitor Center as a park and ride for pathway users would be minimized through the use of way finding signage, which would help to promote a point of origin at the Home Ranch Parking lot. In addition, “Parking for Visitor Center Only” signs would be posted at the Visitor Center parking lot and coordination with the Town of Jackson would ensure enforcement of parking regulations. If parking becomes a further issue, it would be addressed through adaptive management as necessary.

2.7.6 Visual Resources

- Any building footprints associated with interpretive displays and kiosks would be reduced and native vegetative screening would be enhanced, where appropriate, to minimize visual intrusions.
- Building materials visually compatible with the landscape would be chosen for interpretive displays and kiosks.
- Any facilities associated with the shared-use pathway would be sited to minimize impacts to primary view corridors.

2.8 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The option to widen highway shoulders for non-motorized use rather than construct a separated, multi-use pathway was considered but dismissed for several reasons. First, public and agency

comments have consistently expressed the need for a separated pathway to address substantiated safety concerns along this segment of the highway system. Non-motorized use adjacent to the highway could exacerbate safety issues given the high number of vehicle turnouts, traffic volume, speed limit, and truck traffic. Second, the proposed project is intricately linked to the enhancement of wildlife recreational viewing opportunities on the National Elk Refuge and widened shoulders would not satisfy this component of the project. Third, the National Park Service is proposing to construct the segment of pathway from the southern boundary of Grand Teton National Park to Antelope Flats (along US Highway 26/89/191) as a separated pathway located outside of the road corridor. It follows that the pathway proposed in this document should have similar operational characteristics as the pathway to which it connects.

The 1997 Conceptual Study for a Jackson-Moose Scenic Pathway (VLA) proposed an alternative that has since been refined. The alternative that is described in the conceptual study was designed to minimize impacts to wildlife along the southern section of the pathway by aligning the path on the east side of the highway until such point that it could move to the west side of US Highway 26/89/191. At this point (approximately 1.3 miles north of town) there would be an at-grade crossing over to the west side of the highway, where the pathway would continue north until the intersection with the Fish Hatchery access road. At this point, the pathway would cross back over to the east side of the highway via a second at-grade crossing and then continue north to the southern boundary of Grand Teton National Park. This alternative was eliminated primarily because of safety concerns related to two highway crossings and the unlikelihood that Wyoming Department of Transportation would approve at-grade crossing of the highway. Alternative D of this EA is a modified version of the preliminary 1997 alternative, with improved safety design. It should be noted that any possible alternative involving an at-grade highway crossing with, at minimum, a pedestrian refuge island in the center of the highway (signage, no light) was considered not viable from a safety perspective and eliminated from detailed study.

Under Alternative B, the team considered two approaches to negotiating the grade at Fish Hatchery Hill. One option was a cut and fill approach and the second was to use the existing access road, parking lot, and old road bed to provide a switch back trail to the top of the hill. While the cut and fill option would likely remain within the easement, this option was eliminated from detailed study due to the exorbitant cost of fill and the dramatically larger disturbance footprint.

2.9 COMPARISON OF THE ALTERNATIVES

The four alternatives analyzed in this EA differ in regard to their description (Sections 2.3 to 2.6) and resource impacts (Chapter 4). A comparison table (Table 2.9) is provided to compare project and resource tradeoffs among the alternatives.

Table 2.9 Comparison of Impacts by Alternatives

Impact Topic	Alternative A: No Action	Alternative B: East Side Alignment (Proposed Action)	Alternative C: West Side Alignment	Alternative D: Crossover Alignment
Soils	No or negligible impacts.	Negligible direct and indirect impacts Permanent loss: 7.58 acres	Negligible direct and indirect impacts Permanent loss: 4.81 acres	Negligible direct and indirect impacts Permanent loss: 7.60 acres
Vegetation	No or negligible impacts.	Negligible direct and indirect impacts Permanent loss: 7.58 acres	Negligible direct and indirect impacts Permanent loss: 4.81 acres	Negligible direct and indirect impacts Permanent loss: 7.60 acres
Wetlands	No impacts are anticipated.	Negligible indirect impacts	No impacts	Negligible indirect impacts
Water Resources	No impacts are anticipated.	Negligible direct and indirect impacts the greatest Impervious surface: 7.58 acres	Negligible direct and indirect impacts less than Alt. B. Impervious surface impacts could be less than Alt. D. Impervious surface: 4.81 acres	Negligible direct and indirect impacts less than Alt. B. Similar to Alt. C, but impervious surface impacts could be greater. Impervious surface: 7.60 acres
Wildlife Species of Special Concern	No impacts are anticipated.	Negligible direct and indirect impacts; highest for elk, common mammals, greater sage-grouse and herptofauna. Minor indirect impacts to waterfowl, shorebirds and cranes. Minor direct and indirect impacts to migratory birds and raptors greatest.	Negligible direct and indirect impacts; least of all action alternatives for elk, common mammals, greater sage-grouse and herptofauna. Minor direct and indirect impacts to migratory birds and raptors lowest. Potential minor indirect impacts to bald eagles.	Negligible direct and indirect impacts; <than for Alt. B & >than for Alt. C for greater sage-grouse, herptofauna and common mammals. Minor direct and indirect impacts to migratory birds and raptors; <than for Alt. B & >than for Alt. C. Negligible impacts to elk equal to Alt. B. Potential minor indirect impacts to bald eagles.
Educational & Recreational Opportunities	No impacts are anticipated.	Greatest potential to enhance educational and recreational opportunities	Limited potential to enhance educational and recreational opportunities	Potential to enhance educational and recreational opportunities greater than Alternatives C and A and less than Alternative B.
User Safety & Access	Adverse and clearly discernible effects to user safety in the long-term	Beneficial and clearly discernible effects to user safety. Safest in terms of vehicle conflicts and minimal need for at-grade crossings. Safe, direct access to destinations would be greater than the other alternatives.	Beneficial and clearly discernible effects to user safety. Least safe in terms of vehicle conflicts and at-grade crossings. Direct, safe access to the many destinations on the east side of the highway unavailable.	Beneficial and clearly discernible effects to user safety. Slightly safer with more direct access than Alternative C.
Construction & Maintenance Costs	Construction: \$0 Maintenance: \$0	Construction: \$4,313,935 Maintenance: \$43,750 to \$56,250	Construction: \$2,972,575 Maintenance: \$27,790 to \$35,730	Construction: \$5,127,790 Maintenance: \$43,890 to \$56,430 Highest replacement costs
Visual Resources	Long-term effects to visual resources are not associated with Alternative A.	Slight but detectable alterations to scenic views	Slight but detectable alterations to scenic views	Slight but detectable alterations to scenic views
Environmental Justice	Lack of access improvements would not disproportionately affect low-income or minority populations.	The same access improvements that apply to the general public would also apply to low-income and minority persons living in or using the project area.	Same as Alternatives B and D	Same as Alternatives B and C

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter provides baseline information regarding existing environmental conditions within and in the vicinity of the project area.

The National Elk Refuge occupies about 24,700 acres at elevations between 6,200 and 7,200 feet in the western Wyoming mountain valley of Jackson Hole. The Jackson Hole valley is bordered by the Teton Mountain Range on the west; the Gros Ventre Range on the east and southeast; and the Snake River Range to the south and southwest.

The Town of Jackson borders the southern portion of the National Elk Refuge, and the Town of Kelly is situated near its northern boundary. Lands to the south and west of the Refuge are mostly privately owned. Land administered by Bridger-Teton National Forest is located on the east, including the nearby Gros Ventre Wilderness. To the north and northwest of the Refuge are lands within Grand Teton National Park; Yellowstone National Park is located 35 miles north and does not border the National Elk Refuge but shares migratory and non-stationary resources with the Refuge. Ecologically, Yellowstone National Park, as well as other federally managed and private land surrounding and including the Refuge share many biotic and abiotic elements and are part of a larger area referred to as the Greater Yellowstone Area.

3.1 SOILS

Soils within the southern portion of the project area, from the southeastern side of Flat Creek Bridge to Fish Hatchery Hill, have been previously disturbed by highway construction. Undisturbed soils in the vicinity of the project area are generally silty, sandy or gravelly loams that have developed in alluvium and loess. The majority of the soil types mapped within the project area are moderately to well drained, with the exception of the Cryaquolls-Cryofibrists complex, which is a consistently very deep, poorly drained, hydric soil with surface layers of peat.

3.2 VEGETATION

Vegetative communities within the southern portion of the project area, from the southeastern side of Flat Creek Bridge to Fish Hatchery Hill, have been heavily influenced by highway construction. Although areas disturbed by construction have been reseeded with western wheatgrass (*Pascopyrum smithii*) and smooth brome (*Bromus inermis*), invasive weed species have colonized the roadside in many places.

The east side of US Highway 26/89/191 is more diversified in terms of plant communities than the west side of the highway. Palustrine scrub-shrub and emergent wetlands are found along portions of the east side of the highway, from the southern project boundary to the approach to Fish Hatchery Hill. The scrub-shrub wetlands are dominated by Geyer's willow (*Salix geyeriana*), inflated sedge (*Carex vesicaria*), large leaf avens (*Geum macrophyllum*), and northern reedgrass (*Calamagrostis inexpansa*) while emergent wetlands are dominated by Baltic rush (*Juncus balticus*), Nebraska sedge (*Carex nebrascensis*), tufted hairgrass (*Deschampsia cespitosa*), creeping bentgrass (*Agrostis stolonifera*), reed canarygrass (*Phalaris arundinaceae*),

and Kentucky blue grass (*Poa pratensis*). Kentucky blue grass and reed canarygrass dominate mesic grasslands juxtaposed with these wetlands.

North of the National Fish Hatchery, plant communities transition into non-mesic shrub communities dominated by sagebrush and upland grasses. Here disturbance is variable and generally encompasses areas adjacent to the road and areas where utilities have been extended out to the Refuge fence. These disturbed areas are dominated by smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*) nodding plumeless thistle (*Carduus nutans*) and, to a lesser extent, cheatgrass (*Bromus tectorum*). Overall, the mesic sagebrush coetype has been maintained in its relatively natural state. A variety of sagebrush species found in this coetype include mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*), Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), threetip sagebrush (*Artemisia tripartita*), and prairie sagewort (*Artemisia frigida*). The mid-story is also dominated by yellow rabbitbrush (*Chrysothamnus viscidiflorus*). The understory of the mesic sagebrush coetype is dominated by native grasses and forbs consisting of bluegrass (*Poa spp.*), Idaho fescue (*Festuca idahoensis*), basin wildrye (*Leymus cinereus*), and sulphur-flower buckwheat (*Eriogonum umbellatum*).

The west side of the highway is part of a larger expanse of xeric to mesic sagebrush-dominated shrubland that provides crucial winter habitat to mule deer. Dominants include Wyoming and basin big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus viscidiflorus*), Great basin wildrye (*Elymus cinereus*), and smooth brome. Small stands of cottonwood and mature aspen are also present in depressional areas at the toe of East Gros Ventre Butte in the southern portion of the project area.

3.3 WETLANDS

For regulatory purposes under the Clean Water Act, the term wetlands means “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” Executive Order (EO) 11990, Protection of Wetlands requires federal agencies to avoid, where possible, adversely impacting wetlands. Further, Section 404 of the Clean Water Act authorizes the US Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge of dredged or fill material into waters of the United States.

On March 31, 2008, the Environmental Protection Agency (EPA) and the US Army Corps of Engineers issued revised regulations governing compensatory mitigation for authorized impacts to wetlands, streams, and other waters of the US under Section 404 of the Clean Water Act. These regulations were designed to improve the effectiveness of compensatory mitigation to replace lost aquatic resource functions and area by adopting a watershed approach whereby the primary determinant for locating projects would be ecologically driven (Department of Defense 33 CFR Parts 325 and 332; Environmental Protection Agency 40 CFR Part 230: Compensatory Mitigation for Losses of Aquatic Resources).

The National Elk Refuge contains over 1,600 acres of high quality wetlands consisting primarily of palustrine emergent and, to a lesser degree, scrub-shrub and aquatic bed wetlands. These wetlands are valued as one of the most superior and important wetlands in the Jackson Hole area.

This complex wetland system provides multi-functional character, visual qualities, and importance to a wide variety of wildlife, especially resident and migratory birds.

Approximately 2.19 acres of palustrine scrub-shrub (seasonally flooded) wetlands and palustrine emergent (semi-permanently and seasonally flooded) wetlands occur within the project area, along the east side of the highway from the southern project boundary to the approach to Fish Hatchery Hill. Due to past disturbances, wetlands adjacent to the east side of the highway, especially those outside (west) of the Refuge fence, do not provide the same functions and quality as Refuge wetlands located east of the fence. Wetlands west of the Refuge fence are hydrologically isolated from East Gros Ventre Butte, receive pollution via runoff from the highway, and have been directly impacted by fill from highway maintenance projects in several areas. Additionally, the proximity to heavy vehicle traffic has drastically reduced the habitat quality of these wetlands.

While the majority of National Elk Refuge wetlands within the project area are located along the east side of the highway, a small, isolated wetland (0.03 acres) is located in a swale along the west side of the highway, approximately 0.6 miles north of the southern project boundary. In addition, a negligible amount of fringe wetlands are associated with irrigation ditches that cross the highway just south of the Gros Ventre River. Wetlands are also present in association with the Gros Ventre River, but are not considered to occur within the project area because an east-side alignment bridge would span the Gros Ventre River and associated wetlands from upland to upland.

3.4 WATER RESOURCES

Naturally occurring surface hydrologic features found on or influencing the project area include the Gros Ventre River and Flat Creek. These water resources contribute to vegetative diversity (including aquatic, wetland, and riparian plant communities), and provide important wildlife habitat, irrigation and forage production, groundwater discharge, and scenic viewsheds within the project area and elsewhere.

Gros Ventre River - The Gros Ventre River is a cobble-bed mountain stream draining approximately 600 square miles of eastern Jackson Hole and the mountains farther east. The Gros Ventre River represents the northern Refuge boundary east of US Highway 26/89/191, as it flows westerly to its confluence with the Snake River. The Gros Ventre River has been classified as a Class 3 fishery, defined as a trout fishery of regional importance by the Wyoming Game and Fish Department (WGFD 2000). This fishery is made up primarily of the Snake River cutthroat trout and mountain whitefish, although the former species is most sought after by area anglers.

Flat Creek - Flat Creek originates in the Gros Ventre Mountains and has a total drainage area of approximately 120 square miles. Flows in this creek vary seasonally due to runoff, input of irrigation water diverted from the Gros Ventre River, diversions taken out of Flat Creek by irrigators, and losses due to infiltration. The porous nature of Refuge soils through which a section of Flat Creek flows (between the eastern Refuge boundary and the creek's confluence with the South Park Water Users Ditch) causes high infiltration losses and results in a seasonally dry channel bed in this area. The National Elk Refuge Master Plan describes losses of water through infiltration in this and other areas as "of the greatest concern to Refuge planning"

(USFWS 1965). Despite this, Flat Creek is classified as a Class 3 fishery by the Wyoming Game and Fish Department. Although historically important as a spawning stream to Snake River cutthroat trout, this importance appears to have diminished in recent years. The section of Flat Creek located above the old McBride Bridge is open to fishing, and the meadow reach of this watercourse provides outstanding recreational opportunities to a large number of anglers between August 1 and October 31 for native cutthroat trout.

Floodplains - Flood insurance mapping created for Teton County, Wyoming by the Flood Emergency Management Agency indicates approximately 750 to 1700 feet of the southern project area corridor lies within or along the boundary of a floodplain insurance risk zone. The floodplain is associated with Flat Creek and the zone is classified as Zone A, an Area of Special Flood Hazard, for which no base flood elevation has been determined. Any undertaking may be subject to the Floodplain Administrator's directions under Division 1400 of the Teton County, Wyoming Floodplain Management Resolution (Provisions for Flood Hazard Reduction).

Irrigation Ditches – Man-made hydrologic features found in the vicinity of the project area are primarily comprised of irrigation ditches that service agricultural lands in the area. Several of the ditches (i.e., Glidden, Wild Cherry, Newton, and Nickell) traverse the northern end of the project area, near the Gros Ventre River. These ditches originate at a common diversion point on the Gros Ventre River about 1.5 miles upstream of the project area. The South Park ditch, which is diverted from the Gros Ventre River further upstream, flows into Flat Creek west of the project area.

3.5 WILDLIFE

3.5.1 Mule Deer

Habitat use occurs primarily during spring, summer, and fall with localized areas of conservation concern identified including parturition and crucial winter ranges (WGFD 2006). Although transient mule deer use may occur within the project area and its vicinity throughout the year, its primary importance is as winter range for 300 to 500 animals. Summer range for mule deer in Jackson Hole is extensive and mule deer are not limited by a shortage of spring, summer, or fall habitat. Two mule deer migration routes have been anecdotally identified by the Wyoming Game and Fish Department within the pathway project area (but do not appear on department seasonal distribution overlays). Most of the southern portion of the project area has been mapped as crucial mule deer winter range. Crucial winter ranges are vital to the survival of animals during critical periods of winter and mule deer will find food and/or cover here during the most inclement and difficult winter weather conditions due to physiographic and vegetative characteristics. The steep south-facing and east-facing slopes of East Gros Ventre Butte remain relatively snow-free during the winter, and provide movement zones and places where browse is accessible. These slopes are warmer during the winter due to their elevation and orientation toward the sun, and mule deer and other wildlife can often escape colder valley temperatures on the upper slopes of the butte above the inversion zone. Variable environmental conditions, foraging opportunities, and human-related disturbances are thought to influence the frequency and distribution of mule deer on East Gros Ventre Butte in the winter. In addition, historic artificial feeding of deer (both intentional and unintentional) in the Town of Jackson and elsewhere in Teton County has altered traditional mule deer distribution and movement patterns on East Gros Ventre Butte (Biota 1992).

In-depth mule deer winter habitat utilization and distribution data has been collected on East and West Gros Ventre Buttes (Biota 1992 and Wigglesworth et al. 2005). Results show mule deer use west of the project area was substantial during every winter that surveys were conducted. The distribution of mule deer use was fairly uniform, although mule deer were observed less consistently and less frequently at the lowest (below 6,360 feet) and highest (above 6,940 feet) elevations where slopes become more gradual and habitat less optimal. Daily and seasonal conditions strongly influence mule deer behavior and patterns of use.

3.5.2 Elk

Elk are the most visible mammalian wildlife species occupying the National Elk Refuge and management of this species is the reason the Refuge was established. The elk observed in the project area are part of the Jackson Elk Herd, which occupies the Gros Ventre Wilderness, Teton Wilderness, Grand Teton National Park and the southern portion of Yellowstone National Park. Jackson Hole elk are dispersed during the spring, summer, and fall, and migrate to feedgrounds and winter ranges in the Gros Ventre, Jackson and Buffalo valleys. Occupied habitat includes two national parks, the National Elk Refuge, large expanses of national forest, and several winter feedgrounds. The entire National Elk Refuge represents crucial elk winter range for the Jackson Elk Herd and approximately 7,279 elk (57% of this herd) wintered on the Refuge or in its vicinity in 2007 (WGFD 2008). The remainder of the Jackson Elk Herd winter on private and public lands in the surrounding area. However, when annual snowfall is particularly heavy, a larger portion of the Jackson Elk Herd can be found wintering on the Refuge. Conversely, in years of little snowfall, fewer elk migrate as far south as the National Elk Refuge. Elk migrate from extensive spring, summer, and fall ranges found north, west, and east in Grand Teton National Park and Bridger-Teton National Forest, and as far away as southern Yellowstone National Park (Smith and Robbins 1994). These spring-summer-fall ranges provide nearly unlimited supplies of forage (Boyce 1989). Approximately one-half of the elk wintering on the Refuge summer in Grand Teton National Park (Smith and Robbins 1994). In addition, about 200 elk are known to summer on the Refuge.

Elk generally prefer grazing and exploit any covertype in which grass is available; they also readily use aspen stands and tall shrubs where available, especially during the winter. Snow-free slopes are advantageous for elk in the winter since elk, like mule deer, are not well adapted to moving through deep and crusty snow. Over half of the Jackson Elk Herd winter on the Refuge each year and are provided supplemental feed for portions of most winters. Supplemental feeding programs attract high concentrations of elk to specific sites where conflicts involving cattle, animal damage to hay and landscaping, and competition with other big game animals for winter range are minimized. Spring migrations from the Refuge begin when the snow recedes and new vegetation appears, usually in April and May (USFWS 2005). A small percentage of the wintering elk herd returns to the Refuge in the fall prior to the planned pathway closure date, and the fall migration continues through November and December. Arrival timing, and number of animals varies, but characteristically a herd of predominantly bulls begins to congregate in the southwest portion of the Refuge in the first two weeks of October. Data gathered from 2004 to 2007 illustrate that 131 to 355 elk have been counted on the south end of the National Elk Refuge prior to October 17 (National Elk Refuge unpublished data). A portion of the Jackson herd has historically exploited winter feeding on private ranchlands along Spring Gulch, seeking

cover and security on the slopes of East Gros Ventre Butte. Elk that return to area private lands may be hazed onto the Refuge in winter months to minimize such conflicts.

3.5.3 Moose

The Jackson Moose Herd is a resident population of moose that inhabit over 2,000 square miles of lands including Grand Teton National Park, Yellowstone National Park, the Bridger-Teton National Forest, and National Elk Refuge. Population monitoring indicates that this population has experienced recent declines, and remains below the 5-year average of 2,346, and well below the estimated peak of 3,500 moose documented in 1992. At present there are approximately 1,785 moose in the Jackson herd. Moose are most commonly seen alone, or in cow-calf groups. Riparian habitats are utilized year-round, where preferred woody vegetation and protective cover are available. Higher elevation shrub and forested communities are utilized during summer months, and wintering moose are often seen in sagebrush steppe habitats, especially where antelope bitterbrush is well distributed.

Crucial moose winter range is present within the project area, primarily within the riparian zone associated with the Gros Ventre River (WGFD 2006). A small amount of critical winter foraging habitat, movement corridor, and potential thermal cover for moose is found along the Gros Ventre River. In addition, the sagebrush habitats located in the vicinity of the Gros Ventre River on both sides of the highway support relatively high densities of antelope bitterbrush and these cover types provide moose with some foraging opportunities in late fall and early winter. The exact number of animals using the project area is unknown but probably involves only a few individuals periodically during winter months.

3.5.4 Common Mammals

Mammalian predators inhabiting the project areas include coyotes, long-tailed weasel, red fox, and skunks. Other predators present on the Refuge but not likely to occur within the project area include mink, river otters, badgers, and possibly a few mountain lions, bobcats, and black bears in higher elevations. Small mammals are abundant on the Refuge and within the project area, and include Uinta ground squirrels, mice, voles, shrews, chipmunks, tree squirrels, marmots, snowshoe hares, pocket gophers, and bats. Drier sagebrush-grasslands can have relatively high Uinta ground squirrel densities along with lower densities of field mice, voles, chipmunks, northern pocket gophers, and shrews; wetter sites support the greatest numbers of most small mammals such as jumping mouse, voles, chipmunks, and shrews (Minta and Campbell 1991). Tree squirrels are typically confined to more diverse mesic habitats or ecotones. The yellow-bellied marmot occupies the rocky slopes of upper elevations, typically away from the project areas. Pocket gophers are erratically distributed throughout the Refuge and most abundant in pastures or irrigated fields.

3.5.5 Greater Sage-Grouse

Greater sage-grouse is a resident, non-migratory upland game bird of the greater Jackson Hole area. Greater sage-grouse populations have been in decline across their entire North American range for nearly 20 years and the US Fish and Wildlife Service is currently conducting a 12-month status review of the greater sage-grouse to determine if threatened or endangered status is warranted (73 Federal Register 38, February 26, 2008). This species is listed as a Level 1 Priority Species in the Wyoming Bird Management Plan, a status that recognizes sage-grouse statewide

require applied conservation action (Cerovski et al. 2001). Sage-grouse populations in Jackson Hole are considered to be remnant and at risk of local extinction (McDonald 2006). This local population, as measured by male and female attendance on leks, has declined by greater than 70 percent since 1990 (NPS, Grand Teton National Park 2006, unpublished data) compared to an approximate decline of 30% elsewhere in Wyoming. More exact population estimates based on recent winter counts suggest that the Jackson Hole greater sage-grouse population is closer to 500 birds (Bedrosian, pers. comm.). The exact cause of their decline in Jackson Hole has not been conclusively identified but permanent loss, degradation, and fragmentation of key habitats, as well as low nest productivity are likely factors. Any substantial changes to the existing suitable habitat or survival rates of sage-grouse may seriously imperil the continued persistence of the Jackson Hole population (McDonald 2006).

Habitat requirements for sage-grouse are somewhat different during the breeding, nesting, brood-rearing, and wintering periods. Breeding activity begins in mid-March when grouse gather on leks located in open areas, low sagebrush zones, ridgetops, and old lakebeds surrounded by denser sagebrush cover (Connelly et al. 1981). After breeding is complete, females disperse to nesting areas characterized by relatively dense, tall, mature sagebrush stands (Connelly et al. 2000, Holloran and Anderson 2004). Nests are typically shallow depressions lined with grass, twigs, and feathers located under the tallest shrub in the given sagebrush stand (Keister and Willis 1986). Most nests occur within two to four miles of the lek, but some nests may be more than 12 miles away (Autenrieth 1981, Wakkinen et al. 1992). Sage-grouse nests in Grand Teton National Park are, on average, 2.8 miles (range 1.4 to 6.2 miles) from active leks (Holloran and Anderson 2004). In a study of nesting sage-grouse in western and central Wyoming, 45 to 64% of all nests were within 1.9 and 3.1 miles of leks, respectively (Holloran et al. 2005). Early brood-rearing hens in the Jackson Hole region remain within approximately 0.6 miles of their nests (Holloran and Anderson 2004). Sage-grouse use a variety of vegetation conditions and communities in the fall including both sagebrush and meadows, and recently burned areas.

The known reproductive territories of the Jackson Hole sage-grouse population include nine occupied leks, three unoccupied leks, and one new lek found in the spring of 2006. Two active leks are present on the Refuge; however, they are not within the immediate project area vicinity. The North Gap lek is approximately 1 mile east of the project area, and due to existing highway-related disturbance sage-grouse are not anticipated to utilize any portion of the project area during breeding or early brood rearing phases of the reproductive cycle. Winter habitat exists in close proximity to the project area, as deduced from radio-telemetry data collected between 1999 and 2003 (Holloran and Anderson 2004) and GPS locations (Bedrosian, pers. comm.). Sage-grouse select dense, tall stands of mature sagebrush during the winter where they find both food and cover, but also use low sagebrush stands on open windswept knolls as feeding sites. Sage-grouse are widely dispersed over wintering areas during mild weather, but concentrate in areas with exposed sagebrush as snow depth increases.

3.5.6 Waterfowl, Shorebirds, and Cranes

Waterfowl and shorebird species are diverse on the Refuge and, in most cases, have habitat linked to aquatic features. Several species of waterfowl (i.e., trumpeter swans, Canada geese, mallards, green-winged teal, gadwalls, American widgeons, common and Barrow's goldeneyes, and common mergansers) are year-round residents on National Elk Refuge lands, but most waterfowl and shorebird species are seasonal migrants. Their occurrence within the project area

is limited due to the absence of suitable habitats. Greater sandhill cranes nest in proximity to the project area and concentrations of more than 150 cranes have been observed on the Refuge during fall migration. Long-billed curlews are not expected to be present within the project area. Curlews prefer mesic environments, such as wet meadows or irrigated pastures, some of which are present adjacent to the project area.

Trumpeter swans are presently classified as a Priority 1 Species of Special Concern by Wyoming Game and Fish Department (2006), a regionally sensitive species by the US Forest Service, and of great interest to the US Fish and Wildlife Service. The Greater Yellowstone region is home for the Tri-State subpopulation of trumpeter swans and is the largest breeding area for swans in the lower 48 states. In spite of harsh winter conditions, swans often both breed and winter in the region. In Wyoming, a record number of swans were counted during the 2007 mid-winter survey (N=1,024), of which 504 birds were documented along the Snake River in the vicinity of Jackson. In 2006, 15 occupied nests were documented within the Snake River drainage (WGFD 2007).

Flat Creek and its sloughs are aquatic features in the project area vicinity that represent important trumpeter swan habitat. Swans forage on submerged aquatic plants found growing here throughout the year but rely heavily on these areas during the autumn staging period. A large number of swans gather along lower Flat Creek between October 15 and November 15 but as available forage is utilized and these water features freeze (usually in late November), swans begin to disperse to wintering areas elsewhere within the Snake River drainage. Four pairs of swans nested on the Refuge in 2007, of which three pairs nested in the Flat Creek Marsh, within 0.6 miles of Highway 26/89/191. A record number of fledged cygnets were reported in 2007 (N=18), of which 12 were fledged from the three Flat Creek Marsh pairs. The Middle Pond nest is about 600 feet east of the project area. The Marsh Pond nest (distance=1,500 feet) and the East Channel nest (distance=2,900 feet) both occur further outside of the project area.

Motorized and non-motorized recreational activities can reduce habitat availability and quality for trumpeter swans in breeding and non-breeding areas (Slater 2006). Loud vehicles, such as motorcycles, had the greatest potential for disturbance in two separate trumpeter swans studies, including one in Yellowstone National Park (Shea 1979, Henson and Grant 1991). Non-motorized human activities, such as bird watching, photography, and other activities by pedestrians or researchers, have the greatest potential to adversely affect swans during the breeding season (Henson and Grant 1991). Human activities, including bird watching and photography, can cause breeding swans to abandon a nest site in the short-term and even result in permanent nest abandonment.

The trumpeter swan nest site closest to the highway has successfully fledged young in four of the past five years. The buffer provided by extant wetland vegetation, the distance of the nest from US Highway 26/89/191, and the habituation of these nesting swans to the highway corridor as a predictable source of disturbance are all possible factors in the observed tolerance of human activity by swans in this location.

3.5.7 Migratory Birds and Raptors

Migratory birds include raptors, passerines, and shorebirds that breed in North America, but migrate to Mexico and Central and South America for the winter; these species are protected by the Migratory Bird Treaty Act (16 *United States Code* 703). In Wyoming, 162 bird species are considered neotropical migrants with peak migration periods occurring May through early June, and again in late August through early October (Cerovski et al. 2001). Recent consultations with the US Fish and Wildlife Service regarding the proposed project identified the possibility of direct taking of migratory birds or their nests within the project area as a concern (USFWS 2008). Passerines typically initiate nesting from May to June, whereas raptors can initiate nests as early as mid-February. Potential nesting habitat within the project area primarily consists of a sagebrush-grassland community, with sparsely distributed deciduous trees and shrubs. Migratory bird species expected to be present within the project area include (but are not limited to) savannah sparrow, Brewer's sparrow, vesper sparrow, lark sparrow, sage sparrow, green-tailed towhee, Say's phoebe, western kingbird, mountain bluebird, western meadowlark, American robin, sage thrasher, Brewer's blackbird, common nighthawk, mourning dove, tree swallow, cliff swallow, and common raven. Herbaceous wetlands adjacent to the southern portion of the project area also represent important reproductive habitat for several species including yellow warbler, fox sparrow, song sparrow, warbling vireo, willow flycatcher, and red-winged and yellow-headed blackbirds.

Bird species that warrant conservation action are classified as Priority Level I by Wyoming Partners in Flight. Priority Level I migratory birds and raptors that can be expected within the project area or its vicinity include bald eagle, Swainson's hawk, Brewer's sparrow, and although rare in the Snake River valley, possibly sage sparrow (Cerovski et al. 2001; Dorn and Dorn 1999). Species diversity and abundance data collected by Grand Teton National Park biologists from neighboring shrub-steppe and cottonwood-shrub habitats documented Brewer's sparrows as a common species within the project area vicinity (S. Wolff, pers. comm. 2008). Grand Teton National Park has also documented species from the shrub-steppe and cottonwood-shrub habitats that are Priority Level II (declining population trend and habitat loss are not significant; monitoring is recommended) including dusky flycatcher, sage thrasher and vesper sparrow (S. Wolff, pers. comm. 2008). Area calculations based on vegetation mapping for Grand Teton National Park and the National Elk Refuge indicate that approximately 36 acres of breeding habitat is available within the project area, which accounts for roughly 0.14% of shrub-steppe habitat available in both the Park and Refuge combined. The estimate of breeding habitat is generous and does not account for patches of disturbed or weed-infested ground.

Populations of North American species of grassland birds have experienced broad and precipitous declines in the last 30 years, and these declines exceed any other behavioral or ecological group of North American birds (Knopf 1994; Peterjohn & Sauer 1999). Nesting success of grassland birds is positively correlated with patch size of available habitat; research has shown that patches of 1,000 hectares or greater in size tend to support the most productive populations of grassland birds (Herkert et al. 2003). The project area is continuously fragmented by an artificial edge adjacent to the US Highway 26/89/191 corridor, and habitat deterioration exists along this transportation artery (Trombulak & Frissell 2000). Along the eastern edge of US Highway 26/89/191, the exclusionary National Elk Refuge fence has an additive affect to overall landscape fragmentation, by providing predator perches and a potential source of avian mortality

via collisions (Wolfe et al. 2007). Disturbed areas and invasive, non-native plant species are additional factors within localized areas throughout the project area that further fragment native habitat and limit migratory songbird productivity (Faaborg et al. 1993). It is important to note that some migratory bird species respond positively to edge effects, but these species tend to have affinities for edges or are generalist species that use a variety of habitats.

Physical fragmentation of the landscape has likely reduced the productivity of avian breeding habitats within the project area, and a large percentage of the project area is within the disturbance “effect zone” of US Highway 26/89/191, thereby further depressing the utilization of this corridor by migratory birds. Research on the effects of roads on grassland birds has demonstrated that road effects are variable, and species specific, yet reduced densities and species number adjacent to roads have been explained mainly by traffic noise (Reijnen et al. 1996, Forman and Deblinger 2000). In fact, birds have been reported to show the most dramatic negative response to road noise of any animal study group (Kaselloo and Tyson 2004). Local studies are not available to quantify the minimum width of the noise-related effect zone within the project area; however, the available science suggests that the entire project area between the National Elk Refuge fence and US Highway 26/89/191 corridor is affected, to a certain degree, by highway traffic (Reijnen et al. 1996, Forman and Deblinger 2000). Recorded peak traffic counts on US Highway 26/89/191 of 17,000 vehicles per day (2007) occur during the midst of the migratory bird breeding season, and although data is limited, one study reported that grassland birds show population decreases of more than 40% within 300 feet of road with a traffic density of 5,000 vehicles per day. The most sensitive species showed an adverse effect zone of 1,000 feet with a traffic density of 10,000 vehicles per day (Reijnen et al. 1996). The maximum project area width of approximately 130 feet occurs from Fish Hatchery Hill to the Gros Ventre River; therefore, it is assumed that the project area, in its entirety, is within the migratory bird effect zone for traffic noise disturbance. Research on non-motorized pathway zones of influence is limited; however, the majority of species that occur at lower densities adjacent to pathways appear to show detectable reductions in density within 250 feet of a constructed pathway (Miller et al. 1998).

Mountain plovers have been observed in Teton County, Wyoming but have not been documented nesting in Teton County (Cerovski et al. 2004). The impacts to this peripherally present migratory species are analyzed in conjunction with impacts to other migratory birds, and further independent analysis of this species has been dismissed.

Two general groups of raptors are expected to be present within the project area and include forest and shrub-grassland raptors. Forest raptors inhabit and rely on forested covertypes to meet much or all of their ecological requirements, while shrub-grassland raptors primarily exploit open shrub and grass-dominated communities. Since open shrublands dominate the project area and the patches of mature forest tend to be small and scattered, shrub-grassland raptors are expected to be more common than forest raptors. Prominent landforms within Jackson Hole, such as East and West Gros Ventre Butte, provide rising air currents that are used by foraging raptors and a diverse suite of migratory raptors. Red-tailed hawks are commonly seen soaring above the project area and these raptors likely use the project area and its vicinity extensively for foraging and perhaps nesting. Other commonly observed raptor species in this area include American kestrels, northern harriers, and great-horned owls. Rough-legged hawks winter in Wyoming and are also common within the project area during this period. Raptor occurrence

within the project area is expected to be lower than in neighboring woodlands that provide nesting habitat and foraging opportunities in areas with abundant forest edge or aquatic features with productive fisheries. However, it is common to see various raptor species perching on posts of the National Elk Refuge fence.

Nesting habitat for most raptors within the project area is lacking, as they tend to use nests constructed of sticks and vegetative material placed in trees or on exposed cliff or rock faces. Locally common raptors seldom nest on the ground, except for short-eared owls and northern harriers.

Bald Eagle - An active bald eagle nest is located in proximity to the project area. The nest is on a north-facing slope of a shallow draw, vegetated in Douglas-fir and aspen and nearly 500 feet in elevation above the project area. This nest is not visible from the project area. Wyoming Game and Fish Department records indicate that the nest, located on private land immediately west of the National Elk Refuge, has successfully produced young in the last five consecutive years. It is likely that resident nesting birds, their offspring, and other bald eagles may be seen over and in the vicinity of the project area. Actual bald eagle use of the project area is unknown but if it occurs, it is likely confined to birds foraging on ungulate carrion when present.

3.5.8 Reptiles and Amphibians

Four species of amphibians are known to be present on the National Elk Refuge. The Gros Ventre and Flat Creek watersheds have documented breeding sites for four amphibian species (blotched tiger salamander, boreal toad, boreal chorus frog, and Columbia spotted frog). The non-native bullfrog is known to be present in the Kelly warm springs vicinity, and may possibly be on Refuge lands. These species utilize a wide variety of aquatic habitats, such as large wetland complexes, ponds, streams and rivers. The more terrestrial toads and salamanders are more likely to occur in small numbers within the project area. The intermountain wandering garter snake, valley garter snake, rubber boa and northern sagebrush lizard may also be present on or near the project area.

3.5.9 Gray Wolf

The subspecies of the northern Rocky Mountain wolf was initially listed as an endangered species in 1973 (38 Federal Register 14678). The existing population, designated experimental under section 10(j) of the Endangered Species Act (although treated as a threatened species in a national park or national wildlife refuge), was reintroduced into uninhabited areas of its historic range to recover the species. There has been no critical habitat designated for northern Rocky Mountain gray wolves. After the Northern Rockies population of gray wolves was delisted in February 2008, a temporary injunction and subsequent ruling from the US Fish and Wildlife Service restored threatened species status to gray wolves in the Northern Rockies.

In recent years observations of wolves within the National Elk Refuge have been increasing, and wolf predation on Refuge elk has been documented, in some cases resulting in temporary dispersal of wintering elk. In recent years the Teton, Buffalo, and Gros Ventre packs, and the now disbanded Flat Creek pack, were known to hunt on or in the vicinity of the National Elk Refuge, and use the Refuge to some degree. The Pinnacle Peak pack denned on the Refuge in 2008, and was the only wolf pack documented on the refuge in this past year (NER, unpublished data). It has been documented that in years that wolves den on the refuge, wolf activity is not

limited to winter months. Given the density of prey, the presence of wolves in the vicinity of the project area will likely continue, and possibly increase. The western perimeter fence that borders the project area is designed to discourage elk from leaving the Refuge. Although not impervious to wolves, the containment of elk east of the boundary fence and wolves avoidance of human activity effectively limit wolf dispersal in the direction of US Highway 26/89/191 south of the Gros Ventre River. Observations of wolves within the National Elk Refuge from 1998 to present have occurred most commonly during winter months, when prey is concentrated and potentially stressed by winter conditions (USFWS 2008).

3.6 EDUCATIONAL/ RECREATIONAL OPPORTUNITIES

Currently, there are no safe access points for bicyclists, pedestrians, and disabled visitors to enjoy the recreational and educational opportunities along the highway to the National Elk Refuge and Grand Teton National Park without using a private motor vehicle. The educational and recreational opportunities that currently exist are designed for vehicle access and include the several turnouts that serve as scenic and wildlife viewing areas, the National Museum of Wildlife Art and sculpture gardens, and the National Fish Hatchery entrance. The turnout on the east side of the highway immediately north of Flat Creek Bridge contains interpretive displays and is a common stopping point for viewing trumpeter swans. The National Museum of Wildlife Art is located along the west side of the highway and provides an elevated, panoramic view of the National Elk Refuge and surrounding mountains. The museum itself, which contains artwork, displays, and exhibits, is a destination to both valley residents and visitors. Another turnout along the east side of the highway, south of the Fish Hatchery, provides fishing access to Flat Creek on the National Elk Refuge. The Fish Hatchery entrance contains interpretive displays, and provides scenic and wildlife viewing opportunities, as well as a fishing access to Flat Creek.

3.7 USER SAFETY AND ACCESS

A key safety issue on shared-use pathways is managing multiple uses, including bicyclists, pedestrians, in-line or roller skate users, and runners. Safe user behavior messages would be posted and enforced. The Pathways Master Plan (JHCP 2007) provides general guidelines for managing multiple use pathways. Teton County Parks and Recreation Department currently conducts routine inspections of shared-use pathways for safety hazards, defective structures, missing safety signs, etc. The police and sheriff's departments provide law enforcement and emergency response.

Additional safety concerns are related to the potential for accidents between vehicles and bicyclists. Safety is addressed at turnouts, parking lots, and highway approaches through adherence to the American Association of State of Highway Transportation (AASHTO) Guide for the Development of Bicycle Facilities (1999). Design considerations covered in the guidelines include signage, roadway intersections, turning lanes, lighting, sight distance, and other intersection design issues.

The lack of a separated pathway combined with an inadequate highway shoulder width is a primary safety concern. The posted speed for US Highway 26/89/191 is 55 miles per hour and this roadway is heavily traveled by motor vehicles, especially during the summer, with recorded peak daily traffic counts of 17,000 in 2007. Currently, non-motorized travelers and recreationists

are subjected to sub-standard shoulders (2 to 4 feet wide) directly adjacent to the highway. There have been two accidents since 2001 (of which one was fatal), and reports of close calls date back 30 years. Development patterns in the vicinity of the project area, combined with increases in traffic, population, and visitation (Jackson/Teton County 2003, 2008) suggest that conflicts among pedestrians and cyclists, and vehicles are likely to increase.

The primary origins/ destinations for which access is desirable are the Town of Jackson, the Flat Creek Inn commercial area, the National Elk Refuge, the National Museum of Wildlife Art, the Fish Hatchery, and Grand Teton National Park.

3.8 ENVIRONMENTAL JUSTICE

In its commitment to Title VI of the Civil Rights Act, the Federal Transit Administration circular: Title VI and Title VI-dependent guidelines for Federal Transportation Administration Recipients (C 4702.1A) requires recipients of Federal Transit Administration financial assistance who are preparing Environmental Assessments to integrate an analysis of Environmental Justice (Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and low-Income Populations”) into the document per the Department of Transportation’s Order on Environmental Justice (Order 5610.2). Executive Order 12898 directs Federal agencies to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The following description of low-income and minority populations within the affected environment is based on the Teton County Comprehensive Plan, US Census data, and direct observation. Teton County, Wyoming is a mountain town resort community in which 97% of the land is administered by federal, state, and local governmental agencies. Despite rapid population growth in the past 20 years, the area has maintained its rural character and scenic appeal through the preservation of large tracks of open space. The county has a strong second-home market that has transformed the built environment from largely agricultural to largely residential and, consequently, affordable housing for year-round residents has become a mounting issue. The mean household income for Teton County for 2004 was considerably higher than the State (\$43,785) and US average (\$44,334) at \$59,568 (US Census Bureau). The home ownership rate for Teton County in 2000 was less than the State (70%) and US (66.2%) rates (US Census Bureau). The US Department of Housing and Urban Development’s Fiscal Year 2008 Median Family Income Documentation System estimates that the average Teton County, Wyoming income for a family four is \$83,300.

Minority and low-income populations in Teton County, Wyoming, as evidenced by US Census bureau data (Tables 3.8a and 3.8b), are disproportionately low; however, several minority groups appear to be growing at rapid rates (i.e., Asian and Pacific Islander persons; Hispanic and Latino persons; and groups classified in the “other” category). In the immediate vicinity of the project area, housing locations for minority and low-income persons would likely be limited to rental units in the Flat Creek Inn commercial area and north Jackson, near the southern boundary of the project area.

Table 3.8a Teton County, Wyoming demographic data (US Census Bureau)

Teton County, Wyoming	1990	2000	2006
Population Total	11172	18251	19288
White persons	10989	17081	18767
African American persons	17	27	58
American Indian & Alaska Native persons	95	97	96
Asian and Pacific Islander persons	49	105	154
Hispanic or Latino persons	158	1185	2257
Other persons	22	718	--

Table 3.8b. Percentage of Teton County, Wyoming population in poverty (all ages; US Census Bureau)

	Teton Co., WY	Wyoming	United States
2007	4.9%	9.5%	13.0%
2006	5.0%	10.3%	13.3%
2005	6.1%	10.6%	13.3%
2004	4.9%	10.3%	12.7%
2003	5.6%	10.8%	12.5%
2002	5.6%	10.6%	12.1%
2001	5.6%	10.5%	11.7%
2000	4.6%	10.4%	11.3%
1999	4.7%	11.2%	11.9%
1998	4.9%	11.4%	12.7%
1997	4.9%	12.0%	13.3%

3.9 CONSTRUCTION AND MAINTENANCE COSTS

Routine maintenance refers to the day-to-day regimen of litter, trash, and debris removal; weed and dust control; trail sweeping; sign replacement; painting; lighting; tree and shrub trimming; and other regularly scheduled activities. Routine maintenance also includes minor repairs and replacements, such as fixing cracks and potholes or repairing a broken section of fence. Major maintenance includes asphalt sealing, striping, and repair as needed (every three to five years). The Jackson/Teton County Parks and Recreation is responsible for routine maintenance and the Jackson Hole Community Pathways manages major maintenance. Annual maintenance costs per mile of pathway are estimated at \$7,000 to \$9,000, which is funded by the Town of Jackson and Teton County in annual budget requests. This estimate does not include replacement costs, which can vary considerably depending upon conditions (e.g., underpasses and bridges have more expensive replacement costs than pathway alignments across relatively flat terrain).

Construction costs associated with the North Highway 89 Pathway for FY09 are estimated at \$95 per linear foot over relatively flat terrain where negligible natural resource enhancement or mitigation is required. Construction costs associated with the North Highway 89 Pathway are estimated at \$135 per linear foot over 'value-added' areas subject to topographical and engineering challenges, or natural resource restoration or mitigation. The cost of an underpass just north of Flat Creek Bridge is estimated at \$750,000 to \$900,000. The cost of an underpass

near the National Museum of Wildlife Art is estimated at \$550,000. The cost of a dual span pedestrian bridge across the Gros Ventre River is estimated at \$500,000.

3.10 VISUAL RESOURCES

The scenic resources along the project corridor are highly valuable. Several million visitors who visit the area annually do so via US Highway 26/89/191 and its Scenic Byway designation is, in part, a reason why this highway is so heavily used. Depending on location, there are spectacular long-range views to the east of highly noteworthy landforms such as Cache Peak, Jackson Peak, the Sleeping Indian (Sheep Mountain), and the Gros Ventre Mountain Range. The National Elk Refuge offers prominent mid-range views of Flat Creek as it meanders through expansive meadows. Extensive emergent wetlands present along this watercourse attract a diverse array of wildlife. In the foreground is East Gros Ventre Butte, which is located along the west side of the highway, and thousands of wintering elk gather along the east side of the highway. Once on top of Fish Hatchery Hill, the Teton Range comes into view (long-range) and the focus switches from east to west and northwest.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This chapter identifies direct, indirect, and cumulative impacts to the environment resulting from the implementation of each of the alternatives considered in this EA. Direct, indirect, and cumulative impacts ensuing from each alternative are discussed as they relate to the affected environment described in Chapter 3. The environmental consequences of implementing the alternatives are analyzed in terms of their effects upon physical, biological, social, economic, and aesthetic values and resources.

Direct impacts refer to those consequences occurring in the same temporal and spatial location as an action proposed under an alternative. Impacts separated from the action, either spatially or temporally, are considered indirect effects. Cumulative impacts result from the combination of individually minor effects from multiple actions over time (CEQ 1997b). The area of analysis for cumulative effects varies by resource. Past, present and reasonably foreseeable actions that may be relevant to cumulative effects analysis include the completion of a regional trail network, as proposed under the Pathways Master Plan (Jackson/ Teton County 1997) and the Grand Teton National Park Transportation Plan EIS (2007). Additional projects that may contribute to cumulative effects include the Bison and Elk Management Plan and EIS, proposed extension of the Jackson Hole Airport Use Agreement, and ongoing road improvement projects such as pedestrian improvements along North Cache Street and improvements along 3.75 miles of US Highway 26/89/191 between Jackson and the southern Grand Teton National Park boundary (Wyoming Department of Transportation, State Transportation Improvement Project N104076). It is probable but uncertain that Highway improvements would be limited to overlay, and would maintain the existing highway width.

4.1 SOILS

There would likely be no new permanent disturbance to soils under Alternative A, although construction activities related to Wyoming Department of Transportation highway improvements could temporarily impact previously disturbed soils. Under Alternative A, direct, indirect, and cumulative soil impacts would not be expected to exceed negligible.

All of the action alternatives would result in negligible direct impacts to soils due to temporary disturbances and permanent losses associated with pathway construction. Although negligible, quantitative impacts to soil would vary slightly among the alternatives. For comparative purposes, these direct impacts have been quantified using the assumptions that there would generally be a maximum disturbance width of 20 feet for each length of proposed new pathway and approximately one-half of the impacted areas would be reclaimed through seeding and revegetation. Under Alternative B approximately 15.15 acres of soil would be temporarily disturbed and 7.58 acres permanently impacted. Under Alternative C approximately 9.62 acres of soil would be temporarily disturbed and 4.81 acres of this soil would be permanently impacted. Under Alternative D, temporary and permanent soil impacts would be slightly greater than Alternative B due to the inclusion of a second underpass (15.20 acres and 7.60 acres, respectively). Temporary and permanent soil disturbances would be greatest under Alternatives B and D.

Length of proposed new pathway and the type of highway cross sections within the project area (Figure 1) were used to compare relative direct and indirect erosion impacts among the action alternatives. While erosion impacts would be negligible for all of the alternatives, an east side alignment (Alternative B), which consists of more gentle fill slopes than steep cut slopes, would have less of a potential for erosion in the long-term compared to the other alternatives. Similarly, Alternative C would have the greatest potential for erosion in the long-term because a west side alignment may lead to increased erosion in some areas due to the location of the pathway on and adjacent to steep cut slopes.

All action alternatives would also result in negligible indirect impacts related to continued soil compaction in existing and/or new activity areas where social trailing could occur. The potential for social trailing would be greatest under Alternatives B and D given pathway length and separation distance from the highway in the northern portion of the project area. Appropriate design measures would be incorporated into the action alternatives to minimize impacts related to soil loss, erosion, and compaction, and would likely be successful. Under any of the action alternatives, overall soil impacts would be negligible because of the relatively small quantities of new disturbance and the extent of existing disturbance in the southern portion of the project area. The relative contribution of any of the action alternatives to cumulative soil impacts from recent, current, and reasonably foreseeable projects in the area, including an eventual regional trail network, are also considered to be negligible. Overall cumulative effects on soil resources could result in small but perceptible changes in soil characteristics at a landscape scale.

4.2 VEGETATION

There would likely be no new permanent disturbance to vegetation under Alternative A, although construction activities related to Wyoming Department of Transportation highway improvements could temporarily impact previously disturbed vegetation. Under Alternative A, direct, indirect, and cumulative vegetation impacts would not exceed negligible.

All action alternatives would result in negligible direct impacts to vegetation due to temporary disturbances and permanent losses associated with pathway construction. Although negligible, the type and quantity of vegetation impacts would vary slightly among the alternatives. For comparative purposes, these direct impacts have been quantified using the assumptions that there would generally be a maximum disturbance width of 20 feet for each length of proposed new pathway and approximately one-half of the impacted areas would be reclaimed through seeding and revegetation. Under Alternative B approximately 15.15 acres of vegetation would be temporarily disturbed and 7.58 acres permanently impacted. The vegetation would consist of native and non-native forbs and grasses, and native sagebrush shrubland and riparian areas. Under Alternative C approximately 9.62 acres of vegetation would be temporarily disturbed and 4.81 acres permanently impacted. The vegetation would consist of native and non-native forbs and grasses, and a small expanse of native sagebrush shrubland. Alternative D would impact the same type and a slightly greater extent of vegetation than Alternative B due to the inclusion of a second underpass (approximately 15.20 acres of temporary disturbance and 7.60 acres of permanent loss). Overall, direct vegetation impacts would be greatest under Alternative B and marginally less under Alternative D.

All action alternatives would also result in negligible indirect impacts to vegetation related to continued trampling in existing and/or new activity areas where social trailing could occur. The

potential for social trailing would be greatest under Alternatives B and D given pathway length and separation distance from the highway in the northern portion of the project area. Appropriate design measures would be incorporated into the action alternatives to minimize impacts related to permanent vegetation loss, shrub and tree removal, trampling, and the spread of invasive plants. These measures are anticipated to be highly effective at reducing total impacts. Considering the relatively small quantity of permanent disturbance and the extent of previous disturbance within the project area, direct and indirect vegetation impacts would be negligible for any of the action alternatives, as would their relative contributions to cumulative vegetation impacts from recent, current, and reasonably foreseeable projects in the area, including an eventual regional trail network. Overall cumulative impacts on vegetation resources would be small but detectable at a landscape scale.

4.3 WETLANDS

Given the probable scope of highway improvements within the project area, there would likely be no direct, indirect, or cumulative impacts to wetlands if Alternative A were implemented.

There would be no direct impacts to wetlands under the action alternatives. Indirect impacts to wetlands under the action alternatives would either be avoided or negligible. Should a pathway be constructed along the east side of the highway under Alternative B, the surveyed wetlands would be avoided, but there could be small, localized indirect impacts related to runoff, erosion/sedimentation, and general pathway use. Alternative C is not expected to impact wetlands. Should a pathway be constructed under the Alternative D crossover scenario, indirect wetland impacts would be similar to, but slightly less than Alternative B. Alternative D was designed to minimize indirect impacts to project area wetlands, which are located on the east side of the highway, from the southern project boundary to the approach to Fish Hatchery Hill, by locating the section of pathway in question along the west side of the highway in this same area. Construction best management practices aimed at mitigating runoff, erosion, and sedimentation would likely be successful. Overall indirect impacts to wetlands would be greatest under Alternative B, successively less and incrementally smaller under Alternative D, and likely non-existent under Alternatives A and C.

If runoff, erosion, and sedimentation control measures are fully implemented, none of the alternatives are expected to result in a net loss of wetland function. The relative contribution of any of the action alternatives to cumulative wetland effects from recent, current, and reasonably foreseeable projects in the area, including an eventual regional trail network, would be negligible. Overall cumulative indirect impacts on wetland resources would be localized and potentially measurable, though wetland dynamics would remain intact.

4.4 WATER RESOURCES

Given the limited scope of probable highway improvements under Alternative A, impacts to water resources are not anticipated.

All of the action alternatives have the potential to directly affect water resources through fluid spills and leaks, erosion/ sedimentation, and drainage pattern disruptions. The implementation of appropriate mitigation measures during design and construction phases would be expected to effectively minimize these direct impacts to a negligible level.

There would be indirect impacts from increased runoff associated with slight increases in the amount of impervious surface associated with each of the action alternatives. While these indirect impacts would be negligible, they would vary in terms of the amount of impervious surface created relative to proximity to surface water resources. Alternatives B, C, and D would create approximately 7.58 acres, 4.81 acres, and 7.60 acres of impervious surface, respectively. Considering proximity to water resources and drainage complexities associated with the underpass proposed under Alternatives C and D, direct and indirect impacts related to increases in impervious surface are expected to be greatest under Alternative B, and successively less by small increments under Alternatives D and C, respectively.

Portions of each of the proposed alternatives are located within and/or along floodplain boundaries mapped by the Federal Emergency Management Agency. This mapping was used to compare the relative impacts of the alternatives on floodplain encroachment. Given the scale of activities proposed under the action alternatives and anticipated coordination with the county floodplain administrator, floodplain encroachment impacts under any of the alternatives are expected to be minimal. The location of a pathway along the eastern side of the highway (Alternative B) would have a slightly greater potential for mapped floodplain encroachment compared the alignments proposed under Alternatives C and D.

The relative contribution of any of the action alternatives to cumulative effects on water resources from recent, current, and reasonably foreseeable projects in the area, including an eventual regional trail network, would be negligible. Overall cumulative impacts on water resources would result in minimal adverse changes to water resources.

4.5 WILDLIFE SPECIES OF SPECIAL CONCERN

4.5.1 Mule Deer

Alternative A is not expected to have any direct, indirect or cumulative effects on mule deer. Given projected increases in vehicular traffic volume and the lack of a pathway to offset this increase, the number of auto collisions with large mammals has the potential to increase.

All of the action alternatives would directly impact mule deer through permanent habitat removal. While impacts to mule deer habitat would be negligible under all of the alternatives, the quality and quantity of affected habitat would vary slightly. Alternative C would impact approximately 4.81 acres of habitat within or adjacent to crucial mule deer winter range. Alternative B would avoid crucial winter range and impact approximately 7.58 acres of roadside habitat, which provides only marginal quality habitat used incidentally by mule deer. Studies of mule deer distribution on the slopes of East Gros Ventre Butte above the project area illustrate that the surface impacts from any action alternative would not directly affect habitat that is used with any consistency during critical winter months. Though negligible, direct habitat loss is anticipated to be greatest under Alternative C, and successively less under Alternatives B and D, respectively.

All action alternatives would also directly and indirectly affect mule deer through disturbance and displacement associated with human activity and habitat fragmentation. However, the implementation of seasonal pathway closure as a mitigation measure would effectively eliminate

any indirect impacts to mule deer wintering along the slopes of East Gros Ventre Butte. Direct and indirect impacts would be minimized through seasonal pathway closures under all action alternatives and would not exceed a negligible level under any of the alternatives due to limited mule deer use occurring outside of the closure period within the project area. Mule deer could also be directly impacted by wildlife vehicle collisions. These existing impacts would continue to be adverse under all alternatives. However, all action alternatives would provide a non-motorized alternative to automobile travel on US Highway 29/89/191, and hence potentially reduce the number of auto collisions with large mammals (JHCP 2008).

Under all action alternatives, overall direct and indirect impacts to mule deer would be negligible since a small number of individual animals and/or a small amount of their respective habitat may be adversely affected. However, population level impacts would remain below a measurable level of detection. The relative contribution of any of the alternatives to cumulative mule deer impacts from recent, current, and reasonably foreseeable projects in the area, including private development, would be negligible. Overall cumulative effects on mule deer in the vicinity of the project area could result in negligible adverse effects.

4.5.2 Elk

Alternative A is not expected to have any direct, indirect or cumulative effects on elk. Given projected increases in vehicular traffic volume and the lack of a pathway to offset this increase, the number of auto collisions with large mammals has the potential to increase.

Direct impacts to elk habitat would be negligible since virtually no functional habitat is present within the project area. None of the alternatives would have direct or indirect impacts to elk habitat that exceed negligible since elk habitat utilization and movement within the project area is already constrained by US Highway 26/89/191 and associated human activity. Although negligible, Alternatives B and D could result in a higher level of elk displacement than Alternatives A and C because the pathways proposed under Alternatives B and D would be closer to the western Refuge boundary, and could result in temporary displacement due to increased levels of human disturbance (e.g., people stopping and viewing or photographing elk). Adaptive seasonal pathway closure is a mitigation measure common to all action alternatives that would effectively eliminate most if not all displacement impacts to wintering elk on the National Elk Refuge between October 1 and April 31.

A small percentage of wintering elk arrive on the Refuge prior to the planned pathway closure date. Arrival timing and number of animals varies, but characteristically a herd of predominantly bulls congregates in the southwest portion of the Refuge in the first two weeks of October. Elk foraging in proximity to the project area are, to a certain degree, conditioned to human presence along the highway, as motorists frequently stop to view and photograph elk foraging or bedded near the highway. Assuming a displacement corridor related to highway noise and human activity already exists, indirect adverse impacts of mid-autumn pathway use to Refuge elk is expected to be negligible, regardless of alternative. However, Alternative C would further reduce the likelihood of this potential adverse consequence because the pathway segment in question would be located on the west side of the highway. Any adverse impacts to elk perceived by National Elk Refuge staff from an east side pathway alignment would be mitigated on an as-

needed basis through adaptive management of the pathway, such as implementing an earlier closure date.

The indirect impacts of the action alternatives on auto collisions with elk would be barely detectable and related to the extent to which the proposed pathways reduce vehicular traffic by providing a non-motorized transportation alternative.

Elk movement through the project area is a concern during mid-winter hazing operations where the Wyoming Game and Fish Department attempts to drive elk onto the National Elk Refuge via elk-jumps that border the project area. Future elk access to the National Elk Refuge is not expected to be hindered, or otherwise adversely affected as a result of any of the alternatives. Mitigation measures common to all pathway alternatives would minimize the impact of interpretive signs and pathway structures, which could otherwise deter elk from accessing jumps within the project area.

The relative contribution of any of the alternatives to cumulative effects on elk from recent, current, and reasonably foreseeable projects in the area would be negligible. Overall cumulative impacts would result in immeasurable changes to elk populations.

4.5.3 Moose

Alternative A is not expected to have any direct, indirect or cumulative effects on moose. Given projected increases in vehicular traffic volume and the lack of a pathway to offset this increase, the number of auto collisions with large mammals has the potential to increase.

None of the action alternatives are anticipated to directly impact crucial moose habitat within the project area, provided the pathways proposed under Alternatives B and D avoid new disturbance in the Gros Ventre River area. Any of the alternatives could also result in some negligible level of indirect disturbance to moose from pathway users. Mitigation measures implemented under the action alternatives would ensure pathway closure from October 1-April 31, a period when moose would most likely be susceptible to additional disturbance from pathway users.

The indirect impacts of the action alternatives on auto collisions with moose would be barely detectable and related to the extent to which the proposed pathways reduce vehicular traffic by providing a non-motorized transportation alternative.

The relative contribution of any of the action alternatives to cumulative effects on the Jackson moose herd from recent, current, and reasonably foreseeable projects in the area would be negligible. Overall cumulative impacts would result in immeasurable changes to moose populations.

4.5.4 Common Mammals

Alternative A is not expected to have any direct, indirect or cumulative effects on common mammals. Given projected increases in vehicular traffic volume and the lack of a pathway to offset this increase, the number of auto collisions with common mammals has the potential to increase.

All of the action alternatives would have negligible direct and indirect adverse impacts to common mammals. These impacts would be related to vehicle collisions, project area avoidance, and habitat loss and fragmentation.

Vegetative communities on the east side of US Highway 26/89/191 are generally more diverse than those on the west side, primarily because of proximity to wetlands and generally more mesic habitats. Given the greater habitat diversity on the east side, anticipated impacts are likely to affect a greater number of species and perhaps more individuals as a consequence of Alternative B. The impacts of Alternative D are expected to be marginally less than Alternative B. Among the action alternatives, Alternative C is expected to result in the lowest level of minor adverse impacts to common mammals. None of the resultant impacts are expected to exceed negligible under any of the action alternatives.

The relative contribution of any alternative to cumulative effects on common mammals from recent, current, and reasonably foreseeable projects in the area would be negligible. All of the mammal species that occur within the project area are well represented in Jackson Hole and the limited disturbances associated with the project ensures that the overall negative effects to mammals occurring within the project area would be minimal and would not jeopardize their continued existence in the valley, regardless of alternative. Overall cumulative impacts on common mammals would result in undetectable changes in common mammal populations.

4.5.5 Greater Sage-Grouse

Alternative A is not expected to have any direct, indirect or cumulative effects on greater sage-grouse. Given projected increases in vehicular traffic volume and the lack of a pathway to offset this increase, the number of auto collisions with greater sage-grouse has the potential to increase.

The implementation of Alternatives B and D would result in negligible, direct and indirect impacts to sage-grouse. Direct effects would result from permanent conversion of 2.4 acres of sagebrush and grassland covertypes to pathway or reclaimed grasslands within a 2-mile section of the project area, from the top of Fish Hatchery hill to the Gros Ventre River. Direct impacts to this area, however, would be minor given proximity to the highway, and the existing level of disturbance. The National Elk Refuge western boundary fence parallels the eastern edge of the project area and has reduced availability and utilization of the sagebrush habitats within the project area by sage-grouse. Researchers tracking radio-collared birds have never flushed roosting sage-grouse from the area between the east side of US Highway 26/89/191 and the Refuge fence (B. Bedrosian, personal communication).

Potential indirect effects resulting from Alternatives B and D would occur between May 1 and September 30 and involve human disturbance during late nesting, brood-rearing and fall foraging. High levels of pathway use occurring when sage-grouse are using the areas just inside the Refuge fence might result in a subtle shift of sage-grouse use. However, the loss of marginal habitat and disturbance-related impacts would result in a negligible adverse effect to sage-grouse.

Potential disturbance-related impacts resulting from Alternative C would essentially be mitigated as a result of seasonal timing restrictions. Sagebrush covertypes on the slopes of East Gros

Ventre Butte provide limited late winter and spring foraging and roosting habitat, and these habitats are limited in the greater Jackson Hole area (Holloran and Anderson 2004). Direct impacts to this habitat as a result of Alternative C would be negligible due to proximity to the highway, the disturbed state of the habitat, and the seasonal closure, which effectively removes pathway related activities from the vicinity of sage-grouse habitat. A loss of this marginal habitat and possible disturbance would result in negligible adverse effects slightly less than those expected from Alternatives B and D.

Given the existing habitat fragmentation and reduced habitat effectiveness in the vicinity of the project area, and the fact that no development-related impacts exceed negligible, pathway alternatives are not expected to contribute to cumulative effects to greater sage-grouse. Overall, cumulative effects on sage-grouse in the vicinity of the project area would be adverse and minor. Though very few individual birds are anticipated to be indirectly impacted, the minor level is appropriate because of the small local population of sage-grouse.

4.5.6 Waterfowl, Shorebirds, and Cranes

Alternative A is not expected to have any direct, indirect or cumulative effects on waterfowl, shorebirds, or cranes. Given projected increases in vehicular traffic volume and the lack of a pathway to offset this increase, the number of auto collisions with waterfowl, shorebirds, or cranes has the potential to increase.

Under any of the action alternatives, direct impacts to habitat for migratory and nesting waterfowl (including trumpeter swans), shorebirds, and cranes would not exceed negligible. This is because the majority of habitat within the project area has been previously disturbed and does not represent potential breeding or foraging habitat for waterfowl, shorebirds, or cranes. Indirect impacts related to bird vehicle collisions would be expected to generally increase in the future, though be offset by pathways proposed under the action alternatives.

Additional indirect impacts to waterfowl, shorebirds, and cranes would be related to human disturbances emanating from the pathway. Temporary construction activities and the increased presence of pedestrians and cyclists could potentially reduce utilization of habitats in proximity to the project area and also reduce habitat effectiveness. The alignment proposed under Alternative B would run adjacent to Flat Creek and its associated wetland habitats from the Flat Creek Bridge to the base of Fish Hatchery hill. However, given the physical barrier provided by the Refuge boundary fence, existing vegetative screening, and the implementation of project mitigation measures, adverse impacts under Alternative B to this cohort of birds would be negligible to minor. Disturbance impacts could be minimized by purposefully avoiding bringing pathway users' attention to swans nesting in proximity to the project area, and augmenting shrubby vegetation along the Refuge fence within the highway right-of-way adjacent to the Middle Pond nest site. Alternatives C and D would provide an additional spatial buffer between pathway users and migratory and breeding waterfowl, shorebirds, and cranes, resulting in negligible disturbance impacts to this species group.

Where resultant waterfowl, shorebird, and crane impacts are minor, the action alternatives would contribute to cumulative impacts on this guild of species. In particular, there could be minor,

indirect contributions to cumulative impacts on swans and other waterfowl in the unlikely event that nest abandonment or failure would result from the implementation of Alternative B.

The relative contribution of any of the alternatives to cumulative effects on waterfowl, shorebirds, and cranes from recent, current, and reasonably foreseeable projects in the area would likely be negligible. The relative contribution of Alternative B could increase to minor in the unlikely event of nest abandonment or failure. Overall cumulative impacts would result in negligible changes to waterfowl, shorebird, and crane populations.

4.5.7 Migratory Birds and Raptors

Alternative A would not have any long-term direct, indirect, or cumulative impacts on migratory birds and raptors.

Available research (see Section 3.5.7) suggest that the potential pathway zone of influence of Alternatives B, C, or D would be exceeded by the existing highway noise effect zone, regardless of which action alternative is selected. Alternative B may reduce potential foraging and, to a lesser degree, nesting opportunities for migratory birds. Conversion of shrub-grassland covertypes to pathway and reclaimed grassland would remove 7.58 acres of relatively low quality songbird nesting and raptor foraging habitat. Deciduous tree stands and individual trees sparsely scattered within the project area (primarily near the Gros Ventre River) also provide limited nesting opportunities to some raptor species, though no active raptor nests have been identified within the project area. Vegetative covertypes may support a broader diversity of migratory birds along the east-side pathway alignment versus a west-side alignment. Both direct impacts from habitat removal, and indirect impacts from noise and human disturbances are expected to result from Alternative B, and these impacts are expected to be adverse and minor due to existing habitat fragmentation and traffic noise effect zone. The documented Priority Level I or II migratory birds that would be affected by this adverse impact include Brewer's sparrow, sage thrasher and vesper sparrow, and sage sparrows, although they have a much lower likelihood of experiencing adverse effects given their rarity in the greater Jackson Hole area. Given that habitat diversity is greater on the east side of the highway, impacts associated with the cross-over alignment Alternative D are anticipated to be marginally less than those associated with Alternative B and greater than impacts of Alternative C. The overall abundance and productivity of nesting migratory birds and raptors is expected to be reduced in all vegetative covertypes throughout the project area due to the existing highway noise effect zone, and hence impacts under all action alternatives are appreciably lower.

Given the high rate of reproductive success of the East Gros Ventre Butte bald eagle nest, it is evident that nesting eagles associated with this territory are habituated to human activity. The potential exists for additional human disturbance to result from pathway users venturing off of the pathway to hike closer to the nest if detected. An east-side pathway alignment is not expected to adversely affect reproductive or foraging activities, and human-related disturbances are expected to remain the same. Adverse impacts to bald eagles related to pathway construction are expected to be negligible. Alternatives C and D may increase impacts to bald eagles by bringing pathway users along the base of the slope above which the nest is situated. Direct impacts are expected to be the same as those described in Alternative B; however, potential disturbance-related indirect impacts are perceived to be adverse and minor with Alternatives C and D.

Individual or collective impacts associated with all alternatives considered in this Environmental Analysis would not exceed a negligible contribution to local or overall cumulative impacts to migratory bird and raptor populations.

4.5.8 Reptiles and Amphibians

Alternative A would not have any long-term direct, indirect, or cumulative impacts on reptiles and amphibians.

Reptile and amphibian species present within the project area are most commonly associated with mesic or hydric habitats. Vegetative communities found on the east side of US Highway 26/89/191 and within the project area include a small amount of wetlands and represent potential habitat for resident herptofauna. The diversity of adjacent habitats associated with Flat Creek and its associated wetlands increases, in a small manner, the likelihood that Alternative B may adversely affect individual herptiles. However, the small amount of wetlands that could be indirectly impacted by Alternative B ensures that potential adverse impacts to herptiles would be negligible.

The anticipated vegetative communities impacted by pathway alignments on the west side of the highway do not include wetlands or surface hydrological features that represent potential habitat for resident herptofauna. Given the lower diversity of vegetative communities along the western pathway alignments and lack of aquatic habitats, Alternative C is not expected to impact reptiles and amphibians. Under Alternative D (the cross-over alignment) maximum potential indirect impacts to wetlands are incrementally less than Alternative B, and resultant impacts to herptofauna habitat would be negligible.

Overall, there would be either no contribution or a negligible contribution to cumulative impacts to reptiles and amphibians resulting from implementing the action alternatives.

4.5.9 Gray Wolves

Existing uses, operation, and maintenance of US Highway 26/89/191, and anticipated future levels of use would continue to negatively influence wolf activities on the National Elk Refuge in proximity to the project area. It is reasonable to expect that the project area under present and future uses would continue to act as a barrier to wolf movement and foraging in the vicinity of the project area. In addition, one or more wolves may be killed as a result of vehicle collisions. Given the rarity and irregularity of wolf occurrences within the project area, no adverse affects to wolves are anticipated from Alternatives A, B, C, or D.

There are no on-going management actions that suggest any of the alternatives considered in this EA would have more than a negligible contribution to adverse cumulative impacts, either locally or regionally, to gray wolf populations.

4.6 EDUCATIONAL AND RECREATIONAL OPPORTUNITIES

The relative potential for each alternative to enhance educational and recreational opportunities was considered in terms of the likelihood that pathway users would be aware of changes associated with the implementation of a given alternative. Three assumptions were made in

evaluating this likelihood. First, from an educational perspective, it was assumed that interpretive displays are generally more effective when there is a physical and visual connection with the resource of interest. These connections tend to be achieved when pathway users are in proximity to the resources being addressed. Second, from a recreational standpoint, it was assumed that user experience would best be enhanced under alternatives that optimize uninterrupted views, adequate separation from the highway, and direct access to recreational points of interest. Third, it was assumed that pathway users could take advantage of existing turnouts and interpretive displays for educational and recreational opportunities.

All alternatives except Alternative A would provide access to the National Museum of Wildlife Art. The museum itself is an educational resource, and its location offers exceptional elevated views with a sense of physical connection to the National Elk Refuge.

Alternative B would have the greatest potential to enhance educational and recreational opportunities because the majority of resources and existing interpretive displays and scenic overlooks are located on the east side of the highway. Alternative B would offer the most connectivity between users and resources of interest, views uninterrupted by the highway, six existing turnouts, and direct access to the National Elk Refuge, the Fish Hatchery, and Flat Creek fishing.

Alternative C would have the lowest potential to enhance educational and recreational opportunities because the majority of resources and existing interpretive displays and scenic overlooks are located on the east side of the highway. In most locations the highway and its vehicular users would visually and auditorially interrupt connections between interpretive displays and the resources addressed. There is one existing turnout along this alignment and it offers uninterrupted viewing opportunities for resources located directly west of the turnout (East Gros Ventre Butte) and interrupted views of the National Elk Refuge from across the highway. There would be no direct access to the National Elk Refuge, the Fish Hatchery, or Flat Creek.

Under Alternative D, the potential to enhance educational and recreational opportunities would be greater than the potential under Alternatives A and C, and less than the potential under Alternative B. In some locations interpretive displays would not be close enough to establish a connection between users and the resources being addressed. There is one existing observational turnout and it offers uninterrupted viewing opportunities for resources located on the east side of the highway. This same turnout provides direct access to the National Elk Refuge, the Fish Hatchery, and Flat Creek fishing.

Alternative A (no action) would not contribute to cumulative impacts on educational and recreational opportunities. The relative contribution of any of the action alternatives to cumulative impacts on educational and recreational opportunities from recent, current, and reasonably foreseeable projects in the area, including an eventual regional trail network, would be beneficial and negligible to minor. The likelihood that pathway users would be aware of changes to the level of educational and recreational opportunities would be greatest under Alternative B. Overall cumulative effects of any of the action alternatives would result in perceptible beneficial changes in educational/ recreational opportunities.

4.7 USER SAFETY AND ACCESS

Under Alternative A, safety would continue to be an issue for non-motorized travelers, and risks to these users would likely increase in the long-term. It is probable that the highway shoulder width would remain the same, which is considered inadequate from a safety perspective. Safety and access concerns would not be addressed for non-motorized users forced to use the shoulders along both sides of the highway between the Town of Jackson and Grand Teton National Park and other destinations north of the project area.

While all action alternatives would address current highway safety concerns via the construction of a separated pathway, additional concerns related to pathway intersections and user access would vary. Relative comparisons were made between the action alternatives based on the number of highway approaches, the ability to provide safe integration with existing vehicle turnouts, the ability to minimize the need or temptation to make at-grade crossings, and the ability to provide non-motorized travelers safe access to destinations. Alternative B is considered the safest action alternative because only four highway approaches are involved in this alignment, none of which are heavily used by vehicles at present. Alternative B would have to negotiate an additional difficult vehicle turnout that Alternatives C and D do not. Under Alternative B, the need for pathway users to make an at-grade crossing could remain an issue around the Flat Creek Inn area. However, the construction of a pathway spur to connect to the museum underpass has the potential to mitigate this concern. Alternative B would provide safe access to the majority of destinations, although non-motorized travelers coming from the west side of the highway may not have direct access to the pathway. An eastern alignment would likely provide the most direct route for cyclists traveling from Jackson to northern destinations such as Kelly and Antelope Flats.

In comparison, Alternative C is considered less safe than Alternative B. If Alternative C were implemented, six highway approaches would be involved. Five of these approaches are heavily used; four are commercial accesses in the Flat Creek Inn commercial area and the fifth is the National Museum of Wildlife Art entrance. The crossings in the Flat Creek Inn area would be of particular concern. Alternative C would have one less difficult turnout to negotiate than Alternative B. Under Alternative C the need to make an at-grade crossing would remain an issue at the Refuge and fish hatchery and direct access to the many destinations located on the east side of the highway would not be available.

Alternative D has seven highway approaches, four of which are heavily used (the commercial accesses around the Flat Creek Inn commercial area). The crossings in the Flat Creek Inn area would be of particular concern. Under Alternative D, there would be one less difficult vehicle turnout to negotiate than Alternative B and the need to make an at-grade crossing would remain an issue for Refuge access at the southern end of the project area. The Alternative D cross-over alignment may not provide direct pathway access to some non-motorized travelers who want to access resources on the east side of the highway (e.g., residents in the vicinity of Nichols Spring Road and pathway users south of the National Museum of Wildlife Art underpass). Cyclists traveling from Jackson to northern destinations, such as Kelly and Antelope Flats, would be least likely to use the pathway proposed under Alternative D because of frequent interruptions related to highway approaches and pathway underpasses.

The relative contribution of Alternative A to cumulative impacts on user safety and access from recent, current, and reasonably foreseeable projects in the area, including an eventual regional

trail network, would be adverse and clearly discernable (minor) in the long-term. The relative contribution of Alternatives B, C, or D to cumulative impacts on user safety and access would be beneficial and clearly discernable in the long-term. Overall, the cumulative effects of any of the action alternatives would result in perceptible (negligible to minor) beneficial changes in safety and access for non-motorized travelers in the region.

4.8 ENVIRONMENTAL JUSTICE

There would be no adverse environmental justice impacts resulting from any of the alternatives. Under Alternative A, access would not be improved for the public in general, and the lack of access improvements would not disproportionately affect any low-income or minority persons who may live in or use the project area. Under any of the action alternatives, the same beneficial access improvements that apply to the general public (section 4.7), such as increased mobility options and safer access for non-motorized transportation would also apply to low-income and minority populations.

4.9 CONSTRUCTION AND MAINTENANCE COSTS

Alternative A would have no effect on project construction and maintenance costs. Construction costs were estimated for the action alternatives by designating each lineal foot of proposed pathway as either regular pathway (\$95/ft) or value-added pathway (\$135). Pathway costs were then totaled in dollars per linear foot and any additional underpass cost estimates were then added to this total (Table 4.8). Annual maintenance costs (not including replacement) were estimated assuming the cost of maintenance would range from \$7,000 to \$9,000 per mile. It is important to note that additional costs for interpretive amenities have not been factored into these estimates and that although the estimates provided below are precise to the nearest dollar, these approximations are based on historical costs and could vary by as much as 15% given frequent fluctuations in the cost of project materials.

Costs would be the least under Alternative C because the length of pathway proposed under a western alignment is considerably less than the length of pathway proposed under Alternatives B and D. Costs would be the greatest under Alternative D due to the inclusion of a second underpass. The inclusion of a second underpass under Alternative D would also result in considerably greater replacement costs than the other alternatives.

- Total construction costs for Alternative B, with a lineal distance of approximately 33,001 feet, would be approximately \$4,313,935 and annual maintenance costs would be from \$43,750 to \$56,250. This pathway alignment encompasses the longest lineal distance of all pathway alternatives and would likely provide a direct and facilitated connection to a future pathway in Grand Teton National Park. One underpass costing about \$550,000 and one bridge costing \$500,000 is included.
- Construction costs associated with Alternative C, with a lineal distance of approximately 20,961 feet (36% less than Alternative B) would be approximately \$2,972,575 and annual maintenance costs would be from \$27,790 to \$35,730. The difference in costs between Alternatives B and C reflects a considerably shorter lineal distance (about 12,000 feet), and the omission of the museum underpass and Gros Ventre pedestrian bridge.

- Construction costs associated with Alternative D, with a lineal distance of 33,106 feet, would be approximately \$3,252,790 and annual maintenance costs would be \$43,890 to \$56,430. Alternative D encompasses a similar distance as Alternative B, includes both underpasses and the Gros Ventre pedestrian bridge, and has a shorter distance of value-added pathway.

Table 4.8 Project construction and maintenance cost estimates for each action alternative.

Alternative B (Proposed Action)			Alternative C			Alternative D		
<u>Construction</u>			<u>Construction</u>			<u>Construction</u>		
Feet	Cost (\$/ft)		Feet	Cost (\$/ft)		Feet	Cost (\$/ft)	
29,832	95	\$2,829,100	17,054	95	\$1,620,130	30,413	95	\$2,889,235
3,221	135	\$434,835	3,907	135	\$527,455	2,693	135	\$363,555
	Total (\$/ft)	\$3,263,935		Total (\$/ft)	\$2,147,575		Total (\$/ft)	\$3,252,790
Museum Underpass			Museum Underpass			Museum Underpass		
	\$550,000			N/A			\$550,000	
Flat Ck Underpass¹			Flat Ck Underpass¹			Flat Ck Underpass¹		
	N/A			\$825,000			\$825,000	
Gros Ventre Bridge			Gros Ventre Bridge			Gros Ventre Bridge		
	\$500,000			N/A			\$500,000	
Project Total			Project Total			Project Total		
		\$4,313,935			\$2,972,575			\$5,127,790
<u>Maintenance</u>			<u>Maintenance</u>			<u>Maintenance</u>		
Miles	Cost (\$/mile)		Miles	Cost (\$/mile)		Miles	Cost (\$/mile)	
6.25	\$7,000 (min)	\$43,750	3.97	\$7,000 (min)	\$27,790	6.27	\$7,000 (min)	\$43,890
	\$9,000 (max)	\$56,250		\$9,000 (max)	\$35,730		\$9,000 (max)	\$56,430

¹Estimated average of \$750,000 – \$900,000

4.10 VISUAL RESOURCES

Alternative A would not have long-term impacts on visual resources in the project area. Construction activities related to highway maintenance could have a temporary but noticeable direct adverse effect to visual resources.

Under Alternative B, there would likely be sufficient vertical separation between the highway and an east-side pathway to prevent the pathway from obstructing the mid- and long-range scenic views to the east, from the southern project area boundary to the crest of Fish Hatchery Hill. The pathway could disrupt short-range views along this same segment of the project area, but prominent short-range views are limited, mainly to wintering elk and other wildlife present in proximity to the highway. From the crest of Fish Hatchery Hill to the southern boundary of Grand Teton National Park, the highway cross section is relatively flat, and views are confined to the short- and mid-range. Therefore, the pathway would become a more obvious short-range feature. However, at the top of Fish Hatchery Hill long-range scenic views shift from the east to the west with the Teton Mountain Range dominating the viewshed. Under Alternative C, steep slopes along the west side of the highway would require that the pathway be aligned closer to the highway, resulting in less vertical and horizontal separation. A west-side pathway would

therefore obstruct the foreground view of East Gros Ventre Butte, although the prominent views along this section of highway are the mid- and long-range views to the east. Similarly, under Alternative D, the steep slopes along the portion of the pathway located on the west side of the highway would require that the pathway be aligned closer to the highway, also resulting in less vertical and horizontal separation. Visual impacts associated with this section of Alternative D would be identical to Alternative C. Remaining impacts to visual resources under Alternative D, from where the pathway crosses back to the east side of the highway to the northern project boundary, would be identical to the same section of Alternative B.

Alternative A would not contribute to cumulative visual resource impacts. The relative contribution of any of the action alternatives to cumulative effects on visual resources from recent, current, and reasonably foreseeable projects in the area, including an eventual regional trail network, would be minor because the proposed alternatives would result in slight but detectable alterations in scenic views. Overall cumulative effects of any of the action alternatives would limit some visual resources, but not to an appreciable extent.

CHAPTER 5: CONSULTATION AND COORDINATION

5.1 ENVIRONMENTAL ASSESSMENT TEAM

Biota Research & Consulting, Inc.

Thomas M. Campbell III, Project Leader/Author, President/Chief Environmental Consultant

Hamilton Smith, Author, Senior Wildlife Biologist

Jessica Mitchell, Author, NEPA Specialist

Kent Werlin, Author, Wetland Scientist

Natalie Kashi, Author, Plant Ecologist

Rendezvous Engineering

Sean O'Malley, Senior Engineer

Town of Jackson/ Teton County

Brian Schilling, Pathways Coordinator, Jackson Hole Community Pathways

Gordon Gray, Pathways Project Manager, Teton County Engineering Dept.

5.2 AGENCIES AND PERSONS CONSULTED

Steve Kallin, Refuge Manager, National Elk Refuge, Jackson, WY

Brian T. Kelly, Field Supervisor, USDI-USFWS, Wyoming Field Office

Mary Hopkins, Cultural Resource Specialist, Interim SHPO, Wyoming State Preservation Office, Cheyenne, WY

FIGURE 1

**LOCATION AND TOPOGRAPHY,
INCLUDING HIGHWAY CROSS SECTIONS,
OF THE NORTH HIGHWAY 89 PATHWAY PROJECT
ENVIRONMENTAL ASSESSMENT (EA),
TETON COUNTY, WYOMING**

FIGURE 2

**AERIAL PHOTOGRAPHY DEPICTING
ACTION ALTERNATIVES PROPOSED FOR THE
NORTH HIGHWAY 89 PATHWAY PROJECT
ENVIRONMENTAL ASSESSMENT (EA),
TETON COUNTY, WYOMING**

APPENDIX A

AGENCY CORRESPONDENCES

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