4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

This chapter describes the likely direct, indirect, and cumulative effects of proposed project alternatives on the social, economic, physical, and biological environments of Lynn Canal. A substantial amount of the information on the potential environmental effects of project alternatives presented in the 1997 Draft EIS remains valid. To assist the reviewer, that information has been carried forward in this Supplemental Draft EIS, as appropriate.

The environmental impact assessment presented in this chapter is based on the following technical reports that are either new reports or updated versions of the 1997 Draft EIS technical reports:

- *Alternative Screening Report*
- *Marine Segments Technical Report*
- *Traffic Forecast Report*
- *Technical Alignment Report*
- *User Benefit Analysis*
- *Land Use and Coastal Management Technical Report*
- *Visual Resources Technical Report*
- *Socioeconomic Effects Technical Report*
- *Household Survey Report*
- *Snow Avalanche Report*
- *Hydrology and Water Quality Technical Report*
- *Noise Analysis Technical Report*
- *Initial Site Assessment Technical Report*
- *Essential Fish Habitat (EFH) Assessment*
- *Wetlands Technical Report*
- *Anadromous and Resident Fish Streams Technical Report*
- *Wildlife Technical Report*
- *Bald Eagle Technical Report*
- *Steller Sea Lion Technical Report*
- *Air Quality Modeling Memorandum*
- *Indirect and Cumulative Impact Technical Report*
- *Karst Technical Report*
- *Cultural Resources Technical Report*

The technical reports contain detailed analyses that are summarized in this chapter. Except for the *Karst Technical Report* and the *Cultural Resources Technical Report*, all of the technical reports are appendices to the Supplemental Draft EIS. These two technical reports are not being distributed to the public to protect sensitive resources.

This chapter begins with a discussion of the analytical methods used to evaluate potential project impacts. This discussion of methodology is followed by a discussion of the potential direct and indirect impacts of the proposed build alternatives, the potential cumulative impacts of the proposed project, the relationship between the local short-term uses of the project area and the maintenance and enhancement of long-term productivity, and the irreversible and irretrievable commitments of resources that would be involved in the proposed project.

4.1 Methods for Analyzing Impacts

This section presents a summary of the methodologies used for impact assessment. Impacts have been evaluated based on the projected environmental changes caused by the build alternatives relative to the No Action Alternative in 2008 and 2038, the planning years for this impact assessment. Technical reports for each environmental discipline prepared in support of the Supplemental Draft EIS only address direct impacts. Indirect and cumulative impacts are addressed in a separate technical report (Appendix U). The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) define direct effects as those caused by the action and that occur at the same time and in the same place as the action (40 CFR 1508.8). Indirect effects are caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8). Cumulative effects on the environment can result from the direct and indirect effects of an action in combination with other actions over time (40 CFR 1508.7). This chapter addresses direct and indirect impacts together in the individual alternative discussions. Cumulative impacts for all alternatives are discussed later in the chapter.

4.1.1 Land Use

The impact assessment approach for land use is the same as the approach that was used for the 1997 Draft EIS. The evaluation of impacts to land uses and the applicability of enforceable policies in the ACMP and district coastal management plans was based on a comparison of the project alternatives and temporary construction facilities with land use plans and policies. Potential improvements to existing ferry terminal facilities are not addressed in the impact analysis because no land use changes would occur at those locations.

> Note: In order to assess the maximum potential impact on land ownership, the land use assessment evaluates a 300-foot wide corridor where alternatives would traverse federal or state lands as this is the right-of-way width DOT&PF would prefer. The USFS anticipates authorizing right-of-way based on construction limits, which in most locations would be substantially less than 300 feet. DOT&PF would negotiate with the USFS on the actual right-of-way width.

4.1.2 Visual Resources

The visual impact assessment focused largely on the highway alignments included in project alternatives because improved ferry service would not alter landscape quality except in localized areas where new alternative ferry terminals could be constructed. Visual inventories were based on the existing Tongass National Forest database. Potential impacts of project alternatives on visual resources were based on management directives in the TLMP with a focus on LUDs, specifically the Transportation and Utility Systems LUD. In addition, VQOs of LUDs adjacent to the Transportation and Utility System LUD were accounted for in the analysis. A field review was conducted in the summer of 2003 to obtain photographs to develop visual simulations of the most current alternative highway alignments. The viewpoints for field photography as well as the final viewpoints for visual simulations were coordinated with the

USFS. The impact assessment compared potential changes in visual quality in sensitive viewsheds resulting from proposed project alternatives.

4.1.3 Historical and Archeological Resources

The Area of Potential Effect (APE) of project alternatives was established in consultation with the SHPO. Field surveys were conducted on areas of the APE with a high probability of containing cultural resources. Areas with a low potential for containing cultural resources were surveyed by shoreline observations and aerial photography. FHWA made a determination of the eligibility for the National Regiser of Historic Places of resources found during the field surveys. Potential disturbance or visual modification that could impact the cultural integrity of resources eligible for or on the National Register of Historic Places was evaluated for each proposed project alternative, with additional consultation as required by the revised regulations for implementing the National Historic Preservation Act.

4.1.4 Socioeconomic Resources

Because socioeconomic conditions can change rapidly over time, a new analysis was prepared for the Supplemental Draft EIS. The Supplemental Draft EIS evaluates potential project-related impacts on the economy, public utilities, and the social environment of Lynn Canal. The new socioeconomic analysis was conducted using a combination of primary and secondary research. Primary research included interviews with Juneau, Haines, and Skagway businesses as well as government and other community representatives. In addition, interviews were conducted with state and local government agencies throughout the research process to gather data and assess the effects of the project alternatives. Secondary research used for the socioeconomic analysis included collection of published data and information prepared by local, state, and federal agencies as well as private-sector entities. Except where stated otherwise, economic effects are stated in 2003 dollars. For further information on the socioeconomic assumptions and analysis, see the *Socioeconomic Effects Technical Report* (Appendix H).

4.1.5 Transportation

A traffic forecast analysis was conducted in 1996 in support of the 1997 Draft EIS. Forecasts of future traffic for various alternatives considered for the proposed project are difficult to prepare because no road currently exists linking Juneau to the U.S. or Canadian highway systems. For this reason, it is necessary to make some logical assumptions concerning the use of the highway alternatives. In the 1997 Draft EIS, a number of travel demand assumptions for the forecast were supported by a 1994 household survey (McDowell, 1994) conducted in Juneau, Skagway, and Haines regarding the importance of improved access to Lynn Canal communities and the amount of travel that would occur for different transportation modes. In response to the comments on the Draft EIS and the 2003 scoping comments for the Supplemental Draft EIS, another household survey was conducted in Juneau, Skagway, Haines, and Whitehorse in 2003 to obtain current information on the importance of transportation improvements and the projected travel on different transportation modes. In this 2003 survey, 365 households in Juneau, 150 in Haines, 104 in Skagway, and 100 in Whitehorse were contacted regarding their current travel patterns, needs, and preferences for potential transportation improvements in Lynn Canal.

The information obtained from the 1994 and the 2003 household surveys was used in the new traffic forecast analysis conducted for the Supplemental Draft EIS. The analysis also provided a more detailed analytical approach to estimating future traffic demand and the use of alternative modes of transportation. The traffic analysis took into account existing and unmet travel demand, travel costs, and travel time. The analysis was done in the following steps:

- **Baseline Conditions** – Current baseline traffic (2002) in Lynn Canal was updated from the 1997 Draft EIS, including current ferry (Alaska Marine Highway System [AMHS] and private) passenger and vehicle traffic, air traffic, and barge traffic.
- **Market Components** – Baseline traffic was segregated into the following market components: Juneau residents, Haines and Skagway residents, other Alaska residents, Yukon residents, and other non-residents (i.e., travelers from outside of Alaska and the Yukon).
- **Traffic Volume Estimates** – The volume of traffic that would be induced or diverted from existing ferry service as a result of implementing the least-constrained transportation alternative in the Lynn Canal corridor (Alternative 2) was estimated by market component using the household surveys.
- **Travel Costs** – Travel costs were calculated for each project alternative.
- **Travel Demand Model** – A travel demand model was developed based on user costs and traffic for current ferry service and predicted traffic for the most direct and least restrictive mode of transportation. Model parameters included distance, speed, load/unload time, individual and vehicle fares, accident cost, value of time, and frequency delay time (a measure of schedule convenience).
- **Traffic Demand Estimates** – The travel demand model was used to estimate current (2002) traffic demand for each leg of each project alternative. A leg is defined by each mode of travel required between Auke Bay in Juneau and either Haines or Skagway. For example, in the No Action Alternative there is only one leg between Auke Bay and Haines or one leg between Auke Bay and Skagway, as travel to either destination is accomplished in a single ferry trip. Alternative 3, the West Lynn Canal Highway, has three legs to Haines and four to Skagway.
- **Traffic Forecasts** – The traffic demand for each project alternative developed above was used in combination with growth rates in key traffic markets to forecast traffic by alternative in 2008 and 2038.

A user benefit analysis was prepared for the project in 2004. User benefits were estimated by the reduction in user costs compared to the user costs for the No Action Alternative. The costs included in the analysis were travel time; AMHS fares; vehicle operating, maintenance, and ownership costs; and accident costs. A life-cycle cost analysis was also prepared for the project.

In the user benefit analysis, future benefit and costs are discounted at a rate of 7 percent. This is the rate recommended by the Federal Office of Management and Budget for evaluating Federal programs whose benefits and costs are distributed over time. Different discount rates are used for the life cycle cost analysis (which addresses only costs and not user benefits). For capital costs, a rate of 2.65 percent is used. This represents the State of Alaska's real borrowing cost for capital improvement projects. A 5 percent discount rate is used for operating costs. This represents the opportunity cost to the State of spending its own money (5 percent is the projected total return of the Alaska Permanent Fund). An understanding of discounting is important because present value is an important tool in evaluating alternatives.

The concept of residual value is also important in understanding the present value of future benefits and costs. The cost of an alternative includes all the initial construction costs (ferries, terminals, highways) and on-going maintenance (for highways) and operations costs (ferries and terminals). Benefits include those enjoyed by travelers in terms of travel time-savings and reduced out-of-pocket travel expenses. In addition to these costs and benefits, a critical consideration is the future value of a capital investment made today. Each capital improvement

has a useful economic life. The value of a capital improvement declines over time, until there is no value remaining at the end of its useful life. At any point in time, the capital asset's remaining value is referred to as its residual value.

For further discussion of the assumptions used in developing these analyses, see the *User Benefit Analysis* (Appendix E).

4.1.6 Geology

The impact assessment for geology considered both the impacts of project alternatives on geologic resources and the potential effects of geologic hazards on project facilities. As indicated in Section 3.2.1.1, the only geologic resource of concern in the project area is karst on the west side of Lynn Canal.

Geologic hazards associated with alternative project facilities were identified in the *Reconnaissance Engineering Report* (DOT&PF, 1994). Further geotechnical engineering investigations would be done during engineering design of the alternative selected for the project. This Supplemental Draft EIS provides an assessment of the effects of those hazards on alternative project facilities.

4.1.6.1 Karst

The karst impact assessment was conducted in four steps that take into account the TLMP, the Tongass Plan Implementation Team vulnerability criteria, and management objectives for karst resources. Those steps are:

- **Step 1 – Identification of Potential Karstlands and Features** – This step involved the compilation and review of available information and preliminary characterization to identify potential karst terrains and features.
- **Step 2 – Field Inventory of Karst Resources** – On completion of Step 1, a field inventory of karst resources and potential karst features was completed for the segments of the West Lynn Canal Highway alignment (Alternative 3) determined to be underlain by carbonate bedrock.
- **Step 3 – Delineation of Karst Hydrologic System and Catchment Area** – Concurrent with Step 2, hydrologic information was collected and synthesized with other data to define, to the extent necessary and practicable for the proposed land use, the karst hydrologic system and approximate recharge or catchment areas along West Lynn Canal. The objective of this step was to understand the karst hydrologic system well enough to assess and characterize potential project-related impacts to downgradient resources.
- **Step 4 – Assessment of Vulnerability to Management Activity** – Step 4 involved the processing and synthesizing of the data from Steps 1 through 3 to assess karst sensitivity to the relevant project alternatives and adjustment of the alignment where feasible.

4.1.6.2 Avalanche

The avalanche hazard associated with the highway alternatives for the proposed project was assessed in terms of the avalanche hazard index (AHI). The AHI is a dimensionless standard index number representing the probability of encounters between avalanches and vehicles on a highway and the likely resulting damage. It was developed in 1974 in Canada by the Avalanche Task Force and is published in its current form by Peter Schaerer (1989). The AHI provides a

uniform standard for comparing the probability of an avalanche from one avalanche path to another. The standard is also useful for comparing highway avalanche hazards from one region or snow climate to another. The unmitigated AHI was determined for each alternative and compared to several highways in North American. The North American standard for this hazard was used to determine appropriate mitigation measures and a mitigated AHI was calculated.

4.1.7 Hydrology and Water Quality

Where project alternatives would encroach on base floodplains, each alternative was evaluated for the following based on FHWA regulations 23 CFR 650.111:

- Flooding risks
- Impacts on natural and beneficial floodplain values
- Potential for incompatible floodplain development
- Measures to minimize floodplain impacts
- Measures to restore and preserve natural and beneficial floodplain values

As indicated in Section 3.2.3, the Federal Emergency Management Agency has not mapped floodplains in the study area. A floodplain analysis was conducted by DOT&PF as part of the *Reconnaissance Engineering Study* (DOT&PF, 1994). That analysis was used to evaluate flood risks and potential impacts of project alternatives to natural and beneficial floodplain values.

The potential impact of project alternatives on local surface water and groundwater hydrology was evaluated based on preliminary engineering hydraulic design for project alternatives.

The analysis of potential water quality impacts evaluated the pollutants from highway stormwater runoff and accidental spills that could enter surface water drainages crossed by project alternatives. The potential impacts of the disposal of sanitary waste generated at proposed new ferry terminals and shuttle ferries were also evaluated. The Alaska Department of Environmental Conservation (ADEC) Water Quality Standards (18 Alaska Administrative Code [AAC] 70) and the ADEC Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances were used to evaluate water quality impacts.

4.1.8 Air Quality

The Clean Air Act prohibits federal actions that delay attainment of any air quality standard. This Act requires a review of all planned stationary sources of air pollution and transportation projects in areas that do not attain National Ambient Air Quality Standards (NAAQS) (non-attainment areas) to ensure that they will not inhibit the ability of the state to ultimately achieve attainment of those standards. The review for stationary sources and other non-transportation emission sources is known as “general conformity,” and the review of transportation projects is termed “transportation conformity.” Because the proposed project is in an area that is either unclassified or classified as being in attainment by the EPA, a conformity analysis is not required.

The pollutants of concern associated with the Juneau Access Improvements Project are elevated concentrations of CO and PM_{10}. Simplified CO modeling was completed for the 1997 Draft EIS by first determining the CO emission factors using the EPA MOBILE 5 computer model. CO concentrations (unadjusted) were then determined using standard methods.

No air quality monitoring data are available for the study area. Therefore, background CO levels of 1 ppm for the rural section and 2 ppm for the more urbanized areas near the endpoints of the project were then added to the modeled CO concentrations for comparison to the state and federal standards (1-hour CO average). The background CO concentrations were assumed based on ADEC input for the 1997 Draft EIS *Air Quality Analysis Technical Report* and guidance provided by the Federal Highway Administration (FHWA) in *Appropriate Level of Highway Air Quality Analysis for CE, Environmental Assessment/Finding of No Significant Impact, and EIS* (FHWA, 1986). FHWA guidance does not require modeling for 8-hour CO concentrations if the 1-hour average is determined to be less than 9 ppm (FHWA, 1986).

For the 2004 Supplemental Draft EIS, the CO emission model has been rerun using updated Supplemental Draft EIS traffic data for the project area. Emission factors were determined using the updated MOBILE 5B computer model. EPA has also developed a newer emission factor model using the MOBILE 6 software and an updated CALINE 4 dispersion model. However, for the purposes of this analysis, no significant differences were noted during comparison runs of the older and newer models, other than those due to differences in inputs for traffic volume, temperatures, and highway design speeds.

The updated 2004 Supplemental Draft EIS model simulation included CO estimates for the construction year (2008) and the design year (2038) using the peak week average daily traffic (peak week ADT) data predicted for those two years. A factor of 20 percent was applied to the peak week ADT traffic data to convert that value into a peak summer hourly traffic volume (both directions). The *Traffic Forecast Report* (Appendix C) provided the factor of 26 percent for converting the summer peak hourly volume to a peak winter hourly volume. Where possible, the most conservative values were assumed for the model inputs so that a worst-case scenario for CO could be developed (highest value). Model assumptions included a 40-mph average vehicle speed for rural segments and 20 mph for urban segments. A minimum distance of 50 feet from the roadway centerline was also modeled using worst-case meteorological conditions.

Project-related PM_{10} concentrations were evaluated on a qualitative basis by comparing project-related traffic volumes to the traffic volumes in a similar environment where PM_{10} measurements have been made.

Results of the 1997 Draft EIS and 2004 Supplemental Draft EIS analyses were compared to the Alaska Ambient Air Quality Standards (18 AAC 50.010), which adopt the federal NAAQS promulgated in 40 CFR 50.8.

Further information on the CO modeling conducted for the Supplemental Draft EIS is provided in *Air Quality Modeling Memorandum* (Appendix T).

4.1.9 Noise

Comments received on the 1997 Draft EIS indicated the need to conduct additional noise analyses of project alternatives. Baseline noise data gathered for the project in 2003, together with projected traffic volumes, were used as input to FHWA noise models to predict future traffic noise with and without the project alternatives. Potential impacts were assessed by comparing projected future noise levels with and without project alternatives to the FHWA noise abatement criteria.

4.1.10 Hazardous Waste

An ISA was conducted in 2003 to identify any known or likely areas of hazardous materials along the alignments and facility locations of the project alternatives. Federal and state databases were reviewed for this assessment. A limited on-site field review was made for the portions of alternative alignments that were within the cities of Skagway and Haines. Past use of any property of potential interest and adjoining properties was researched by reviewing historical aerial photographs. Sites that are known to contain or could potentially contain contamination because of past activities were assigned a site hazard rating. Sites with a high or medium hazard within a 300-foot-wide corridor centered on the alternative alignments and related facilities were further evaluated and assigned an impact rating based on the potential cost of remediation.

4.1.11 Wetlands

This assessment evaluated potential project impacts on wetlands, wetland functions, and marine waters of the U.S. Impacts on rivers and streams (freshwater waters of the U.S.) are addressed under marine and freshwater habitat. The principal direct impact of project alternatives on wetlands is their long-term loss through the placement of fill and modification of local hydrologic patterns.

4.1.12 Marine and Freshwater Habitat and Fish (Including Essential Fish Habitat)

Potential project-related impacts to freshwater habitat and fish were evaluated by estimating the potential for direct and indirect mortality of fish and disruption or disturbance of spawning and rearing behavior as a result of construction and highway maintenance and operation. The *Anadromous and Resident Fish Streams Technical Report* (Appendix P) contains an analysis of these impacts. Habitat-related impacts (i.e., destruction of spawning and/or rearing habitat for anadromous fish) were assessed separately in the *Essential Fish Habitat (EFH) Assessment* (Appendix N).

The EFH assessment serves a dual purpose: it documents potential impacts of project alternatives on the intertidal and subtidal environments of Lynn Canal and it is being used to comply with the Magnuson-Stevens Fishery Conservation and Management Act requirement that federal agencies assess the effects of their actions on essential fish habitat for commercial fish stocks in all life stages and associated habitats. Potential project effects on EFH are summarized in Sections 4.3.14, 4.4.14, 4.5.14, 4.6.14, 4.8.11, and 4.9.2.10 for project alternatives.

The potential effects of project construction and operation on the fish species included in this analysis were evaluated based on projected changes in habitat quality and quantity and the estimated effect of those changes to local fish populations.

4.1.13 Terrestrial Habitat

The assessment of the potential impacts of project alternatives on terrestrial habitat was based on the long-term loss of those habitats resulting from the construction of project facilities. The effect of habitat loss on wildlife was addressed in the *Wildlife Technical Report* (Appendix Q).

4.1.14 Wildlife

The 1994 *Wildlife Technical Report* assessed potential project-related impacts to wildlife using Habitat Capability Index (HCI) models, and still provides valid information for the proposed project. These HCI models were developed for black bear, brown bear, marten, and mountain goat which were management indicator species identified by the USFS, the Alaska Department of Fish and Game (ADF&G), and the U.S. Fish and Wildlife Service (USFWS). Public and agency comments on the 1997 Draft EIS requested an expansion of the number of species considered for analysis and pointed out the limitations of the HCI models for assessing impacts from highway development. The wildlife evaluation for the Supplemental Draft EIS assessed the direct impacts of project alternatives on 22 representative species of mammals, birds, and amphibians. The impact analysis presented in this document does not rely on any new HCI modeling. However, the Supplemental Draft EIS summarizes statistics from the previous HCI model analyses where appropriate.

The potential impacts of project alternatives on wildlife were assessed in the following steps:

- **Step 1 – Setting up the Analysis** – The geographic scope of the wildlife analysis was defined using a combination of U.S. Geological Survey (USGS) and USFS maps and ADFG Wildlife Analysis Areas.
- **Step 2 – Describing the Situation** – Wildlife species' preferred habitats, population trends (if known), and the types of interactions they have with humans in the study area, including how they interact with the existing transportation systems in Alaska, were described. This information was summarized from other documents and incorporated by reference.
- **Step 3 – Identifying Issues** – A number of federal laws address wildlife and development issues, including the Endangered Species Act, the Fish and Wildlife Coordination Act, the Migratory Bird Treaty Act, and the Marine Mammal Protection Act. A list of the issues to be considered was derived from these laws, public and agency comments during scoping for the Supplemental Draft EIS, and from USFS documents concerning road impact analysis (USFS, 1999, 2000).
- **Step 4 – Assessing Benefits, Problems, and Risks** – For biological resources, guidelines for the NEPA recommend that population-level measures be used to evaluate the intensity of project-related effects and that the evaluation be quantifiable where possible. If quantitative information is unavailable, professional judgment on the likelihood of an impact occurring or its severity may be used. Historical population survey data from resource management agencies and academic sources were used in the impact assessment to the extent possible. Given the uncertain nature of predicting the future effects of project alternatives, a combination of quantitative estimates and qualitative judgments was used to describe potential impacts.

See the *Wildlife Technical Report* (Appendix Q) for additional information on the impact assessment methodology.

4.1.15 Bald Eagles

The 1997 Draft EIS assessed the potential impacts of project alternatives on bald eagles by measuring the distances between nests and alternative highway alignments. Based on many years of experience in Southeast Alaska, the USFWS developed a set of guidelines for state- and federal-funded highway construction activities to ensure compliance with the Bald Eagle Protection Act and prevent disruption of bald eagle nests. Those guidelines are incorporated

into a USFWS and USFS interagency agreement. The guidelines were used in the updated (2003) *Bald Eagle Technical Report* (Appendix R) to evaluate potential project-related impacts on the bald eagle population in the Lynn Canal corridor.

In general, the guidelines prohibit construction activities within 330 feet (primary zone) of an existing nest during the eagle's nest selection (initiation) period from March 1 through May 31. A secondary zone, between 330 feet and up to 0.5 mile from an existing nest, is established in the guidelines to screen the nest from particularly loud and obtrusive activities, such as blasting, and to protect the habitat within the primary zone. If a pair of eagles is actively using a nest by June 1, all construction activities within 330 feet of the nest should be avoided, and blasting activities should not occur within 0.5 mile of the nest during the nesting season, which usually ends by August 31. In certain circumstances, the USFWS does not object to limited blasting within a 0.5-mile radius of an active nest. Factors considered include the acclimation of the nesting eagles to human activity, terrain shielding, blasting loads, and monitoring of the nest disturbance. The USFWS has agreed that some highway construction activities may proceed within 330 feet of an active nest under the condition that it is monitored continuously by observers and that construction activities stop immediately if the eagles exhibit any signs of disturbance (Dunn, 2000).

The distances between eagle nests identified in the USFWS surveys and the cut-and-fill limits of each alternative were calculated. Where nests were within 330 feet of the alignment, the alignment was shifted when feasible to take it out of this primary zone of protection. For those nests that could not be reasonably avoided by at least 330 feet, the constraint factors that prevented realignment were described.

The number of nests within the primary and secondary zones for each alternative alignment were evaluated in relation to the total number of nests identified in the study area. This information, together with literature on the effects of noise on bald eagles, was used to evaluate potential project-related impacts on this species.

4.1.16 Threatened and Endangered Species

As indicated in Section 3.3.7, only two species in the study area are classified as threatened or endangered under the Endangered Species Act: the humpback whale and the Steller sea lion. The 1997 Draft EIS included the following mitigation measures to minimize impacts on sea lions:

- Initiate multi-year monitoring study to provide additional information on year-round sea lion use of Gran Point and Met Point haulouts if the East Lynn Canal Highway is selected as the preferred alternative.
- Maintain as large a distance and vegetation buffer between the highway and the haulouts as possible.
- Limit road construction within the Gran Point Critical Habitat Area to times when sea lions are not present at the haulout unless authorized by NMFS.
- Install signage and fencing along the highway near Gran Point and Met Point to discourage pedestrian disturbance of sea lions, if deemed necessary.

The 1997 Draft EIS concluded that these measures would avoid construction disturbance and that overall impacts to sea lions would not adversely affect their chances of recovery or adversely modify their critical habitat. DOT&PF sent a biological assessment to NMFS in August 1998 detailing the basis for the not likely to adversely affect determination and requested concurrence with this finding. NMFS responded that it would concur with a finding of

no adverse impact if DOT&PF agreed to follow the mitigation measures described in the 1997 Draft EIS and the following three conditions:

- No boat launches or structures that enhance boat access would be constructed anywhere along the East Lynn Canal Highway
- Expand year-round monitoring at Gran Point and Met Point to include an assessment of human behavior around the haulouts. This study to be conducted for a period of at least three years after the highway is constructed and it should focus on whether access from the highway is causing disturbance to sea lions. If human disturbance is documented, additional mitigation measures would be required.
- Employ independent observers during construction to ensure that sea lions are not present at the Gran Point haulout. If sea lions are present at any time during construction in the Gran Point Critical Habitat Area, all work must cease and NMFS must be consulted before any further construction proceeds.

Alternatives 2 through 2C would include no DOT&PF-constructed boat launches or structures that enhance boat access. As described in Section 3.3.7, DOT&PF monitored Steller sea lions at Gran and Met points in 1998 and 2002 to 2004. DOT&PF adjusted alternative highway alignments because of this monitoring to minimize potential impacts to sea lions.

Potential project impacts on Steller sea lions were reassessed for the Supplemental Draft EIS because of these alignment adjustments and the additional baseline data. The 2003 *Steller Sea Lion Technical Report* (Appendix S) updated and built on the information presented in the 1997 Draft EIS. The impact assessment in the report uses the same disturbance factors considered in the 1997 Draft EIS (i.e., construction noise and vibration, human presence, and traffic noise) but includes new traffic predictions and noise analysis data.

As indicated in this chapter, the FHWA has made the preliminary determination that Alternatives 2 through 2C would not be likely to adversely affect Steller sea lions. FHWA will provide an updated biological assessment to NMFS with further analysis of the potential effects of the preferred alternative on these species in accordance with Section 7 of the Endangered Species Act.

4.2 Alternative 1 – No Action

The No Action Alternative would consist of continued operation of the AMHS in Lynn Canal. As indicated in Section 1.2.1, ferry service has been modified in 2004 with the addition of the motor vessel (*M/V) Fairweather*. For purposes of this document, it is assumed that the 2004 service will be similar in the future, with the addition of the Haines/Skagway shuttle, which could be operational as early as 2005. This section describes the environmental consequences to resources discussed in Chapter 3 during the analysis period from 2008 and 2038. The section only discusses the environmental areas for which changes from conditions described in Chapter 3 have been forecasted within the project planning horizon. No changes to existing conditions were identified for land use, visual resources, historical and archeological resources, environmental justice, subsistence, geology, floodplains, Wild and Scenic Rivers, air quality, hazardous materials, and biological resources.

4.2.1 Socioeconomic Resources

As discussed in Section 4.2.2, summer average daily traffic (summer ADT), which represents average daily traffic during the summer travel period in Lynn Canal, is projected to increase from 124 vehicles in 2002 to 170 vehicles in 2008, which is close to the capacity of the AMHS

system under the No Action Alternative. The demand[12] is projected to reach 230 summer ADT by 2038; this demand would not be met based on current AMHS vessel deployment and operation. The increased traffic would bring more money into the economies of Lynn Canal communities from the traveling public, particularly in Juneau, as it is the transportation hub of the region. However, even though the projected increase in daily traffic is relatively large as a percentage, it remains small in absolute terms. Therefore, the increased economic activity associated with this traffic increase would not noticeably change economic conditions in Lynn Canal. In addition, the No Action Alternative would not substantially alter the quality of life for residents in Juneau, Haines, and Skagway.

4.2.2 Transportation

Based on travel data maintained by AMHS, traffic averaged 80 vehicles per day (80 annual ADT) between Juneau, Haines, and Skagway in 2002, and summer traffic averaged 124 vehicles a day (124 summer ADT). During the busiest week of the summer, which is the busiest week of the year, traffic averaged 200 vehicles a day (200 peak week ADT). In the winter, average daily traffic dropped to 45 vehicles a day (45 winter ADT).

The summer of 2002 was the last season the *M/V Malaspina*, with a vehicle capacity of 88, was used as a shuttle in Lynn Canal. The AMHS also operated up to five mainline ferries in the canal that summer. Because of operating costs and logistical considerations, AMHS has reduced vehicle capacity in Lynn Canal since 2002. In 2003, shuttle service was replaced with a combination of smaller ferries, including the *M/VAurora*, with a vehicle capacity of 34, and the *M/V Taku*, with a vehicle capacity of 69. Starting in the summer of 2004, shuttle service is provided 4.5 days per week by the fast ferry *M/V Fairweather*, with a vehicle capacity of 35. As discussed in Supplemental Draft EIS Chapter 2, the projected combined daily summer traffic capacity under the No Action Alternative is 167 vehicles.

Based on current trends in key traffic markets, including population growth in Juneau, Whitehorse, Haines, and Skagway, and growth in the non-resident visitor market, travel demand under the No Action Alternative is projected to reach an annual average of 90 vehicles per day in 2008 and 130 vehicles per day in 2038. By 2008, travel demand under the No Action Alternative is projected to reach an average of 170 vehicles per day in the summer and 330 vehicles per day in the peak week. By 2038, travel demand is projected to increase to an average of 230 vehicles per day in the summer and 460 vehicles per day in the peak week. As indicated above, the capacity of the ferry system under the No Action Alternative is limited to approximately 167 vehicles per day during the summer in those future years. Therefore, summer demand would exceed capacity under the No Action Alternative.

Maximum surface transportation demand in the Lynn Canal corridor is expected to reach at least 900 annual ADT by 2038. The capacity of the No Action Alternative is 167 vehicles/day, which falls far short of meeting the demand.

The No Action Alternative would provide eight round-trips per week between Juneau and Haines and seven round-trips per week between Juneau and Skagway. Using the fast ferry, travel time from Juneau to Haines and Skagway would be 3.5 and 3.8 hours, respectively. Using a mainline ferry, travel time from Juneau to Haines and Skagway would be 7.1 and 9.1 hours, respectively.

[12] Demand projected for a particular mode of transportation, in this case ferry service, assuming no capacity limitations on that transportation mode.

The Haines-Skagway shuttle ferry would take approximately 1.3 hours for a one-way trip. The *M/V Aurora* would make to three roundtrips per day in the summer and two roundtrips per day in the winter. This would provide a daily summer capacity of 204 vehicles, which would more than provide for the projected summer shuttle demand (67 ADT in 2008 and 98 ADT in 2038).

The 30-year life cycle cost of the No Action Alternative would be $267 million, which includes all state and federal capital costs and all state operating costs. The net cost to the state would be about $61 million discounted to present dollars (January 2004). AMHS expenditures in Lynn Canal for 2001 and 2002 exceeded $10 million a year, $5 million per year of which was subsidized by the state. The average annual operating cost of the No Action Alternative is estimated to be about $10.2 million. The 2008 revenue for the No Action Alternative is projected to be $6.9 million, which would result in a $3.3 million annual state subsidy for transportation in Lynn Canal. By 2038, revenue for the No Action Alternative is projected to be $8.5 million, which would result in a $1.7 million annual state subsidy for Lynn Canal transportation.

Based on the 2004 AMHS rate structure, the cost for a family of four in a 19-foot-long vehicle to travel from Juneau to Haines would be $180 on a mainline vessel and $198 on the *M/V Fairweather*. The cost for the same family to travel from Juneau to Skagway would be $237 on a mainline vessel and $261 on the *M/V Fairweather*. Travel between Haines and Skagway on a shuttle is estimated to be $41 for a family of four.

4.2.3 Hydrology and Water Quality

Treated wastewater from mainline ferry vessels would continue to be discharged into Lynn Canal under the No Action Alternative. Wastewater would be stored in tanks on the *M/V Fairweather.* These tanks would be pumped out and the sewage would be hauled to an existing landside treatment facility. Some discharges would introduce concentrations of fecal coliform (FC) and total suspended solids (TSS) above Alaska Water Quality Standards (AWQS) to ambient waters. Dilution on discharge to marine water would reduce the toxic effects of FC and TSS, as well as other potential pollutants. Discharges occurring while ferries are traveling away from shore would have the least impact on water quality. Because wastewater discharges from ferries are automatic and can occur while the vessels are near shore or docked, some short-term impact to water quality from elevated levels of FC and TSS are anticipated. New compliance regulations effective beginning in 2004 require wastewater discharges to meet water quality standards; therefore, elevated FC and TSS discharges may decrease substantially in the next few years.

4.3 Alternatives 2, 2A, 2B, and 2C – East Lynn Canal Highways

As discussed in Section 2.3, four alternatives contain a highway on the east side of Lynn Canal. The highway alignment for all four alternatives is the same, and under each alternative mainline ferry service from Auke Bay to Haines and Skagway would end. The alternatives differ on either the location of a shuttle ferry service to Haines or the length of the highway within the alignment. Alternatives 2 and 2C (Figures 2-3 and 2-7, respectively) call for a highway from Echo Cove to Skagway with the shuttle ferry to Haines either from a new terminal at the Katzehin River delta (Alternative 2) or the existing terminal at Skagway (Alternative 2C). Alternative 2A is the same as Alternative 2 except that the highway would not be constructed around Berners Bay and vehicles would be shuttled across the Bay on ferries from Sawmill Cove to Slate Cove (Figure 2-5). In Alternative 2B, the highway would extend from Echo Cove to the Katzehin River delta and ferries would provide service to Skagway and Haines from a new terminal located there (Figure 2-6).

Based on the environmental studies conducted for the Juneau Access Improvements Project, many of the potential impacts associated with these four alternatives would be the same; therefore, they are discussed together in this assessment. Where the potential impacts of Alternatives 2 through 2C are substantially different, those differences are noted in the text.

Several pullouts, scenic overlooks, and trailheads were identified in the 1997 Draft EIS. Many of those sites are no longer applicable because the highway alignments for Alternatives 2 through 2C have been revised to avoid or minimize potential impacts to resources such as wetlands and trees with bald eagle nests. DOT&PF and the USFS reconsidered appropriate sites for the different alternatives in 2003. The following sites are likely to be constructed in the event that Alternative 2, 2A, 2B, or 2C is the selected alternative. These sites are shown on Figure 4-1.

- The USFS cabin in Berners Bay would remain and become a road-accessed cabin. A handicapped-accessible pullout and trailhead would be located on the highway adjacent to the cabin and DOT&PF would construct a trail to the cabin (Alternatives 2, 2B, and 2C).
- A Lace and Berners River pullout would be located just after the bridge over the Lace River (Alternatives 2, 2B, and 2C).
- A Slate Cove pullout would be located west of Slate Cove (Alternatives 2, 2A, 2B, and 2C).
- The planned Comet highway maintenance building would include a rest stop with public facilities. A pullout and scenic overlook on the canal side of the highway would also be provided (Alternatives 2, 2A, 2B, and 2C).
- A pullout on the east side of the highway and a pullout and scenic overlook on the canal side of the highway would be located near the Brown Point geodetic marker (Alternatives 2, 2A, 2B, and 2C).
- A pullout and scenic overlook would be located near Eldred Rock (Alternatives 2, 2A, 2B, and 2C).
- A pullout on the east side of the highway and a pullout and scenic overlook on the canal side of the highway would be located near Yeldagalga Creek (Alternatives 2, 2A, 2B, and 2C).
- A pullout and scenic overlook would be located in a valley south of the Katzehin River (Alternatives 2, 2A, 2B, and 2C).
- A pullout and scenic overlook would be located north of the Katzehin River (Alternatives 2, 2A, 2B, and 2C).
- A pullout on the east side of the highway and a pullout and scenic overlook on the canal side of the highway would be located near Dayebas Creek (Alternatives 2, 2A, and 2C).
- A pullout and scenic overlook would be located near Long Falls (Alternatives 2, 2A, and 2C) below Schubee Glacier.
- Sturgill's Landing currently is a day use area at the end of a 3-mile trail. A highway pullout with toilet facilities would be located to intersect with the existing trail (Alternatives 2, 2A, and 2C).

The environmental impact assessment provided in Section 4.3 includes consideration of the potential impacts of the proposed pullouts and scenic overlooks. The USFS may develop trails at some of the pullouts in the future. (See USFS letter dated March 25, 2004 in Chapter 7 for

information regarding trails envisioned by USFS if one of these alternatives is constructed.) A separate environmental assessment would be completed by the USFS for these trails.

4.3.1 Land Use

4.3.1.1 Land Ownership

Current ownership of the land that would be required for the highway right-of-way and any new ferry terminal facilities for Alternatives 2, 2A, 2B, and 2C is presented in Table 4-1. As indicated in that table, over 90 percent of the land is either part of the Tongass National Forest under the management of the USFS or it is managed by other federal agencies. This land would remain under federal ownership with a highway easement conveyed to the state. Approximately one percent of the land that would be required by Alternatives 2, 2A, and 2C is already owned by the state. About two to three percent of the land required by Alternatives 2 through 2C is owned by Goldbelt, and the remaining land is owned by the City of Skagway or other parties including the Alaska Mental Health Trust. For Alternative 2B the highway would end at the Katzehin River delta, and no land owned by Skagway or the Mental Health Trust would be required for the project. Goldbelt, Skagway, the Mental Health Trust, and private owners would be compensated for lands taken for a new highway right-of-way at fair market value in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

Table 4-1
Land Ownership of Required Right-of-Way for Alternatives 2 through 2C

Alternative[1]	Ownership (acres)							Total (acres)
	USFS	U.S. Coast Guard	State of Alaska	Mental Health Trust	Goldbelt	Skagway	Private	
2	2,223	37	32	3	55	37	5	2,392
2A	1,820	37	32	3	55	37	5	1,989
2B	1,719	29	0	0	55	0	5	1,808
2C	2,223	37	32	3	55	37	5	2,392

Note: [1]Based on the maximum right-of-way width of 300 feet on federal and state lands and 150 feet on private and municipal lands.

4.3.1.2 Consistency with Land Use and Management Plans

As described in Section 3.1.1.1, the TLMP for the Tongass National Forest identifies a transportation corridor along the alignment for Alternatives 2 through 2C; therefore, these alternatives are consistent with the TLMP. A portion of the USFS land crossed by the alignments for Alternatives 2, 2B, and 2C along the east shore of Berners Bay is currently managed under LUD II, which refers to Congressionally designated lands where the principal management goal is to retain the primitive wildland character of the area while allowing necessary state highways (Figure 3-3). Much of the rest of the USFS land along the alignment for Alternatives 2 through 2C is managed under the TLMP designation of Semi-Remote Recreation. A small amount is managed under the designations of Old Growth Habitat and Scenic Viewsheds. Some areas such as the Kensington Gold Project area are managed under the designations Modified Landscape and Minerals. Based on language in the 1997 TLMP and consultation with the USFS, if Alternative 2, 2A, 2B, or 2C is selected as the final preferred alternative for the proposed project and a highway is constructed on the alignment, the USFS would change the management of the highway corridor to Transportation and Utility Systems.

The regional transportation policy set forth in the CBJ Comprehensive Plan is to support the improvement and expansion of air, marine, and highway transportation systems to maintain and expand Juneau's role as the capital city and a regional transportation center (CBJ, 1996). The 1996 update to the CBJ Comprehensive Plan maintains plans for the consideration of all alternatives, including highways, high-speed ferries, and light rail or railroad, to improve transportation links throughout Southeast Alaska and Canada. Therefore, Alternatives 2 through 2C are consistent with the CBJ Comprehensive Plan.

The existing Haines Borough Comprehensive Plan (HBCP) discusses the importance of consistent, daily AMHS service and expresses concern regarding a highway link to Juneau (Haines Borough, 2004). Alternatives 2 through 2C cross USFS lands with a general use designation in the HBCP. Haines Borough Ordinance 03-02-007 indicates that the intent of the general use designation is to provide a minimum of planning, platting, and land use regulation in rural areas. A transportation facility would be consistent with this zoning designation.

The Skagway Comprehensive Plan (City of Skagway, 1999) is also silent on a highway link to Juneau.

4.3.1.3 Land and Resource Uses

Alternatives 2 through 2C would substantially improve access to the east Lynn Canal coastline for recreation and tourism. In recognition of this potential improvement, the USFS has evaluated development of scenic turnoffs and trailhead parking along Alternatives 2 through 2C to provide use of Tongass National Forest lands (Figure 4-1).

Alternatives 2 through 2C would improve opportunities for recreational activities such as hiking, camping, sightseeing, rafting, canoeing, kayaking, fishing, and hunting. These opportunities would provide benefits for residents and visitors, and spread out recreation activities that are currently concentrated along the existing highway systems in Juneau, Haines, and Skagway. Berners Bay and the Katzehin River delta are already popular locations on the east side of Lynn Canal for remote and semi-remote recreation. A highway through these areas would make them more accessible for people looking for a rustic but not totally remote outdoor experience. A highway would also make the USFS-maintained Berners Bay cabin and the unmaintained cabin east of the Katzehin River delta more accessible for recreation. A highway could also provide opportunities for outfitters to make more recreational trips available to the public in the region. For example, river crossings often provide good places for putting in or taking out kayaks. Bridges associated with Alternatives 2 through 2C could open up opportunities for new kayak trips.

Opening up the recreation opportunities of the coastline along the east side of Lynn Canal would be perceived as a negative impact to the quality of the experience by those who enjoy the existing remote nature of the region, including some outfitters who currently provide wilderness trips there. For instance, current users of the Berners Bay cabin who travel there by kayak, canoe, small boat, or float plane would find the experience there different if the cabin were accessible by road. Alternatives 2 and 2C would provide access to recreation along the full corridor on the east side of Lynn Canal, as each alternative would include a highway from Echo Cove to Skagway. Alternative 2A would not provide direct road access between Sawmill Cove and Slate Cove, leaving that area unchanged. Under Alternative 2B, the highway would end north of the Katzehin River delta, and remote and semi-remote recreational opportunities would continue to be available along the east Lynn Canal coast between there and Skagway.

Many of the rivers and streams that would be crossed by Alternatives 2 through 2C contain resident and anadromous fish stocks available for sport fishing. The region also supports populations of mountain goat, bear, and moose, big game species available for take by resident and out-of-state hunters. Hunting and fishing pressure has increased along every highway in Alaska that has opened a formerly remote area. Increases in recreational hunting and recreational and personal use fishing would be expected along Alternatives 2 through 2C. As in other readily accessible regions of the state, the Alaska Department of Fish and Game would monitor the resources along Lynn Canal and adjust fish and game regulations, as necessary, to protect those resources from overutilization.

The commercial activities of Goldbelt could be expanded with improved access to its Echo Cove lands. Better access and through-traffic resulting from Alternatives 2 through 2C would facilitate development opportunities, including transportation-related activities, recreation, tourism, and residential development.

Alternatives 2, 2B, and 2C would benefit the Kensington Gold Project by facilitating the transport of goods and services to the mine site from Juneau and making it more convenient for workers in Juneau, Skagway, and Haines to reach the site. A highway would provide easier and less expensive access to other mineral occurrences, prospects, and former mines along the east side of Lynn Canal. It is unlikely that any mineral deposits in the region would be developed solely because of this improved access. Development of mineral resources is capital intensive, involving many other costs besides access. Market conditions must be high enough to account for all of these costs before development can occur.

4.3.1.4 Parks and Recreation Facilities

No land from a municipal, state, or federal park or recreation area would be required by Alternatives 2 through 2C. Based on a USFS request, the Berners Bay cabin would be provided with handicapped access from the highway under Alternatives 2, 2B, and 2C. See Chapter 6 for further discussion of potential impacts to public recreation facilities.

4.3.2 Coastal Zone Management

Alternatives 2 through 2C are within the coastal zone. Federal lands owned, leased, or held in trust or whose use is otherwise subject by law solely to the discretion of the federal government, are excluded from the coastal zone boundary of the ACMP and local plans. Uses and activities on excluded federal lands by non-federal entities that affect the coastal zone, such as the highway and ferry terminal uplands for Alternatives 2 through 2C, must be consistent with the ACMP and the consistency provisions of Section 307 of the Coastal Zone Management Act for all land impacted.

The topics addressed by the enforceable policies of the ACMP and the district coastal management plans that are relevant to Alternatives 2 through 2C are coastal development; geophysical hazards; recreation; transportation and utilities; timber harvest; mining and mineral processing; subsistence; biological habitats; air, land, and water quality; and prehistoric and historic resources. These policies provide goals and performance criteria for activities within or affecting the coastal zone, including transportation projects.

Alternatives 2 through 2C have been sited in consideration of the enforceable policies of the ACMP and district coastal management plans. These enforceable policies would also be considered in the development of design parameters for the alternative selected for the proposed project. In accordance with the Coastal Zone Management Act, DOT&PF will obtain a determination from ADNR of the consistency of the selected alternative with the state coastal

management program and Juneau and Skagway coastal management plans following the ACOE and ADNR public notice period as part of the process to obtain the necessary state and federal permits for the project.

4.3.3 Visual Resources

Visual simulations were made of Alternatives 2 through 2C at typical viewpoints that represent characteristic viewing conditions in each of the major landscape units described in Section 3.1.2. The locations of those viewpoints are provided in Figure 4-2. A description of the visual character of the alternatives at each viewpoint is provided below.

4.3.3.1 Berners Bay

Views from the Bay – In Berners Bay, the most susceptible views to potential impacts from Alternatives 2 through 2C include:

- Views from Berners Bay
- Views from small boats and ferries
- Views from the Berners Bay cabin
- Views from lower reaches of Berners, Lace, and Antler rivers
- Views from Point Bridget State Park

Figure 4-3 provides a visual simulation of the highway in background views from the southern end of Berners Bay. From this location, the highway is approximately 2.4 miles from the viewer, and it is located in an area not requiring substantial cuts and fills. Therefore, the highway is not likely to dominate the existing natural setting. At closer distances, the ferry terminal at Sawmill Cove and associated highway proposed for Alternative 2A would be more noticeable. It is likely that visitors to Berners Bay and Point Bridget in the Point Bridget State Park would notice the highway; however, this condition is highly dependent on the view distance.

Figure 4-4 is a visual simulation of the highway in the foreground at the Sawmill Cove Ferry Terminal, which is proposed for Alternative 2A. The highway would be noticeable intermittently along the eastern edge of Berners Bay. However, the proposed ferry terminal would likely be highly visible from this distance (approximately ½ mile) and through the middleground viewing threshold. The changes to form, line, color, and texture introduced by the ferry terminal would dominate the existing viewshed.

Figure 4-5 is a visual simulation of the highway under Alternatives 2, 2B, and 2C just south of the confluence of the Berners, Lace, and Antler rivers on the east side of Berners Bay within proximity of the Berners Bay cabin. Topography within this area varies from gentle to moderately steep. As a result, it is likely that cut-and-fill areas would be intermittently visible from this viewpoint. A distinct line created by the removal of vegetation would also be noticeable. The layering of landscapes surrounding primarily all but the central western portion of the bay dominates existing viewsheds.

Figure 4-6 provides a visual simulation of Alternatives 2, 2B, and 2C within Berners Bay. A strong linear band created by exposing lighter soil and rock in cut-and-fill areas would be most noticeable. The proposed bridge would create contrast in form; however, depending on the angle of view as well as the distance, the bridge would be more or less noticeable. Steep road cuts on the eastern edge of Berners Bay would dominate the existing setting out to the

middleground viewing threshold. The bridge and highway would dominate the existing setting when they are included in foreground views.

Figure 4-7 is a visual simulation near the Slate Creek Ferry Terminal, which is proposed for Alternative 2A. The highway would traverse very gentle terrain in a continuous closed-canopied forest. Although the visibility of cut-and-fill areas would be reduced as a factor of terrain characteristics, the removal of vegetation would create a distinct line across this small peninsula. Changes to the natural rounded form characteristics would be noticeable from views of the highway at a perpendicular angle, as the roadway would create a distinct notch as it crests over the peninsula. The proposed ferry terminal would contrast strongly with the natural landscape because of the closeness of the viewer (i.e., foreground) and the increased visibility of changes to form, line, color, and texture from natural characteristics.

Views from the Highway – Views from a highway along the east shore of Berners Bay looking east would be limited to the foreground by dense old-growth forest in most places. Crossing the Berners River and Antler River delta, views to the east would open up to an extensive marsh in front of a forested valley cut through steep and rugged mountains. Many of the views looking west from a highway would be panoramic, taking in Berners Bay and Lynn Canal with the snow-capped peaks of the Chilkat Range in the background approximately 12 miles away.

4.3.3.2 Point St. Mary to Eldred Rock

Views from Lynn Canal – From Point St. Mary to Comet, views most susceptible to potential impacts from Alternatives 2 through 2C include:

- Views from mining roads in the vicinity of Comet
- Views from cruise ships and small boats

Figure 4-8 is a visual simulation of Alternatives 2 through 2C from Lynn Canal looking east toward Point Sherman. The existing viewshed is unique, as it has scenes that contain rolling terrain in the foreground and middleground and mountains in the background. Because of the highway being sited within an area of less steep topography, the visibility of cut-and-fill areas is reduced. However, the linear band created by the removal of vegetation would be noticeable primarily in the middle and foreground viewing thresholds.

Figure 4-9 provides a visual simulation of Alternatives 2 through 2C within middleground views of the area from the canal north of Comet. The highway would traverse steep topography in an area interspersed with vegetation. A waterfall occurs in the viewshed as well as a noticeable rockslide. The highway would create a distinct linear feature across the existing setting that would compete with and detract from natural landscape features. This conclusion is primarily a factor of substantial cut-and-fill areas occurring within the existing viewshed.

From just north of Comet to Eldred Rock, the most susceptible views to potential impacts from Alternatives 2 through 2C include:

- Views from Sullivan Island and Sullivan Island State Marine Park
- Views from and around Eldred Rock Lighthouse
- Views from cruise ships and small boats

Figure 4-10 provides a visual simulation of Alternatives 2 through 2C from a traveler in the Lynn Canal on a vessel near Eldred Rock, with the highway at a distance of approximately 1.5 miles. As indicated in the simulation, the highway would represent a strong linear feature introduced to

an otherwise natural setting. Some portions of the roadway would be sited close to the water's edge, thus reducing visibility of this linear band. In other areas the highway would be sited 60 to 80 feet above the water's edge and traverse areas of extreme slope, creating dominant shear-cut faces.

Views From the Highway – Views from a highway would alternate between confined foreground and middleground views of dense forest to panoramic scenes of Lynn Canal. Those panoramic views would include the east shoreline in the foreground and the water of the Canal in the middle- and background, with background views of the rugged, snow-capped peaks of the Chilkat Range across the Canal.

4.3.3.3 Eldred Rock to Mount Villard

Views from Lynn Canal – Alternatives 2 through 2C would be visible in the viewshed of the Katzehin River delta. Views most susceptible to impact in this area include:

- Views from the Katzehin River Valley downstream reach proposed as a Wild and Scenic River
- Views from Portage Cove Campground
- Views from Haines
- Views from cruise ships and small boats
- Views from shoreline cabins

Figures 4-11 and 4-12 show visual simulations of Alternatives 2 through 2C within the middleground viewing threshold in this area. From the location assumed in Figure 4-11, a viewer traveling within Chilkoot Inlet in the vicinity of the Katzehin River would likely notice a linear band created by the exposure of lighter soils as well as the bridge spanning the rivermouth. Although the proposed bridge would be noticeable, the scale of both landform and vegetation modifications is less than that of cut-and-fill areas constructed on mountain slopes. Southbound travelers would not notice this portion of the highway to the same degree as northbound travelers approaching the river headwaters because the highway would be masked by topography as the inlet turns to a more northwesterly direction than a northern direction.

As shown in Figure 4-12, the highway would appear as a linear band along the base of Mount Villard. Topography along this link is very steep and vegetation intermittent. As a result, cut-and-fill areas would be highly noticeable in middle- and background views. The proposed ferry terminal north of the Katzehin River delta for Alternatives 2, 2A, and 2B would be noticeable as an interruption in the line associated with the roadway. The existing natural setting dominates this viewshed, and it is unlikely that the highway would visually compete with the existing setting. The proposed bridge crossing the Katzehin River, from this viewpoint, would not compete substantially with the natural setting.

Views of Alternatives 2, 2A, and 2C around the base of Mount Villard most susceptible to potential impacts include:

- Views from Portage Cove Campground
- Views from Chilkat State Park
- Views from Haines
- Views from ferries, cruise ships, and small boats

Figure 4-13 provides a visual simulation of these project alternatives in the background viewing threshold from Haines. From this viewpoint, the highway would create a linear band across an unmodified setting. The highway would be sited 60 to 80 feet above the water surface in a closed-canopied forest. The existing natural setting with Mount Villard in the background dominates the viewshed. It is anticipated that the light linear band created by exposing subsurface soil and rock along the proposed highway may be noticeable at this distance but not compete substantially with the existing setting.

Views From the Highway – Views from a highway would typically alternate between confined foreground and middleground views of dense forest to panoramic scenes of Lynn Canal. Those panoramic views would include the east shoreline in the foreground and the water of the Canal in the middle- and background, with background views of the rugged, snow-capped peaks of the Chilkat Range across the Canal. At the bridge over the Katzehin River, views would encompass the broad floodplain of this river and the deep, forested valley extending to the east.

4.3.3.4 Mount Villard to Skagway

Views from Lynn Canal – Alternatives 2, 2A, and 2C would affect views in this area. Alternative 2B ends south of Mount Villard and would not be visible from this landscape unit.

In Taiya Inlet south of Skagway between Mount Villard and Mount Harding, views most susceptible to potential impacts include:

- Views from Taiya Inlet
- Views from Sturgill's Landing Day Use Area
- Views from cruise ships, ferries, and small boats
- Views from hiking trails

Figure 4-14 provides a visual simulation of Alternatives 2, 2A, and 2C along Taiya Inlet in this area. This viewpoint represents a characteristic viewpoint of a traveler in a boat in Taiya Inlet. From this viewpoint, the highway would be sited approximately 60 to 80 feet above the water surface. Travelers within Taiya Inlet have foreground, middleground, and background views of the highway. Because of its contrasting line and color, the highway would be visible even in background views of this area.

Views most susceptible to potential impacts at the northern end of Taiya Inlet in the vicinity of Skagway include the following:

- Views from the Skagway Historic District
- Views from the White Pass & Yukon Route Railroad
- Views from residences within the valley bottom and on hillsides
- Views from Sturgill's Landing Day Use Area
- Views from ferries, cruise ships, and small boats
- Views from hiking trails
- Views from Dyea Road and the Klondike Highway
- Views from near the NPS campground at the head of Taiya Inlet

The viewpoint for Figure 4-15 is approximately one-half mile from Skagway looking northeast from the approach to the port in -Taiya Inlet. From this location, the highway would be hidden within the immediate foreground viewing threshold. Middleground views would be intermittent at the northern portions of Skagway. Background views, even from within Taiya Inlet approaching Skagway, would be screened by topography from both the northern portions of Skagway and south of Mount Harding. From superior viewing locations at Upper Dewey Lake and other surrounding higher hills and mountains, the highway would be highly noticeable. The lighter color contrast would be noticeable within this moderately developed area given the close proximity of the highway to viewers and the linear nature of the highway ascending into this confined valley. Cruise ships and other man-made features (e.g., the Skagway Airport) detract from the overall existing natural setting in this area, which would lessen the visual contrast of the proposed highway from many viewing locations.

The viewpoint at Figure 4-16 occurs within the foreground viewing threshold of the highway within the vicinity of the Skagway Airport. The topography within this area is very steep and is covered by a continuous forested canopy. Large and continuous cuts are anticipated, which would create a distinct linear feature within the existing setting. It is likely that this portion of the highway would create a visual contrast in the line, color, and texture of the natural landscape.

Figure 4-17 is a view from a scenic pullout along Dyea Road above Skagway. As with the visual simulation shown in Figure 4-14, the highway would create a clear linear feature in the existing viewshed. This feature would contrast in line, color, and texture with the existing natural landscape.

Alternatives 2, 2A, and 2C would be visible in the background of views from the Skagway and White Pass District NHL and Klondike Gold Rush NHP. However, there would be only intermittent views of the road and the bridge over the railroad tracks at 23rd Avenue from the core of the Klondike Gold Rush NHP, where vistas are screened or blocked by buildings and other features of the natural and developed environment. The bridge at 23rd Avenue is at the northern end of town, where both foreground and middleground views are predominately of modern development.

Figure 4-18 is a visual simulation of Alternatives 2, 2A, and 2C from a viewpoint near the NPS Dyea campground at the head of Taiya Inlet. The highway would be located approximately three to five miles from this viewpoint. The highway would be noticeable as a line along Taiya Inlet in the background of views from the inlet looking south. Form and texture changes are not as noticeable as line and color contrast created by exposing sub-soil and rock and through physical landform modifications. These changes could create a noticeable linear feature for several miles along the inlet.

Views from the Highway – From Mount Villard to Mount Harding, the highway is high above the water (60 to 80 feet), providing panoramic views of the narrow Taiya Inlet. Because of the steep forested slopes on both sides of the narrow inlet, views would tend to be drawn to the north toward Skagway, which would become visible about one-half mile south of the town. At the northern end of Taiya Inlet, the topography would more strongly focus views toward Skagway, and as the highway approaches the town, it would provide panoramic views of the Skagway and White Pass District NHL and Klondike Gold Rush NHP.

4.3.3.5 Consistency with USFS Visual Quality Objectives (VQOs)

As explained in Chapter 3, the TLMP has assigned VQOs for each LUD. The VQO for the Transportation and Utility Systems LUD is Modification with only the foreground of views considered. Alternatives 2 through 2C would be consistent with this VQO. Where ever

possible, the alignment has been located to maintain a buffer between the highway and the shore to reduce the visibility of the highway from Lynn Canal. In many locations, the alternatives would exceed the VQO of Modification. In order to demonstrate the overall visual effect of the alternatives, DOT&PF also evaluated the alternatives' consistency with the VQOs of the adjacent LUDs.

Berners Bay – USFS LUD II land at the north end of Berners Bay has a VQO of Retention. From Echo Cove to south of the Antler River delta, the VQO is Partial Retention. Alternatives 2 through 2C would be visible from many of the views of the coastline from the bay; therefore, the alternatives would not conform to the VQOs of adjacent land in most of the area.

Point St. Mary to Eldred Rock – USFS land is this area has a VQO of Retention. Because of the gentle terrain and homogeneous vegetative cover in this area, Alternatives 2 through 2C would not be visible from most Lynn Canal views; therefore, the alternatives would meet the VQO of the adjacent land.

Eldred Rock to Mount Villard – Most of the USFS land from Eldred Rock to Mount Villard has a VQO of Partial Retention. The Katzehin River delta and the coastline east of Anyaka Island have a VQO of Retention. The area east of Shikosi Island has a VQO of Maximum Modification. From Mount Villard to the Katzehin River delta, Alternatives 2, 2A, and 2C would be consistent with the VQO of adjacent lands because the highway would be largely masked from views from the Lynn Canal by topography and vegetation. The VQO of adjacent land would not be met at the Katzehin River delta because the proposed bridge crossing for Alternatives 2 through 2C would be visible in foreground and middleground views from Lynn Canal. South of the Katzehin River delta, Alternatives 2 through 2C would be visible from many views from Lynn Canal; therefore, they would not be consistent with the VQO of adjacent land except in the vicinity of Shikosi Island.

Mount Villard to Skagway – USFS land in this area has a VQO of Retention. Because the proposed alignment for Alternatives 2, 2A, and 2C would be sited approximately 60 to 80 feet above the water, a highway would be visible along most of the alignment from Skagway to Mount Villard. Therefore, it would not meet the VQO of adjacent land in this area.

4.3.4 Historical and Archeological Resources

Based on record searches and surveys of the study area, Alternatives 2 through 2C would not affect any known prehistoric resources. Consultations with Native Tribes and organizations have not indicated that these alternatives would impact any traditional cultural properties. Historic resources potentially affected by Alternatives 2 through 2C are discussed below.

Alternatives 2, 2B, and 2C would cross the Jualin Mine Tram, a contributing element of the Jualin Historic Mining District as well as the encompassing Berners Bay Historic Mining District, just inshore from Berners Bay (Figure 3-6). At this location, the rails on the tram are visible on the ground between the shore and a rock bluff to the west. The alternatives would bridge over the tram to the top of the rock bluff, leaving the tram intact. These alternatives would impact no other structures or features that contribute to the Jualin Historic Mining District. For these reasons, FHWA has determined that Alternatives 2, 2B, and 2C would not have an adverse effect on the Jualin Historic Mining District.

Alternatives 2 through 2C would cross the Comet/Bear/Kensington Railroad (Figure 3-6), a contributing element of the Comet/Bear/Kensington and Berners Bay Historic Mining Districts, in a forested area where the rail sections are missing but where the cleared right-of-way and evidence of the supporting pilings and trestles can be seen heading easterly toward the

Comet/Bear/Kensington mill site. The alternatives would bridge over the railroad right-of-way, and would cross no other structures or features that contribute to the Historic Mining District. For these reasons, FHWA has determined that Alternatives 2 through 2C would not have an adverse effect on the Comet/Bear/Kensington Historic Mining District.

Alternatives 2 through 2C would pass between two discontinuous units of the Ivanhoe/Horrible Historic Mining District (Figure 3-6). Therefore, FHWA has determined that Alternatives 2 through 2C would have no effect on the Ivanhoe/Horrible Historic Mining District.

Alternatives 2 through 2C would pass through the Berners Bay Historic Mining District. The only contributing elements affected are the Jualin Mine Tram and the Comet/Bear/Kensington Railroad, both of which would be crossed by a bridge. Therefore, FHWA has determined that Alternatives 2 through 2C would not have an adverse effect on the Berners Bay Historic Mining District.

The APE for Alternatives 2, 2A, and 2C includes the Dayebas Creek Mill Site. Due to the fact that this site is eligible because of its potential for historic information and highway construction would not occur at the site itself, these alternatives would not affect the site. Therefore, FHWA has determined that Alternatives 2, 2A, and 2C would have no effect on the Dayebas Creek Mill Site.

Alternatives 2, 2A, and 2C would pass through the Skagway Hydroelectric Complex District, which is eligible for the National Register of Historic Places (NRHP), and cross above the pipelines and tramway west of and below the dam and reservoir. The alternatives would affect the District, but this effect would not be adverse because the proposed highway would bridge over the pipelines and tramway. The bridge design would be based on a form (i.e., steel arch) that would minimize visual contrast to the historic resources. For this reason, FHWA has determined that Alternatives 2, 2A, and 2C would not have an adverse effect on the Skagway Hydroelectric Complex District.

Alternatives 2, 2A, and 2C would cross the Lower Dewey Lake Trail near the northern end of Lower Dewey Lake. The same bridge that crosses the pipeline and tramway of the Skagway Hydroelectric Complex District would go over the trail. Because the highway would span the trail, FHWA has determined that Alternatives 2, 2A, and 2C would not have an adverse effect on the Lower Dewey Lake Trail.

The proposed highway alignment for Alternatives 2, 2A, and 2C would end in the Skagway and White Pass District NHL. Northeast of Lower Dewey Lake, the proposed alignment into Skagway would run diagonally down the intermittently vegetated, irregular rock bluff east of town and cross a bridge over the railroad tracks to connect with the Klondike Highway at 23rd Avenue. The proposed alignment runs east and north of the Skagway unit of the Klondike Gold Rush NHP, but enters the Skagway and White Pass District NHL as it starts down the bluff.

The Skagway and White Pass District boundaries specifically include “sufficient natural area…to provide an understanding of the physical [environment] and cultural landscape that defined the historic corridor through the Skagway River Valley” (Norris, Cole, and Houston, 1999). Based on this language, Skagway’s setting contributes to its historic importance.

Setting refers to the character of the place in which Skagway played its historical role and the town’s relationship to surrounding features and open space. Physical features that constitute the setting of the Klondike Gold Rush NHP and Skagway and White Pass District NHL are both natural and man-made, and include such elements as topography and vegetation. For such historic districts, setting includes not only the relationships between buildings and other features

within the exact boundaries of the property, but also the relationships between the properties and their surroundings (NPS, 1991). Because landscapes change over time as vegetation grows, land use practices change, and structures deteriorate, what is important is the general character and feeling of the historic period[13].

The proposed alignment would not result in the physical loss of any of the Klondike Gold Rush NHP's or Skagway and White Pass District NHL's contributing buildings, structures, or sites. The nearest contributing structures to the alignment are at the corner of Main Street and 22nd Avenue. These structures are the Shearer cabin, a "dilapidated, one story log cabin converted to a garage," and the Ed Hestness House, a two-story framed structure. These buildings are listed as contributing resources 249 and 250 in the Skagway and White Pass District nomination (Norris, Cole, and Houston, 1999). The Gold Rush Cemetery, another contributing element of the Skagway and White Pass District, is located approximately one-half mile northeast of 23rd Avenue just below Reid Falls.

The proposed highway would have a visual effect on the setting of the Klondike Gold Rush NHP and Skagway and White Pass District NHL under the evaluation criteria set forth in the implementing regulations for Section 106 of the National Historic Preservation Act found at 36 CFR 800.4(d)(2). The degree of visual effect on the Skagway and White Pass District NHL depends on many factors, including the sensitivity of the viewer and existing visual elements. Distance is also a large factor, so that the proposed road cut and the bridges would not be major features of the landscape unless the viewer had an open view from at least one-quarter of a mile away. The integrity of the setting has already been compromised by development in the greater Skagway area and by cruise ships that in essence become permanent features on the skyline during peak tourist months. Alternatives 2, 2A, and 2C would be only one of several elements already impacting the setting of the Skagway and White Pass District. For example, the vista toward town from the southern-most bridge over the Skagway River, the first clear view of Skagway along the Klondike Highway, is currently of a modern highway bridge, a new pedestrian bridge, the railroad yard, the airport runway, and modern houses.

The proposed alignment would have visual effects on the Klondike Gold Rush NHP and Skagway and White Pass District NHL. However, these effects would not be adverse in part because the cultural context of the sites has been modified extensively by recent development. Furthermore, the final appearance of the road cut and bridges over Dewey Creek and the railroad tracks would be developed during design with input from the City of Skagway and the NPS to minimize the effect on the historic physical setting and cultural landscape of the community. For these reasons, FHWA has determined that Alternatives 2, 2A, and 2C would not have an adverse effect on the Skagway and White Pass District NHL and the Klondike Gold Rush NHP.

Alternatives 2 through 2C would increase human access in the east Lynn Canal area. Increased access could result in indirect impacts because of disturbance to historic and prehistoric cultural sites from hikers, hunters, and other recreational users.

DOT&PF and FHWA have consulted with the USFS, NPS, and the SHPO regarding potential impacts to historic properties in the APE. Consultation with the NPS regarding potential visual and auditory impacts to the Skagway and White Pass District NHL is ongoing.

[13] During the historic period, the hillside to the east of Skagway where the proposed highway would be constructed was logged for building materials and firewood. The area has since been revegetated.

4.3.5 Socioeconomic Resources

4.3.5.1 Overview

The improved access in the Lynn Canal that would result from Alternatives 2 through 2C would facilitate the movement of goods and people through and to the northern Southeast Alaska region. This would create closer links between the economies of Juneau, Haines, Skagway, and Whitehorse.

In the near-term, improved access to Juneau is not expected to result in new major economic development in Alaska. Instead, improved access to Juneau would redistribute within the state some of the economic benefits received from one of Alaska's primary industries, the visitor industry. Independent visitors (i.e., non-cruise ship visitors) could shift their travel patterns, perhaps spending more time and money in Southeast Alaska, particularly in Juneau.

The redistribution of tourism-related economic benefits might result in net economic gain in one area of the state, offset by economic loss in another. On a regional basis, improved access would result in a net gain to Juneau's local retail industry, and Haines and Skagway could realize some loss in certain types of retail sales such as durable goods.

Population and the overall demographics of Juneau, Haines, and Skagway would not be substantially affected by the improved access resulting from Alternatives 2 through 2C. However, it is possible that improved access would enhance Haines' reputation as a retirement community through better access to Juneau's retail and service sectors, particularly health care services and cultural activities. To the extent that this occurs, Haines population would grow as a result of improved access. Better access to Haines would also increase the number of Juneau residents with second homes or cabins in the Haines area. Of the three major communities in the Lynn Canal corridor, Juneau would experience the most population growth due to improved access, though as mentioned above, that growth would not be large.

The population increase associated with better access to Juneau could be accommodated within the existing housing stock of that community. Property values in Haines might increase because of its growing reputation as a retirement community and/or demand for second homes or cabins by Juneau residents. The increased traffic through Skagway resulting from highway access would increase the value of the commercial property in that town.

Local governments would be affected by improved access in the Lynn Canal corridor in the following ways:

- Increased demand for public safety services in remote areas of the Juneau and Haines Boroughs as well as outlying Skagway areas
- Potential increased demand for some public utilities
- Increased local road maintenance costs
- Increases in sales and bed tax revenues from traveler-related spending
- Increases in property tax revenues

Improved access would affect the health care industry in several ways. Haines and Skagway residents would have better access to Juneau's well-developed health care sector. This improved access would mean less reliance on local and/or Whitehorse health care providers. Provision of emergency medical services is a key function of clinics in Haines and Skagway.

Demand for these kinds of services would increase as non-resident traffic through those communities increased.

Improved highway access to northern Southeast Alaska would have minor or negligible effects on other segments of the region's economy. The cruise ship industry is principally affected by berth facilities at points of origin (e.g., Seattle and Vancouver) and destination (Juneau, Skagway, and Haines), and is projected to grow at an annual average rate of 1 to 2 percent over the next 10 to 20 years. The manufacturing sector in Juneau would benefit from better access to markets in Haines, Skagway, and Whitehorse. Better access to the Alaska/Canada highway system would also improve the economics associated with serving markets in Interior Alaska from the Lower 48 states. The region's wholesale trade sector would benefit from the lower cost of transportation between Juneau, Haines, and Skagway. Currently, wholesalers, primarily in Juneau, compete with Seattle distributors for this regional business.

The following subsections provide a more detailed discussion of the economic and social effects to Juneau, Haines, and Skagway projected for Alternatives 2 through 2C. A portion of the information presented here is based on interviews with industrial representatives and public service providers. See the *Socioeconomic Effects Technical Report* (Appendix H), for references to these interviews as well as further discussion of the socioeconomics analysis.

4.3.5.2 Juneau

Population, Economics, Housing, and Municipal Revenues – The total increase in non-Juneau resident traffic to and from Juneau associated with Alternatives 2 through 2C is estimated to range from 125 annual ADT (Alternatives 2A and 2B) to 185 annual ADT Alternative 2) in 2008[14]. Assuming all traffic is round-trip, two annual ADT equals one additional visiting vehicle carrying an average of 2.3 people[15]. Therefore, Juneau is projected to receive a total of 52,000 (Alternatives 2A and 2B) to 78,000 (Alternative 2) new non-Juneau resident visitors in 2008. From the 2003 Alaska Travelers Survey (see Appendix H) and the 1994 household survey (McDowell, 1994) conducted for this project, in-state visitors to Juneau are estimated to spend $80/visitor/trip and non-Alaskan visitors (e.g., Canadians and people from the Lower 48 states) are estimated to spend $160/visitor/trip. Based on these assumptions, visitor spending in Juneau would increase by $5.7 million to $8.6 million in 2008 as a result of Alternatives 2 through 2C (Table 4-2).

The economic impact of this additional spending would include new employment and payroll sources in Juneau. This increase in visitor spending in Juneau would generate between $3.2 million and $4.7 million in new payroll and between 110 and 160 additional annual average jobs (Table 4-2).

[14] These estimates are less than half of total traffic associated with each alternative because Juneau residents would account for the majority of traffic on a highway. The estimates of new traffic also do not include baseline traffic because that traffic is already affecting the economy.

[15] Based on the Skagway and Haines border crossings average vehicle occupany (USDOT, 2001).

Table 4-2
2008 East Lynn Canal Highway Alternatives
Visitor Spending and Related Impacts in Juneau

Description	East Lynn Canal Alternative			
	2	2A	2B	2C
Highway Traffic (Annual ADT)	510	390	380	410
Vehicle Traffic Less Residents and Baseline Traffic	185	125	125	140
Total New Visitors[1] per year	78,000	52,000	52,000	58,000
Total New Visitor Spending per year	$8,600,000	$5,800,000	$5,700,000	$6,400,000
New Local Payroll per year	$4,700,000	$3,200,000	$3,200,000	$3,500,000
New Local Employment	160	110	110	120

Note: Annual ADT = annual average daily traffic
[1]New visitors would be all visitors who are not Juneau residents.

Traffic on Alternatives 2 through 2C is predicted to increase at an annual rate of approximately 2 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to new highway traffic in 2038 would be approximately 80 percent higher than in 2008 (Table 4-3).

Table 4-3
2038 East Lynn Canal Highway Alternatives
Visitor Spending and Related Impacts in Juneau

Description	East Lynn Canal Alternative			
	2	2A	2B	2C
Highway Traffic (Annual ADT)	930	670	670	730
Vehicle Traffic Less Residents and Baseline Traffic	335	225	225	250
Total New Visitors[1] per year	140,400	93,600	93,600	104,400
Total New Visitor Spending per year	$15,480,000	$10,440,000	$10,440,000	$11,520,000
New Local Payroll per year	$8,460,000	$5,760,000	$5,760,000	$6,300,000
New Local Employment	290	200	200	220

Note: Annual ADT = annual average daily traffic
[1]New visitors would be all visitors who are not Juneau residents.

Generally, each new job in the Juneau economy results in an increase in population of about 1.5 people[16]. Therefore, the 110 to 160 new jobs in Juneau resulting from Alternatives 2 through 2C in 2008 would be expected to result in a population increase of between 170 and 250 residents. By 2038, the population increase would reach between about 300 and 430 residents. A population increase in Juneau of up to 430 residents would represent an overall increase of about 1 percent of Juneau's current population (approximately 31,000).

Assuming 2.6 persons per household, a population increase of 250 residents would result in additional demand for about 100 housing units in 2008, and a population increase of 430 residents in 2038 would result in a demand for about 165 housing units. Juneau had approximately 320 vacant housing units in 2001. Although the housing demand associated with

[16] Based on an estimated participation rate of 65 percent, meaning that 65 percent of the Juneau population participates in the local labor force.

Alternatives 2 through 2C in 2008 and 2038 is less than the existing vacancy rate, some additional housing development would probably occur in anticipation of increased demand.

Alternatives 2 through 2C would increase the value of private property along the highway, though the extent of that increase is difficult to estimate. For example, Goldbelt's property in and north of Echo Cove would increase in value. In addition, a proposed land swap in Berners Bay between the USFS and the Cape Fox Corporation would put additional land in private-sector ownership. Highway access to this property would increase that land's value as well as the property taxes associated with the land.

Sales tax revenues (plus hotel, liquor, and tobacco taxes) for Juneau would increase at a rate proportional to the increase in spending. Total additional visitor spending of between $5.7 and $8.6 million in 2008 would generate (assuming all of the spending is taxable) $290,000 to $430,000 in additional sales tax revenues (based on a five percent tax rate). In 2038, additional visitor spending of between about $10.4 and $15.5 million would generate $520,000 to $775,000 in additional sales tax revenues. Property values along Glacier Highway would increase. CBJ would have an increase in property tax revenues because of this increase in property values. Residents in this area would pay higher property taxes.

Industry/Commercial Sectors – Alternatives 2 through 2C would not impact the cruise ship industry in Juneau. Port-of-call decisions are based on a combination of factors, including the availability of berthing space, appeal to passengers, and the overall capacity and profitability of tour offerings. Also considered are operational issues such as vessel speed, fuel consumption, docking fees, and safety. Alternatives 2 through 2C would not impact any of these factors.

As indicated above, the independent visitor industry in Juneau would benefit from Alternatives 2 through 2C. With completion of a highway, Juneau would become the mainline terminus for the AMHS, resulting in a significant number of independent visitors traveling to Juneau that otherwise might not visit the community. Approximately 60 percent of the non-resident travelers now using the ferry between Juneau and Haines/Skagway are actually spending time in Juneau. Most of the current pass-through visitors (15,000 to 20,000) would be spending some time in Juneau with Alternatives 2 through 2C. Based on the 2003 *Household Survey Report* (Appendix I) conducted for this project, the traffic forecast (see Section 4.3.7) projects that Whitehorse residents would account for 10,000 household trips a year to Juneau, or about 20,000 total visitors. Also, Juneau would capture a somewhat larger share of the Alaska Highway market. The traffic forecast estimates that trips from this market would average 10 annual ADT, which translates into about 4,000 additional independent visitors per year to Juneau. The increase in non-resident traffic to Juneau would be lower for Alternatives 2A and 2B, which include ferry links, than for Alternatives 2 and 2C, which provide uninterrupted highway connection to the Alaska/Canada highway system.

According to AMHS data, approximately 900 RVs visited Juneau in 2002, at least 90 percent of them in the May to September period. The total number of 2002 RV nights (i.e., nights that RVs spend in Juneau) is estimated to be between 3,000 and 4,000. The total number of annual Juneau RV nights expected in the first year of highway access is estimated to be approximately 10,000 to 12,000, 90 percent of which would also occur during the summer season. This increase results because Juneau would become the terminus for AMHS in the Lynn Canal corridor. RV travelers on the ferry who otherwise would have gone directly to Haines or Skagway would disembark in Juneau, and many would spend some time there.

There are several RV parks in Juneau, totaling about 100 RV parking sites. The capacity of these parks is 12,000 RV nights from May 15 to September 15. Although this total capacity is more than the predicted number of RV nights that would result from Alternatives 2 through 2C

by 2008, Juneau would still need additional RV capacity. The current capacity would not be enough to accommodate estimated demand during peak periods, and average summer demand would exceed capacity by 2038.

The process of planning and building an RV park in Juneau would present some challenges to prospective RV park operators. According to city officials, it is difficult to find developable land in Juneau appropriate for RV parks. The land would need to have easy highway access, water and electrical utilities, and accommodating neighbors. Such a location is likely to be desirable to a variety of interests, and in the past RV parks have not been able to promise the revenues that other operations would.

Construction of Alternatives 2 through 2C would result in logging incidental to clearing the highway right-of-way. A highway would improve access to timber stands that at some future date could be made available for harvest. However, the USFS manages most of the Tongass National Forest (over 90 percent of the highway alignment) within the study area primarily as a natural setting. An area of approximately 12 miles along the eastern shore of the canal between Point Sherman and a point east of Sullivan Island is designated for moderate development. Although timber harvest is an approved use of this LUD in the TLMP, the USFS has no plans for logging over the next five to 10 years.

Development of Alternatives 2 through 2C could affect operation of the Kensington Gold Project. The decision to develop the mine and its productive life is not contingent on a highway. In fact, the mine would likely be fully operational before Alternatives 2 through 2C could be constructed. Couer plans to ship supplies into the mine and product out by barge to and from Seattle. Shipping would be from Slate Cove, the nearest place for a deep-water port. This method of moving supplies and product would continue even if Alternatives 2 through 2C were implemented because it would be more cost-effective to ship directly to and from the mine rather than bear the expense of shipping to or from Juneau or Skagway first and rehandling the materials. A highway on Alternatives 2 through 2C could reduce the cost of transporting workers to the site. It could also help to ensure prompt medical responses to injuries of mine personnel.

Juneau's seafood processing industry would benefit from Alternatives 2 through 2C as a result of lower-cost access to fresh fish markets such as Seattle. In the fresh fish market, shipping cost and logistics are critical. From the perspective of seafood processors, barge transport has the advantage of being relatively low cost ($0.05/pound), but has the disadvantage of being slow. Alternatively, air shipment of fresh fish can have product in Seattle in a few hours, though at a cost of between $0.33 and $0.46 per pound. Highway transport offers a third option with faster delivery times than a barge to Seattle or locations in other Lower 48 states at lower cost than air freight ($0.15/pound).

Juneau processors indicate that a highway would result in more fresh fish moving out of Juneau. Overland shipping of fresh seafood has proven economical in other regions of the state. A McDowell Group study conducted for the World Trade Center in 2001 found that of the 42 million pounds of fresh seafood shipped out of Southcentral Alaska, half was trucked south via the Alaska Highway. Alternatives 2 and 2C would have the greatest effect on this industry with no ferry links to restrict travel times.

Water transportation is the primary method of moving freight to and from Juneau, with Seattle being the primary port of origin and destination. This barge service is provided by Alaska Marine Lines (AML) and Northland Services. Although improved access would provide some short-term transportation benefit, transportation by barge would likely remain the mode by which most freight is shipped to Juneau. The economies of scale possible with barge service, and the

relatively frequent service offered into Juneau (three barges/week) places the economics on the side of barge transportation.

Utilities and Public Services – Alternatives 2 through 2C are not expected to impact Juneau utilities. All of the utilities are adequate to accommodate any population increases attributable to the improved access afforded by Alternatives 2 through 2C through 2038.

Much of the information provided below on the effects of Alternatives 2 through 2C is based on interviews with public service providers. References to these interviews are provided in the *Socioeconomic Effects Technical Report* (Appendix H).

School enrollment is a function of population. Because population impacts are expected to be minimal, the same would be true of impacts on enrollment. The maximum impact on Juneau's population from Alternatives 2 through 2C would be an increase of less than one percent by 2038. This increase would mean an additional 20 to 30 students spread across all grades.

Health and social services demand is mainly a function of population, and would therefore not be expected to change substantially under Alternatives 2 through 2C. Additional independent visitors to Juneau, particularly older retirees, would place some new demands on emergency room and other medical and dental services in Juneau. Demand for health care services resulting from additional highway accidents would be negligible when compared with existing demand.

Traffic increases resulting from improved access would not affect fire and emergency medical services within the current service area. According to local officials, a new highway might warrant consideration of another station further north and/or redeployment of a light-duty/fast-response vehicle to the existing Lynn Canal station at Lena Cove.

Improved access would have a modest impact on the ability of police services to handle the increase in local traffic congestion and to respond to occasional emergency calls on the new highway within the City and Borough of Juneau. Local officials do not anticipate that additional staff would be required to patrol the area.

In response to concerns voiced in the 2003 public scoping meetings for this Supplemental Draft EIS, the Juneau Police Department has discussed whether connecting Juneau to the outside highway system would result in new types of crime or more serious crime. Currently, only five percent of arrests in the City and Borough of Juneau involve non-residents and less than two percent involve people from outside Alaska. Juneau also has very low rates for many of the crimes associated with more "connected" communities, such as gang activity and car theft. It has relatively higher incidences of crime that may be associated with isolation (e.g., domestic and alcohol-related crimes). One possibility raised in public scoping is that ending either a highway or mainline ferry service in Juneau would precipitate an "end-of-the-road" effect, bringing to town more transients who are unable to support themselves and individuals with mental and behavioral problems. However, the U.S. and Canadian customs stations on the Haines and Klondike highways act as a significant filter in this regard, and Haines and Skagway do not have this problem.

The Juneau Police Department believes that there is not enough evidence or precedents to suggest that simply improving access would affect the nature and rates of local crime. Much more of a factor than access is Juneau's distance from other population centers, particularly large cities. The Juneau Police Department believes a highway connection might be associated with some increase in teen runaways and perhaps some additional auto theft and credit card

incidents. There could be an increase in importation of illegal drugs; however, local officials indicate it is already relatively easy to move these substances in and out of Juneau.

Quality of Life – The household surveys conducted in 1994 and 2003 indicated that more than three-quarters of Juneau residents agree that improved access to their community is important. There is less agreement on whether quality of life is best served by highway access. Many proponents of a highway acknowledge that better ferry service would improve quality of life, but not by enough. Many proponents of ferry service believe that better access is important, but only ferry access would result in an overall improvement in the quality of life. In October 2000, Juneau voters were split on an advisory ballot question regarding preference for a long-range plan for surface access north from Juneau, with 5,840 choosing enhanced ferry service and 5,761 choosing a road.

The reasons for these differing views are complex and interwoven with how individuals view Juneau's lack of highway access. Research and public comment over the past two decades have shown that some residents cherish this condition while others deplore it. Further, improved transportation is generally associated with growth opportunities, and growth typically affects the quality of life. Finally, as noted in the *Socioeconomic Effects Technical Report* for the 1997 Draft EIS, the isolation associated with lack of highway access induces a sense of psychological comfort in some residents and a feeling of frustration and claustrophobia in others.

4.3.5.3 Haines

Population, Economics, Housing, and Municipal Revenues – The total increase in non-Haines resident traffic to Haines associated with Alternatives 2 through 2C is estimated to range from 30 annual ADT (Alternative 2C) to 115 AADT (Alternative 2) in 2008. Growth in Juneau resident travel accounts for the majority of this traffic increase, as the Juneau Household Survey conducted for this project measured a strong interest among Juneau residents in more travel to Haines.

This annual ADT is projected to result in an increase in non-Haines resident visitors of between 12,000 (Alternative 2C) and 48,000 (Alternative 2) in 2008. Assuming that visitors would spend an average of $50 to $60 per trip in Haines (Southeast Strategies, 2000 and McDowell, 2002), visitor spending in the community would increase by $700,000 to $2.8 million in 2008 as a result of Alternatives 2 through 2C.

In terms of economic impact, increased spending in Juneau by Haines residents would offset some of the new visitor spending in Haines. Approximately 10 percent of new spending that would occur in Juneau with Alternatives 2 through 2C would be by Haines residents, and this spending would range between $600,000 and $900,000 in 2008. Based on these estimates, total visitor spending in Haines would result in an increase of approximately $100,000 (Alternative 2C) to $1.9 million (Alternative 2) in 2008 (Table 4-4). A net increase in visitor spending in Haines of $1.9 million would generate $800,000 in new payroll and an annual average of 40 additional jobs.

Traffic on Alternatives 2 through 2C is predicted to increase at an annual rate of approximately two percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to new highway traffic in 2038 would be approximately 80 percent higher than in 2008 (Table 4-5).

Table 4-4
2008 East Lynn Canal Highway Alternatives
Visitor Spending and Related Impacts in Haines

Description	East Lynn Canal Highway Alternative			
	2	2A	2B	2C
Highway Traffic (Annual ADT)	225	170	190	120
Vehicle Traffic Less Residents and Baseline Traffic	115	80	100	30
Total New Visitors[1] per Year	48,000	33,000	42,000	12,000
Total New Visitor Spending per Year	$2,800,000	$1,900,000	$2,500,000	$700,000
Less New Haines Resident Spending in Juneau	$900,000	$600,000	$700,000	$600,000
Net Annual Change In Spending In Haines	$1,900,000	$1,300,000	$1,800,000	$100,000
New Local Payroll per Year	$800,000	$500,000	$700,000	-
New Local Employment	40	25	35	-

Note: Annual ADT = annual average daily traffic
[1]New visitors would be all visitors who are not residents of Haines.

Table 4-5
2038 East Lynn Canal Highway Alternatives
Visitor Spending and Related Impacts in Haines

Description	East Lynn Canal Highway Alternative			
	2	2A	2B	2C
Highway Traffic (Annual ADT)	405	305	340	215
Vehicle Traffic Less Residents and Baseline Traffic	207	144	180	54
Total New Visitors[1] per Year	86,400	59,400	75,600	21,600
Total New Visitor Spending per Year	$5,040,000	$3,420,000	$4,500,000	$1,260,000
Less New Haines Resident Spending in Juneau	$1,620,000	$1,080,000	$1,260,000	$1,080,000
Net Annual Change In Spending In Haines	$3,420,000	$2,340,000	$3,240,000	$180,000
New Local Payroll per Year	$1,440,000	$900,000	$1,260,000	-
New Local Employment	70	45	65	-

Note: Annual ADT = annual average daily traffic
[1]New visitors would be all visitors who are not residents of Haines.

Each new job in the Haines economy would result in a population increase of about 1.5 people[17]. Therefore, for the maximum of 40 new jobs in Haines in 2008, the population would increase by about 60 residents or about three percent of the existing Haines population (2,360). In 2038, the population would increase by a maximum of about 100 residents, which represents about four percent of the existing Haines population. As indicated in Tables 4-4 and 4-5, Alternative 2C is projected to have no population effect on Haines, and Alternatives 2A and 2B would have population effects somewhat lower than Alternative 2.

A population increase of 60 residents would result in additional demand for about 25 housing units in 2008, assuming 2.4 persons per household. In 2038, housing demand would reach a maximum of about 40 units. Improved access would enhance Haines' reputation as a retirement community through better access to Juneau's retail and service sectors. To the extent that this occurs, demand for property in Haines would increase. Further, because of land availability in Haines and its drier climate when compared to Juneau, additional Juneau

[17] Based on an estimated participation rate of 65 percent, meaning that 65 percent of the Haines population participates in the local labor force.

residents may seek seasonal or year-round homes in Haines with Alternatives 2 through 2C. Finally, improved access to the Kensington Gold Project could result in demand among mine workers for Haines area housing. This impact could range from a few to several dozen housing units, depending on how ferry schedules mesh with mine shift schedules, ferry rates, availability of company-provided transportation, and other factors. The housing demand that would be stimulated by Alternatives 2 through 2C may increase housing development in Haines and increase local property values as well as property taxes.

Sales tax revenues would increase at a rate proportional to the increase in spending in Haines. Total additional visitor spending in Haines of between $100,000 (Alternative 2C) and $1.9 million (Alternative 2) in 2008 would generate $5,500 to $100,000 in additional sales tax revenues (based on a 5.5 percent tax rate). In 2038, additional sales tax revenues would range from about $10,000 (Alternative 2C) to $188,000 (Alternative 2). Haines would also receive an increase in property tax revenues as a result of the potential increase in private property values mentioned above.

Industry/Commercial Sectors – Haines is having difficulty maintaining a position in the independent and cruise visitor markets. Independent visitor travel to Haines has been declining, direct cruise traffic has been erratic, and the local visitor industry has a growing dependence on Skagway cruise passengers taking excursions to the Haines area. Alternatives 2 through 2C would affect Haines' non-Alaskan independent market but would not affect the cruise market.

As indicated above, visitor traffic to Haines is expected to increase with Alternatives 2 through 2C. The economic impact of this change in traffic depends primarily on visitors' length of stay. The key factor regarding length of stay now and after construction of Alternatives 2 through 2C would be the degree to which Haines develops and promotes local assets and attractions.

Alternatives 2 through 2C would provide better opportunities for Haines residents to find employment with the Kensington Gold Project or for employees of the mine to relocate to Haines. The mine is within the City and Borough of Juneau but about equidistant between Haines and Juneau. A variety of factors could persuade employees to live in Haines, including housing affordability, smaller schools, and access to fish and game resources.

Haines is an important transshipment point, linking Inside Passage barge and ferry traffic to the Yukon and Interior Alaska. Waterborne freight arrives in Haines on a weekly basis through AML barge service. AMHS ferries also provide freight service to Haines.

The critical issue for local commercial truck drivers is AML's plans for serving Haines should a highway be constructed. AML currently has three to four full-time truckers living in Haines and they often add one to two additional staff in the summer. Representatives of AML have stated that they would not alter their barge service to Haines should a highway be constructed. The cost of off-loading vans in Juneau and trucking to Haines would not be competitive with continued barge service to Haines.

Utilities and Public Services – Much of the information provided below on the effects of Alternatives 2 through 2C is based on interviews with public service providers. References to these interviews are provided in the *Socioeconomic Effects Technical Report* (Appendix H).

School enrollment is a function of population. Because population impacts are expected to be minimal, the same would be true of impacts on enrollment. The maximum increase in students resulting from Alternatives 2 through 2C would be about 10 in 2038 spread across all grades.

Solid waste, hazardous waste, and electric utilities would not be affected in the Haines Borough by the development of Alternatives 2 through 2C based on the potential population growth

associated with these alternatives through 2038. Haines' water supply and wastewater treatment system is adequate to accommodate 10 percent population growth. Alternatives 2, 2A, and 2B would generate a maximum of about four percent population growth by 2038. This growth would not be sufficient to require expansion of these public utilities.

Improved access would make it somewhat easier and faster to transport patients either on an emergency or a scheduled basis to Juneau from Haines. However, air transport for medical emergencies would remain the method of choice. The medical clinic in Haines is operated by Southeast Alaska Regional Health Consortium (SEARHC). SEARHC is a regional organization with substantial facilities in Juneau. Improved access between Juneau and Haines would reduce cost and increase the efficiency of SEARHC operations by facilitating movement of staff, supplies, and samples between SEARHC locations.

Increased traffic through and to Haines would place additional demands on the community's fire and emergency response services. If fire and emergency response personnel respond to incidents outside current service areas, which includes the portion of the Haines Borough on the east side of Lynn Canal, it would reduce capacity to deliver normal services while those personnel and equipment are occupied.

The Haines Police Department does not expect substantial impacts from improved access. Most crime in Haines involves local residents in spite of its highway connection to the north.

Quality of Life – Haines' quality of life would change in a number of ways as a result of Alternatives 2 through 2C. The household surveys indicate that 87 percent of Haines residents agreed that improved access to their community is important. In the 1994 household survey, Haines residents cited increased recreation opportunities, economic growth, and better access to health care and job markets as potential improvements to quality of life that could result from a highway. The principal negative impact on quality of life cited by Haines residents was social change such as increased crime and the appearance of undesirable transients, increased traffic, and declining local businesses. As indicated above and in Section 4.3.7, traffic would increase in Haines with Alternatives 2 through 2C. It is also projected that residents of Haines would increase their spending in Juneau. For Alternatives 2 through 2C, increased spending in Juneau may be off-set by increased visitor spending, though a shift in consumer type may have an impact on the types of retail businesses in Haines. There is no evidence that crime would increase in Haines because of Alternatives 2 through 2C because most crime in Haines involves local residents in spite of the community's highway connection to the north.

4.3.5.4 Skagway

Population, Economics, Housing, and Municipal Revenues – Based on the 1994 household survey (McDowell, 1994) conducted for this project, Skagway households spent a total of about $900,000 that year in Juneau. If the 1994 spending data were adjusted for inflation, annual Skagway household spending in Juneau would total about $1.2 million in 2004.

In the 1994 survey, with improved access to Juneau, Skagway households indicated that they would spend more money in Juneau than they did at the time of the survey. In fact, 72 percent of Skagway households indicated that their spending in Juneau would increase with improved access.

Despite this leakage from the Skagway economy, Alternatives 2 through 2C are expected to economically benefit the community. The total increase in non-Skagway resident traffic to Skagway associated with Alternatives 2 through 2C is estimated to range from 100 annual ADT (Alternative 2B) to 320 annual ADT (Alternative 2C) in 2008. Growth in Juneau resident travel

accounts for the majority of this traffic increase, as the Juneau Household Survey conducted for this project measured a strong interest among Juneau residents for more travel to Skagway.

This increase in annual ADT is projected to result in an increase in new independent visitors to Skagway of between 43,000 (Alternative 2B) and 134,000 (Alternative 2C) in 2008. Independent visitors would spend an average of $50 per trip in Skagway (Southeast Strategies, 2000). This expenditure would result in an annual increase in visitor spending of $2.1 million (Alternative 2B) to $5.0 million (Alternative 2C) in 2008 (Table 4-6). This net increase in visitor spending in Skagway would generate from $900,000 (Alternative 2B) to $2 million (Alternative 2C) in new payroll and an annual average increase in jobs of 30 (Alternative 2B) to 70 (Alternative 2C) (Table 4-6).

Table 4-6
2008 East Lynn Canal Highway Alternatives
Visitor Spending and Related Impacts in Skagway

Description	East Lynn Canal Alternative			
	2	2A	2B	2C
Highway Traffic (Annual ADT)	285	220	190	410
Vehicle Traffic Less Residents and Baseline Traffic	180	125	100	320
Total New Visitors[1] per year	75,000	53,000	43,000	134,000
Total New Visitor Spending per year	$3,700,000	$2,600,000	$2,100,000	$5,000,000
New Local Payroll per year	$1,500,000	$1,100,000	$900,000	$2,000,000
New Local Employment	50	40	30	70

Note: Annual ADT = annual average daily traffic
[1]New visitors are all visitors who are not Skagway residents.

Traffic on Alternatives 2 through 2C is predicted to increase at an annual rate of approximately two percent for the 30-year forecast period considered. At that rate of growth, annual spending, employment, and payroll related to new highway traffic in 2038 would be approximately 80 percent higher than in 2008 (Table 4-7).

Table 4-7
2038 East Lynn Canal Highway Alternatives
Visitor Spending and Related Impacts in Skagway

Description	East Lynn Canal Alternative			
	2	2A	2B	2C
Highway Traffic (Annual ADT)	515	395	340	740
Vehicle Traffic Less Residents and Baseline Traffic	325	225	180	575
Total New Visitors[1] per year	134,000	95,000	78,000	241,000
Total New Visitor Spending per year	$6,660,000	$4,680,000	$3,780,000	$9,000,000
New Local Payroll per year	$2,700,000	$1,980,000	$1,620,000	$3,600,000
New Local Employment	60	70	55	125

Note: Annual ADT = annual average daily traffic
[1]New visitors are all visitors who are not Skagway residents.

Because of the nature of much of the Skagway population, each new job in the economy results in a population increase of about 1.3 people[18]. Therefore, the population of Skagway would increase by 40 to 90 new residents in 2008 and by about 70 to 160 new residents in 2038. This would represent an increase of five to 11 percent over the year-round population of the community (840) and approximately two to five percent over the summer population in 2008, and about double that in 2038.

A population increase of 90 residents would result in additional demand for about 40 housing units in 2008. The demand for housing would increase to a maximum of about 70 units in 2038. This increase in housing demand would be in excess of available housing in Skagway. It is likely that the private sector would respond by constructing additional single-family and multi-family housing. This increase in housing demand would have a strong seasonal component and would result in an increase in local property values with a corresponding increase in property tax.

Skagway would experience an increase in sales and bed tax revenues in conjunction with increased visitor spending. The estimated initial increase in visitor spending would generate from $80,000 to $200,000 in additional sales tax revenues in 2008. In 2038, sales tax revenues would increase by about $140,000 to $360,000.

Industry/Commercial Sectors – Construction of a highway between Juneau and Skagway would not alter cruise lines' decisions on port calls in either community. During public scoping for the Supplemental Draft EIS, concern was expressed about the possible loss of cruise ship traffic to Skagway if a highway were constructed to Juneau. The concern is that in an effort to reduce fuel costs and travel times, cruise lines would bus passengers to Skagway rather than actually make a port call.

Port-of-call decisions are based on a combination of factors, including the availability of berthing space, appeal to passengers, and the overall capacity and profitability of tour offerings. Also considered are operational issues such as vessel speed, fuel consumption, docking fees, and safety.

Members of the NorthWest Cruiseship Association (NWCA) recently discussed the proposed highway alternatives during the NWCA Operations and Technical Committee meeting as well as the Government Affairs and Community Relations Committee meeting. As a follow-up to their discussions, NWCA sent a letter to the Governor of Alaska stating that construction of a highway would have no effect on members' itineraries. The NWCA consists of Carnival Cruise Line, Celebrity Cruises, Crystal Cruises, Holland America, Norwegian Cruise Line, Princess Cruises, Royal Caribbean International, Seabourne Cruise Line, World Explorer Cruises, and Radisson Seven Seas Cruises. NWCA estimates their member lines carry 97 percent of Alaska cruise passengers.

Regional managers for Princess Tours and Gray Line, the primary ground transportation providers for all large ships have stated that terminating voyages in Juneau and busing cruise ship passengers to Skagway is not feasible due to limitations regarding tour capacity, pricing, and timing. A round-trip bus excursion would require a minimum of six to seven hours, leaving little time for passengers to experience the sites and activities in Skagway or the popular rail excursion. Although a flight and bus tour combination might reduce the overall transportation time, this option is not practical due to the high cost of the flight, capacity limitations, and potential for weather cancellations.

[18]Based on an estimated participation rate of 77 percent, meaning that 77 percent of the Skagway population participates in the local labor force.

The other concern expressed during public scoping is the aesthetic impact a highway visible from the water would have on the quality of the cruise experience in Lynn Canal. According to cruise operators, it is likely that Alternatives 2 through 2C would have little or no effect on current cruise itineraries. Cruise ships generally sail at night and visit a port during the day; therefore, the aesthetic impact of the highway is not an issue for the cruise industry.

Skagway is also an important transshipment point linking Inside Passage barge and ferry traffic to the Yukon and Interior Alaska. In 2001, 84,000 tons of freight moved through the Skagway port, primarily (85 percent) petroleum products (USACE, 2003). Freight is also transported by AMHS.

Skagway would see reduced costs for freight shipped from Juneau. In 2002, of the 210 vans transported on the AMHS to Skagway, 139 originated in Juneau. The cost of transporting these vans over Alternatives 2 through 2C would be lower than the cost of ferry transport.

With the exception of freight currently moved from Juneau to Skagway on the ferry, Skagway is not expected to see any change in waterborne freight service with Alternatives 2 through 2C, particularly for those alternatives that include a ferry link. The cost of off-loading vans or fuel in Juneau and then trucking to Skagway or the Yukon is more than the cost associated with barge transportation.

Public Utilities and Services – Much of the information provided below on the effects of Alternatives 2 through 2C are based on interviews with industrial representatives and public service providers. References to these interviews are provided in the *Socioeconomic Effects Technical Report* (Appendix H).

School enrollment is a function of population. Because population impacts are expected to be minimal, the same would be true of impacts on enrollment. The maximum increase in students resulting from Alternatives 2 through 2C would be about 16 in 2038 spread across all grades.

Alternatives 2 through 2C would increase demand for water supply and solid waste disposal in Skagway. Current water supply capacity for the community is adequate for the next two to three years, but probably not much longer at current rates of growth. Skagway's solid waste incinerator is adequate for non-peak demand but use is maximized during the summer peak. Anticipated growth in cruise ship traffic will place additional demands on the system. It is likely that Skagway will address peak solid waste demand capacity issues before Alternatives 2 through 2C are constructed.

The medical clinic in Skagway is operated by SEARHC. Improved access between Juneau and Skagway would reduce cost and increase the efficiency of SEARHC operations by facilitating movement of staff and supplies between SEARHC locations.

The emergency response demands resulting from additional highway traffic and a new roadway south of Skagway would impact the Skagway fire department. The department's small size and reliance on volunteers would make responding to multiple emergencies difficult. Continued growth in demands on the department would mean a need for more paid staff.

Skagway police would not experience substantial increase in activity as a result of Alternatives 2 through 2C. The department adds two seasonal officers to address the influx of summer population and visitors and believes that this action is enough to handle the additional demand that would be generated by Alternatives 2 through 2C.

Police incidents in Skagway tend to involve residents, seasonal workers, cruise visitors, and Canadian visitors. The proportion of non-resident arrests is relatively high, perhaps 75 percent

by department estimates. Police activity occasionally correlates with the celebration of Canadian holidays, when visitors drive down the Klondike Highway to Skagway.

Quality of Life – In 1994, Skagway residents indicated that increased tourism, economic growth, and enhanced recreational opportunities would be the principal benefits of improved access in Lynn Canal. Negative impacts on quality of life from improved access cited by Skagway residents included increased crime, the presence of undesirable transients, and loss of spending in local businesses. In the 2003 Household Survey, most Skagway residents said that improved access to Juneau is important (24 percent) or very important (59 percent). Many residents said the best way to provide surface access is by ferry (53 percent), while 41 percent chose a highway. Much of the concern Skagway residents appear to have with a highway is the potential loss in cruise ship visitors and the resulting economic loss for the community. As discussed above under "Industry/Commercial Sectors," the cruise ship industry has indicated that the presence of a highway between Juneau and Skagway would not change its plans for calling on Skagway. As indicated in Section 4.3.7, traffic would increase in Skagway with Alternatives 2 through 2C. It is also projected that residents of Skagway would increase their spending in Juneau. For Alternatives 2 through 2C, this increased spending may be off-set by increased visitor spending, though the shift in consumer type may have an impact on the types of retail businesses in Skagway. With regard to undesirable transients and increased crime, an East Lynn Canal Highway would primarily provide for an increase in Juneau travelers. The Skagway Police Department does not anticipate that these visitors would be a major source of crime.

For more information on the economic and social effects of Alternatives 2 through 2C on Juneau, Haines, and Skagway, see the *Socioeconomic Effects Technical Report* (Appendix H).

4.3.6 Subsistence

Haines and Skagway residents use the Katzehin River area for subsistence harvest of marine invertebrates and marine mammals. Alternatives 2 through 2C, combined with USFS plans for potential public access locations along the highway, would increase access to areas for subsistence harvest activities that previously were accessible only by boat or aircraft. This access could increase competition for subsistence resources from recreational hunting and fishing. These changes to subsistence opportunities would be viewed as beneficial for some subsistence harvesters, but for others the increased competition for resources would be negative.

Juneau is not recognized as a subsistence community under the Alaska National Interest Lands Conservation Act. However, some residents of Juneau use Berners Bay and Lynn Canal for personal use harvests of fish and shellfish.

4.3.7 Transportation

The 2004 Southeast Alaska Transportation Plan calls for construction of a highway from Juneau to Skagway with a shuttle from Katzehin to Haines. Alternative 2 is consistent with this plan. Alternatives 2A, 2B, and 2C contain elements of the plan regarding Lynn Canal but are not completely consistent.

4.3.7.1 Capacity and Demand

Traffic demand for Alternatives 2 through 2C was projected for 2008 and 2038 using the transportation model summarized in Section 4.1.5. These projections were based on 2002 traffic in Lynn Canal, the unmet travel demand in the region, projected growth in the region,

costs of travel, travel distance and speed, value of time, accident costs, and frequency of delay. The travel demand expressed as ADT is a combination of the demand between Juneau and Haines and Juneau and Skagway. It is also, therefore, an estimate of the through traffic on the highway segments common to both destinations.

Projected traffic demand in 2008 for the No Action Alternative and Alternatives 2 through 2C is provided in Table 4-8. A comparison between the No Action Alternative and Alternatives 2 through 2C indicates that these build alternatives would generate and accommodate substantially more travel demand in the Lynn Canal corridor than the No Action Alternative. From four to almost six times as much traffic would travel under Alternatives 2 through 2C than on the AMHS system under the No Action Alternative in 2008.

Table 4-8
2008 Forecast Demand and Capacity to Haines and Skagway for the No Action Alternative and Alternatives 2 Through 2C

Alternative	2008 Annual ADT	2008 Summer ADT	2008 Winter ADT	2008 Peak Week ADT	Summer Capacity (vehicles per day)
1 – No Action	90	170	40	330	96/71[1]
2	510	910	240	1,800	612/30,000[2]
2A	390	680	180	1,350	544/776[2]
2B	380	680	180	1,340	544/636[2]
2C	410	730	190	1,450	408/30,000[3]

Notes: [1]The first number is vehicle capacity between Juneau and Haines and the second number is vehicle capacity between Juneau and Skagway.
[2]The first number is vehicle capacity between Katzehin and Haines and the second number is vehicle capacity between Juneau and Skagway.
[3]The first number is vehicle capacity between Haines and Skagway and the second number is vehicle capacity between Juneau and Skagway.

As shown in Table 4-8, traffic demand is projected to vary among Alternatives 2 through 2C. This variation is a function of unit travel cost and travel time. Alternative 2 with a highway from Echo Cove to Skagway and a short ferry link to Haines would have the lowest unit travel cost and the shortest travel time of any of the alternatives and therefore would generate the greatest travel demand. As travel times and costs increase with ferry links, projected travel demand decreases.

As traffic demand grows with time, the ability of Alternatives 2 through 2C to accommodate that demand relative to the No Action Alternative would become more pronounced. Table 4-9 provides projections of traffic demand and capacity in 2038 for the No Action Alternative and Alternatives 2 through 2C. These projections assume an increase in travel demand of 1.9 to two percent annually. As indicated in Table 4-9, five to seven times as much traffic would travel on Alternatives 2 through 2C than on the AMHS system under the No Action Alternative in 2038.

By providing a highway on the east side of Lynn Canal, Alternatives 2 through 2C would have the indirect effect of increasing travel demand between Haines and Skagway. Under the No Action Alternative, the summer ADT between Haines and Skagway is projected to be 67 vehicles in 2008 and 98 vehicles in 2038. With Alternatives 2 through 2C, travel demand between Haines and Skagway is projected to increase to 89 ADT in 2008 and 138 ADT in 2038.

Table 4-9
2038 Forecast Demand and Capacity to Haines and Skagway for the No Action Alternative and Alternatives 2 Through 2C

Alternative	Annual ADT	Summer ADT	Winter ADT	Peak Week ADT	Summer Capacity (vehicles per day)
1—No Action	130	230	60	460	96/71[1]
2	930	1,640	430	3,250	912/30,000[2]
2A	670	1,190	310	2,360	720/600[2]
2B	670	1,190	310	2,350	640/636[2]
2C	730	1,290	340	2,560	576/30,000[3]

Note: [1]The first number is vehicle capacity between Juneau and Haines and the second number is vehicle capacity between Juneau and Skagway.
[2]The first number is vehicle capacity between Katzehin and Haines and the second number is vehicle capacity between Juneau and Skagway.
[3]The first number is vehicle capacity between Haines and Skagway and the second number is vehicle capacity between Juneau and Skagway.

The summer ADT between Juneau and Haines with Alternatives 2 through 2C is projected to range from 220 (Alternative 2C) to 399 (Alternative 2) vehicles in 2008 and 388 (Alternative 2C) to 723 (Alternative 2) vehicles in 2038. The summer ADT between Juneau and Skagway is projected to range from 339 (Alternative 2B) to 733 (Alternative 2C) vehicles in 2008 and 594 (Alternative 2B) to 1,294 vehicles (Alternative 2C) in 2038. The number of ferry trips and ferry capacity between Haines and Katzehin (Alternatives 2 through 2B) or Skagway (Alternative 2C) has been sized to accommodate the combined projected summer ADT including the demand for travel just between Haines and Skagway.

4.3.7.2 Travel Flexibility and Opportunity

Alternative 2 would provide the greatest increase in flexibility and opportunity for travel relative to the No Action Alternative. In summer, travelers to Skagway could use the highway at any time without regard for ferry schedules or reservations. In winter, the road would be closed at times because of weather conditions or avalanches. As indicated in Table 4-16, Alternatives 2 through 2C would be closed an average of 16.5 times per year with a total projected closure time of about 34 days per year. The shuttle ferry(s) associated with Alternatives 2 through 2C could carry northbound and southbound traffic between Haines, Skagway, and Juneau when the highway is closed. Generally, a shuttle ferry would only be used for this purpose if the road were closed for two or more consecutive days. *The M/V Aurora* would provide passage for 34 vehicles per day in each direction for Alternatives 2, 2B, and 2C and 68 vehicles per day for Alternative 2A using the Sawmill Cove terminal. Other AMHS ferries could be used to supplement the *M/V Aurora* if necessary. See Section 4.3.8.2 for more detail.

Under Alternative 2, travelers to Haines would take a ferry from Katzehin to Haines. It is projected that there would be nine ferry trips per day to Haines in the summer and six per day during the winter. This would be a substantial increase in travel flexibility and opportunity compared to the No Action Alternative.

Alternative 2C would provide the same flexibility and opportunity for travel between Juneau and Skagway as Alternative 2. However, because of the longer ferry travel time from Skagway versus Katzehin, there would be fewer trip opportunities between Juneau and Haines. Under Alternative 2C, there would be six ferry trips per day to Haines in the summer and four per day

during the winter. Nevertheless, this is still a fivefold increase in travel flexibility and opportunity compared to the No Action Alternative.

Alternatives 2 and 2C would also provide a direct surface transportation link to Whitehorse. This would provide Juneau residents the option of using air service to and from Whitehorse as an alternative to Juneau air service.

Travel flexibility under Alternatives 2A and 2B would be less than for Alternatives 2 and 2C because they would involve a ferry link for all travel between Juneau, Skagway, and Haines. Under Alternative 2A, travel flexibility and opportunity to Skagway would be limited by the Berners Bay shuttles and travel to Haines would require two ferry links (across Berners Bay and from Katzehin to Haines). Two shuttle ferries would operate in Berners Bay in the summer and one in the winter, with 20 round-trips per day between Sawmill and Slate Coves in the summer and 8 round-trips per day in the winter. Alternative 2A would provide eight round-trips per day from Katzehin to Haines. This alternative would still represent a substantial increase in travel flexibility and opportunity compared to the No Action Alternative.

Under Alternative 2B, travel from Juneau to Skagway and Haines would be linked to shuttle ferries from Katzehin. In the summer, there would be eight round-trips per day to Haines and six round-trips per day to Skagway. In winter, service would decrease to six round-trips per day to Haines and four round-trips per day to Skagway. This alternative also represents a substantial increase in travel flexibility and opportunity relative to the No Action Alternative.

An indirect impact of the forecast demand for Alternatives 2 through 2C would be increased opportunities for travelers to take trips between Haines and Skagway. Under the No Action Alternative, the shuttle would operate up to three times per day in the summer. Shuttle ferries between Haines and Katzehin in the summer would operate nine times per day under Alternative 2 and eight times per day under Alternatives 2A and 2B. For Alternative 2C, a Haines/Skagway shuttle would operate six times per day during the summer.

4.3.7.3 Travel Time

Table 4-10 provides a comparison of travel times between the No Action Alternative and Alternatives 2 through 2C. Travel between Juneau and Skagway under Alternatives 2 and 2C would take approximately 2.1 hours, assuming an average travel speed of 45 mph.

As travelers are required to take ferries to reach their destinations, the length of their travel time increases. Alternatives 2 and 2B have the shortest travel time to Haines of the build alternatives on the east side of Lynn Canal (2.5 hours) because of the short shuttle ferry link between Haines and Katzehin. Travel to Haines under Alternative 2C would take 3.4 hours, virtually the same amount of time as the FVF trip under the No Action Alternative, because of the longer shuttle ferry ride from Skagway to Haines in a conventional monohull vessel.

Travel time between Juneau and Skagway with Alternative 2A would be lengthened to 2.6 hours because of the necessary shuttle ferry ride across Berners Bay. Travel between Juneau and Haines under Alternative 2A would take at least 3.0 hours because of the shuttle ferry to Haines from Katzehin as well as the ferry link across Berners Bay. All travel times involving ferries include load and unload time but no additional wait time. For alternatives with two ferry links it is unlikely that no wait time would occur.

Alternative 2B would have the longest travel time between Juneau and Skagway of the build alternatives on the east side of Lynn Canal because of the ferry trip from Katzehin to Skagway; this alternative's travel time would still be shorter than the travel time under the No Action Alternative. Travel time between Juneau and Haines for Alternative 2B would be the same as

travel time under Alternative 2, which is an hour less than the travel time for the No Action Alternative on the FVF.

Table 4-10
Travel Times for the No Action Alternative and Alternatives 2 Through 2C

Route	Summer (hours)
No Action Alternative	
Auke Bay – Haines	3.5/7.1[1]
Auke Bay – Skagway	3.8/9.1[1]
Haines - Skagway	1.3
Alternative 2	
Auke Bay – Haines	2.5
Auke Bay – Skagway	2.1
Haines - Skagway	1.2
Alternative 2A	
Auke Bay – Haines	3.0
Auke Bay – Skagway	2.6
Haines - Skagway	1.2
Alternative 2B	
Auke Bay – Haines	2.5
Auke Bay – Skagway	3.0
Haines - Skagway	1.3
Alternative 2C	
Auke Bay – Haines	3.4
Auke Bay – Skagway	2.1
Haines - Skagway	1.3

Note: [1]The first number is the time for the trip on the fast vehicle ferry (FVF) and the second number is the time for the trip on a mainline vessel.

4.3.7.4 State and User Costs

The 30-year life cycle costs for the No Action Alternative and Alternatives 2 through 2C discounted to present (January 2004) dollars are provided in Table 4-11. These costs include state and federal capital costs and state maintenance and operating expenses. Capital costs include design, right-of-way acquisition, highway, vessel, and terminal construction, vessel refurbishment, and vessel replacement.

Table 4-11
Thirty-Year Life Cycle Costs for the No Action Alternative and Alternatives 2 Through 2C ($millions)

Alternative	Capital Cost	Operating Cost	Total Life Cycle Cost
No Action	$87	$179	$267
2	$219	$104	$323
2A	$227	$152	$380
2B	$194	$158	$352
2C	$202	$103	$304

Table 4-12 provides an estimate of the state's portion of these costs. As indicated in the table, the capital cost of Alternatives 2 through 2C would be higher than the No Action Alternative due to the required highway and ferry terminal facilities. However, because the operating cost is lower for Alternatives 2 through 2C, the total state cost, before considering estimated revenues, would be less for any of these build alternatives than for the No Action Alternative. As explained in Chapter 2, Alternatives 2 and 2C would have an annual operating cost of approximately $4.4 million versus $10.2 for the No Action Alternative. The annual operating cost for Alternatives 2A and 2B would be $8.4 million and $9.0 million, respectively.

Table 4-12
Present Value of Capital and Operating Costs to State of Alaska for the No Action Alternative and Alternatives 2 through 2C

Alternative	State Funds[1]					
	Capital Costs ($million)	Operating Costs ($million)	Total State Cost ($million)	Revenue ($million)	Net State Cost ($million)	State Cost/Vehicle (dollars)
No Action	$8	$179	$187	$126	$61	$51
2	$20	$104	$124	$56	$68	$9
2A	$21	$152	$173	$87	$86	$15
2B	$18	$158	$176	$88	$88	$15
2C	$18	$103	$121	$53	$68	$11

Note: [1]Current value of 2004 to 2038 costs as of January 1, 2004, at private-sector rate of return. The revenue estimates in the table include ferry fares and fuel tax receipts.

Table 4-12 indicates that the net cost to the state of Alternative 2 would be about $7 million more than the No Action Alternative. This is because revenues from fares and onboard ferry services generated by Alternative 2 would be less than half those generated by the No Action Alternative. Alternatives 2A through 2C would have a net cost to the state of about $25 to $27 million more than the No Action Alternative. These build alternatives would also generate less revenues than the No Action Alternative. Alternatives 2 through 2C would carry more vehicles than the No Action Alternative. Therefore, they all would cost the state less than the No Action Alternative on a per vehicle basis.

The total cost[19] of travel between Juneau and Skagway or Haines for a family of four in a vehicle 19 feet long is listed in Table 4-13 for the No Action Alternative and Alternatives 2 through 2C. This table also lists the out-of-pocket cost of travel between Juneau and Skagway or Haines for the same family. As indicated in the table, Alternatives 2 through 2C would cost the traveler from 17 to 43 percent of the cost of the same travel on a mainline vessel under the No Action Alternative. The savings to the traveler would be greater when compared to travel on a FVF.

Based on total user costs, travel time cost, and the projected travel in the Lynn Canal corridor through 2038, total user benefits in terms of reduced travel cost for each alternative in present dollars is provided in Table 4-14. As indicated in that table, Alternatives 2 through 2C would provide benefits to travelers of as much as $288 million (Alternative 2) relative to the No Action Alternative over 35 years.

[19] Total user costs areout-of-pocket costs, vehicle maintenance and ownership costs, and accident costs.

Table 4-13
Juneau to Haines and Skagway Total and Out-of-Pocket User Cost for Family of Four in 19-Foot Vehicle for the No Action Alternative and Alternatives 2 through 2C

Alternative	Haines User Cost[1]	Skagway User Cost[1]
No Action	$180/$180[2]	$237/$237[2]
2	$60/$34	$41/$10
2A	$77/$55	$60/$31
2B	$60/$34	$70/$51
2C	$82/$50	$41/$10

Note: [1]Fist number is total user cost and second number is out-of-pocket cost. Total cost is based on fares plus $0.44 per mile for vehicular travel (AASHTO, 2003). Out-of-pocket cost based on fares and gasoline consumption.
[2]Cost is for a mainline ferry. Cost for FVF would be 10 percent higher.

Table 4-14
User Benefits and Net Present Value of Alternatives 2 through 2C Versus the No Action Alternative[1]

Alternative	User Benefits ($million)	Net Incremental Project Costs ($million)[2]	Net Present Value ($million)
2	$288	$173	$115
2A	$240	$193	$46
2B	$226	$156	$70
2C	$271	$157	$114

Note: [1]For the period 2004 to 2038 discounted to current (January 2004) dollars.
[2]Overall project costs minus revenues.

The cost of taking the shuttle ferry between Haines and Skagway would remain the same regardless of the alternative. The fare for a family of four is estimated to be about $40. Under Alternatives 2 and 2A, a traveler could drive between Skagway and Katzehin and take the ferry from Katzehin to Haines. Because of the shorter ferry trip, this would cost less than the Haines/Skagway shuttle. It is estimated that the Katzehin/Haines shuttle fare plus the cost of driving from Skagway to Katzehin would be about $28 for a family of four.

One of the best economic measures of an alternative is its net present value. Net present value is the total of the user benefits minus the net cost of an alternative over and above the net cost of the No Action Alternative for a given period of time. The 2004 to 2038 net present values of Alternatives 2 through 2C are provided in Table 4-14. The net present values of Alternatives 2 and 2C are similar at approximately $115 and $114 million, respectively. Alternatives 2A and 2B have substantially lower net present values for this period of about $46 and $70 million, respectively.

4.3.7.5 Other Transportation Impacts

Water transportation is the primary method of moving freight within Lynn Canal. Freight is transported from Seattle by barge to Juneau, Skagway, and Haines. AMHS ferries also move freight in vans between the communities of Lynn Canal. Haines and Skagway are important

transshipment points, linking Inside Passage barge and ferry freight to the Yukon and Interior Alaska.

Alternatives 2 through 2C would not substantially alter freight traffic between Juneau and Seattle. Trucking companies servicing other Alaska communities were asked to approximate the cost of trucking between these two cities if a highway were available. Those estimates averaged about $0.15 per pound of freight compared to the existing barge freight cost of $0.05 per pound. Although trucking goods from Seattle is not competitive with barge service, a highway link to Juneau may provide opportunities for transporting time-sensitive freight, such as fresh fish. Air freight, which currently serves this function, costs between $0.33 and $0.46 per pound between Juneau and Seattle.

Alternatives 2 through 2C would not result in a change in scheduled barge service to Haines and Skagway. Freight that now moves from Juneau to Haines and Skagway on the ferry would instead be trucked at a lower cost.

Alternatives 2 through 2C are likely to divert traffic from the air taxi operations currently serving Lynn Canal. In interviews conducted for the Supplemental Draft EIS, local air taxi operators noted that the addition of the Lynn Canal day ferry in 1998 reduced air passenger loads in Lynn Canal. For example, the air traffic from Juneau to Haines dropped from 10,014 passengers in 1998 to 6,939 passengers in 2001. The degree to which travelers might change their current air travel behavior would depend on travel times and costs. Alternative 2 would provide a direct highway link between Juneau and Skagway with a short ferry link to Haines, and could divert up to 52 percent of the current air travel between these two communities. For Alternatives 2A and 2B, an estimated 40 percent of air traffic would be diverted. For Alternative 2C, an estimated 42 percent of air traffice would be diverted. As travel time increases with more ferry links, the amount of air travel diverted would decrease. Travelers between Juneau and Haines with substantial time constraints are likely to continue to rely on air transportation, whereas they may choose to use the highway instead of air transportation to travel between Juneau and Skagway.

With Juneau serving as the northern terminus for mainline AMHS service under Alternatives 2 through 2C, the AMHS would only need to operate short shuttles in Lynn Canal. The projected annual AMHS operating costs and estimated AMHS state subsidy for Alternatives 2 through 2C in 2008 is provided in Table 4-15. As indicated in the table, the No Action Alternative is estimated to require a state subsidy of about $3.3 million in 2008. Alternatives 2, 2A, and 2C would require less of a state subsidy for AMHS operations in Lynn Canal in 2008 than the No Action Alternative. Alternative 2 would require the smallest state subsidy at $700,000. As ferry links increase in length or number, the state subsidy required for AMHS service in Lynn Canal increases, with Alternative 2B requiring the largest state subsidy in 2008 at $3.2 million, approximately $100,000 less than the subsidy that would be required for the No Action Alternative.

As stated in the 2004 SATP, the mainline ferry fleet would be reduced based in part on Lynn Canal service no longer being needed. Service south of Lynn Canal would be augmented by greater use of point-to-point shuttles. Because of the high cost of mainline ferry operations and the inconvenience of their schedules, DOT&PF envisions reduced mainline service south of Lynn Canal even if a highway alternative is not constructed.

Table 4-15
Annual AMHS Operating Costs and Estimated AMHS State Subsidy in 2008 for the No Action Alternative and Alternatives 2 Through 2C

Alternative	AMHS Operating Cost ($million)	Estimated AMHS State Subsidy ($million)
No Action	$10.2	$3.3
2	$2.9	$0.7
2A	$6.9	$2.6
2B	$7.7	$3.2
2C	$2.9	$0.8

Note: Source DOT&PF, 2004g.

Residents of Haines have expressed concern that an East Lynn Canal Highway could result in the state closing the Haines Highway in winter to reduce maintenance costs. This concern is based on the premise that a direct highway connection to the Klondike Highway via Skagway would reduce the traffic on the Haines Highway. Closing the Haines Highway is unlikely to occur for several reasons. As the traffic forecast indicates, traffic to and through Haines would increase, not decrease, in comparison to the No Action Alternative. Also, the Haines Highway is Canada's official access to tidewater in northern Southeast Alaska, established by international agreement. Furthermore, the Haines Highway is important as a local road as well as a connection to Canada. Haines Borough residents live along the highway throughout its length, all the way to the border.

Rather than jeopardizing winter operation of the Haines Highway, an alternative that substantially increases traffic to both the Haines and Klondike Highways decreases the likelihood of future winter closures of either, but particularly the Klondike. The Klondike Highway is more expensive to the state to maintain, because the snowiest part (the pass) is close to the border. Currently winter traffic counts on the Klondike Highway are lower than on the Haines Highway, in part because there are few residents beyond the downtown Skagway area, and the winter population is smaller than in Haines. Although there are no current plans to close the Klondike under any alternative, it would be more likely under alternatives that result in lower levels of traffic.

Lack of highway access is often cited by capital move proponents as one of the reasons to move the state capital. Alternatives 2 through 2C would provide highway access to Juneau, which would reduce the perception that it is difficult and expensive for the majority of Alaska residents to visit the state capital.

The highway proposed for Alternatives 2 through 2C would include 4-foot paved shoulders suitable for bicyclist and pedestrian use. Predicted traffic volumes would be compatible with bicycle or pedestrian use of the shoulders. Shuttle ferries for these alternatives would accommodate bicyclists and foot passengers.

As indicated in the *Traffic Forecast Report* (Appendix C), many current walk-on passengers would choose to travel by car if a highway were available in the Lynn Canal corridor. Travelers without vehicles would be forced to rent vehicles, take a commuter flight, or travel on private carriers if they develop to accommodate this demand.

See the *Traffic Forecast Report* (Appendix C) for additional information on the transportation demand forecast for the proposed project alternatives.

4.3.8 Geology

Alternatives 2 through 2C would not impact any unique geologic resources in the study area. These alternatives would be subject to a variety of geologic hazards, including earthquake-induced ground tremors, avalanches, and landslides. Geotechnical investigations would be used in support of the final engineering design of the selected alternative. These studies would minimize the impact of geologic hazards on the road embankment and related structures.

4.3.8.1 Seismic Activity

As indicated in Section 3.2.1.2, the Queen Charlotte/Fairweather fault system located within 75 miles of the project area has the capability of producing earthquakes with magnitudes greater than 7.0 on the Richter scale. Based on USGS hazard maps published in 1999, this fault system has a 10 percent probability of producing an earthquake in the next 50 years that would cause ground accelerations in excess of 1.1 to 1.15 g[20] in the project region. These types of ground accelerations would be taken into account in the design of roadway pavement and highway structures. It is probable that a maximum ground acceleration in the project area would cause damage to a highway, as is the case with many other Alaskan highways in seismic areas.

4.3.8.2 Avalanches

The proposed highway alignment for Alternatives 2 and 2C crosses 61 avalanche paths (including subpaths). Alternative 2A crosses 60 avalanche paths. Alternative 2B crosses 36 avalanche paths (the proposed highway would end immediately north of the Katzehin River). Avalanche risk assessment is based on the AHI, a dimensionless standard that calculates the probability of encounters between avalanches and vehicles and the likely damage. The 1997 Draft EIS reported an unmitigated AHI value of 369.5 for the highway proposed on the East Lynn Canal Highway alignment at that time. Using more accurate survey data, refined alignments, long-term climate studies, and additional winter observations, the calculated unmitigated AHI for Alternatives 2 and 2C is 205.2, the unmitigated AHI for Alternative 2A is 204.7, and the unmitigated AHI for Alternative 2B is 186.

These unmitigated figures are considered very high, but are in the middle range for highways operated with good safety records in avalanche terrain. (For example, Rogers Pass, B.C., has an unmitigated AHI of 1,004, the previous Seward Highway alignment from Anchorage to Seward had an unmitigated AHI of 331, and the previous Seward Highway alignment from Anchorage to Girdwood had an unmitigated AHI of 188.) With appropriate hazard reduction and operational risk management, the mitigated AHI for Alternatives 2 through 2C would be reduced to an AHI value of 30 or less. Hazard reduction methods are physical changes such as constructing barriers or adjusting the alignment of a highway. Risk management methods include forecasting, warnings, temporary highway closures, and use of explosives to release unstable snow during temporary highway closures. A mitigated AHI value of 30 or less is the North American standard for safe operation of a highway.

DOT&PF is proposing to use helicopter placement of explosive charges to release unstable snow. The explosive charges would be dropped by hand from a low-hovering helicopter with the door removed. Helicopter delivery has proven to be an effective, accurate, and flexible method for covering large areas in a short time. The major disadvantage is that helicopter delivery requires calm ridgetop winds and good visibility. The lack of good flying weather can result in substantial delays and missed opportunities. The *Snow Avalanche Report* prepared for

[20] Seismic ground acceleration is measured in units of gravity or *g*. The acceleration of *g* is 32 feet/second/second.

the proposed project (Appendix J) calculated closure periods using weather logs and avalanche observations from the same six years of field studies that were used in the AHI calculations. Estimates of average closure time/year, average number of closures/year, closure length, and capital and operating budgets for highway maintenance relative to avalanche hazards for Alternatives 2 through 2C are provided in Table 4-16. The capital costs of avalanche control equipment and facilities have been included in the construction cost estimate, and the annual operating cost for avalanche control has been included in the maintenance and operating cost estimate for each alternative.

Table 4-16
Costs, Closures, and Mitigated Avalanche Hazard Index for Alternatives 2 Through 2C

Alternative	Capital Cost	Annual Operating Cost	Average Closure Time per Year (days)	Average Number of Closure per Year	Closure Length (days)	Mitigated Avalanche Hazard Index
2, 2A, and 2C	$2,790,170	$749,556	34.5	16.5	0.8 to 8.0	29.4
2B	$2,668,070	$719,446	33.9	16.5	0.8 to 7.8	26.5

The avalanche season in the project area runs from November 1 to April 30 with the highest activity from December to March. As indicated in Table 4-16, in an average year the highway would be closed between 34 (Alternative 2B) and 35 days (Alternatives 2, 2A, 2C). Road closures would vary in length from one to eight days, with the average closure lasting two days.

A northern Lynn Canal shuttle ferry is included in Alternatives 2 through 2C. This shuttle ferry would carry northbound and southbound traffic between Haines, Skagway, and Juneau when the highway is closed for more than one or two days. Having an alternative means of moving essential traffic provides not only convenience but reduces the pressure to open the highway in marginal conditions.

The *M/V Aurora* would be diverted from the Haines to Katzehin (or Skagway for Alternative 2C) run to transport vehicles to and from Auke Bay (Alternatives 2, 2B, 2C) or Sawmill Cove (Alternative 2A). Given the *M/V Aurora*'s capacity, on a 12-hour operating schedule 68 vehicles could be moved to and from Auke Bay, and 136 could be moved to and from Sawmill Cove. (If the Coeur Alaska dock at Slate Cove is constructed, the *M/V Aurora* could transport 136 vehicles per 12-hour day around a road closure for any East Lynn Canal Highway alternative.) Based on the SATP, at least one fast ferry will be homeported in Juneau, providing service to Petersburg. During the winter this vessel would also be available to provide additional temporary service in Lynn Canal during road closures.

4.3.8.3 Landslides

Six slide areas have been identified near Alternatives 2, 2A, and 2C, and four in the vicinity of Alternative 2B (Figure 3-11). All of these slides are rockfall slides, with little soil movement, although the initial slides removed large amounts of vegetation. Two of these slides stop above the alignment of Alternatives 2, 2A, and 2C (one above Alternative 2B) and would not pose a problem in terms of safety or maintenance. Of the four slides that have the potential to reach the alignment of Alternatives 2, 2A, and 2C, three are also avalanche paths. These three rock slides on avalanche paths are the only rock slides with potential to reach the alignment of Alternative 2B. These rock slides would be mitigated as part of avalanche control by constructing raised embankments with large culverts. A raised roadway would prevent rock and avalanche debris from flowing onto the road, while the culverts would pass water and small debris. The remaining rockslide near Dayebas Creek (Alternatives 2, 2A, and 2C) would be

mitigated by constructing a rock catchment ditch along the uphill side of the road. Other avalanche paths may also have rockslides in the spring and summer but these slides tend to be smaller than the avalanches on the same path and generally do not extend to the bottom of the path.

New slides could occur in the vicinity of the East Lynn Canal alternatives due to rock conditions and steep uphill slopes. There are six identifiable slides, one of which occurred during the 11-year period after the initial geological investigation took place. A rough conservative estimate of potential new rockslide activity is approximately one per decade. Slides actually reaching the roadway would occur somewhat less often. Stabilization of all potential rockslide areas above the alignment of Alternatives 2 through 2C is not practical. Geotechnical studies during design would identify appropriate locations for alignment adjustments, rockfall barriers, and slope stabilization. These measures, along with the normal maintenance action of removing slide material from catchment ditches and shoulders, would make road closure due to slides an infrequent event.

4.3.9 Hydrology and Water Quality

4.3.9.1 Floodplains

Planning and preliminary design of Alternatives 2 through 2C have been done in compliance with EO 11988, Floodplain Management and FHWA regulations in 23 CFR 650.11.

Flooding Risks - The alignment for a highway between Juneau and Skagway runs perpendicular to most of the natural drainages along the east side of Lynn Canal. Therefore, it is not possible to avoid transverse encroachments of these drainages. The alternatives would have no longitudinal encroachments of any drainages. No regulatory floodways occur in the project area. The transverse encroachments are mainly bridge piers that would be designed so that Alternatives 2 through 2C would not create significant flood risks.

Impacts on Natural and Beneficial Floodplain Values - Alternatives 2 and 2C would cross the floodplains of 58 streams. Most of these streams are less than 50 feet wide. Bridges would be used to cross 27 streams, including all anadromous fish streams. Fourteen of the bridges would be single-span structures. For these bridges, each bridge and its piers would be located outside of the predicted 100-year flood elevation of the streams, as determined by hydraulic studies to be conducted during the final engineering design of the selected alternative. Multi-span bridges would be constructed at the crossings of the Katzehin, Lace, and Antler rivers. These larger bridges would extend beyond the outer most channels at each river delta to protect their natural, meandering flow. The bridges would require placement of supports in the river floodplain. These supports would be spaced and designed to accommodate the predicted 100-year flood volume with no more than a one-foot rise in backwater. The remaining streams would be crossed with culverts. The culverts would be sized to pass the 100-year flood.

The Katzehin, Lace, and Antler rivers are navigable in accordance with U.S. Coast Guard guidelines. The bridges over these rivers would require a Rivers and Harbors Act Section 9 permit from the U.S. Coast Guard. These bridges would be constructed to maintain navigation at all tide stages.

Alternative 2A would not include highway construction around Berners Bay; therefore, this alternative would not affect the Lace and Antler rivers or Slate Creek.

Under Alternative 2B, the highway would end at the proposed Katzehin River Ferry Terminal. This alternative would cross 46 streams, including the Katzehin, Lace, and Antler rivers.

Potential for Incompatible Floodplain Development - There are no community floodplain development plans for the project area. The streams crossed by Alternatives 2 through 2C that have a large enough floodplain for development are located within the Tongass National Forest. All of these lands are designated as either LUD II or semi-remote recreation areas, where the principal management goal is to retain the natural character of the area. Therefore, no incompatible floodplain development would occur in the project area.

Alternatives 2 through 2C would provide a highway where there are currently no roads. The highway would serve as a new evacuation route for emergencies for private properties adjoining the road, for Juneau, and in the case of Alternatives 2, 2A, and 2C, for Skagway.

Measures to Minimize Floodplain Impacts and Preserve Natural and Beneficial Floodplain Values – All of the larger floodplains would be crossed with bridges. Bridge abutments would be located outside the floodplains. Multiple-span bridges would be supported on piles no more than 24 inches in diameter with groups of in-line piles spaced approximately 130 feet apart.

4.3.9.2 Hydrology

Alternatives 2 through 2C would act as a partial barrier to the flow of shallow groundwater and surface water. Shallow groundwater blocked by the highway would eventually flow to the surface. Roadside drainage ditches would collect surface water on the upgradient side of the highway and channel it to the downstream side through culverts. This flow diversion would include sufficient cross-culverts to adequately maintain the water's natural downgradient flow. Culverts would be designed for the 50-year rainfall event and end sections or rock dissipaters would be used to disperse high-volume/high-velocity flows to protect soils and vegetation below culvert outfalls from erosion.

Ferry terminals at Sawmill Cove and Slate Cove for Alternative 2A and at Katzehin River for Alternatives 2, 2A, and 2B would require the placement of fill (shot-rock generated during highway construction) at each proposed terminal site. The proposed terminals at Sawmill Cove and Katzehin would also require dredging to approximately 25 feet below mean lower low water. These encroachments would not measurably change the hydrodynamics of Lynn Canal or Berners Bay.

4.3.9.3 Water Quality

Highway construction, maintenance, and operations can affect water quality through earth-moving activities, equipment oil and fuel spills/leaks, debris generation, winter sanding, and vehicular traffic. These activities could introduce metals, fuel, oil, and other potential contaminants to water courses whose drainages include Alternatives 2 through 2C, principally through runoff from the highway.

Results from stormwater research by the FHWA indicate that stormwater runoff from low to medium traffic volumes (under 30,000 vehicles per day) on rural highways exerts minimal to no impact on the aquatic components of most receiving waters (USDOT & FHWA, 1987). Studies conducted in Anchorage, Alaska, under the Municipality of Anchorage Watershed Management Program similarly concluded that street runoff has minimal impacts to the water quality of receiving waters from most potential pollutants (MOA, 2000b). These studies showed dissolved concentrations of calcium, chromium, magnesium, and zinc to be below the Alaska Water Quality Standards (AWQS). Only dissolved concentrations of copper and lead were noted to be above their AWQSs; however, modest dilution would likely reduce these concentrations below their AWQS. Identified concentrations would not adversely impact streams with flow rates

greater than 0.5 cubic foot per second (MOA, 2000e). Polynuclear aromatic hydrocarbons were at concentrations below the EPA water quality criteria.

Because of the rural setting of Alternatives 2 through 2C and the predicted low annual ADT, fewer impacts to water quality in the project area would occur than were found in the Anchorage studies. Studied runoff was collected from Anchorage roadways that ranged from residential (<2,000 ADT) to major arterial (>20,000 ADT). Studied melt water was from snow collected from a mix of these types of roads. In comparison, Alternative 2, which provides the greatest capacity of the alternatives considered for the east side of Lynn Canal, would have a maximum peak week ADT in 2008 and 2038 of 1,800 and 3,250 vehicles, respectively. During all but that week, ADT would be on the order of less than 1,000 vehicles per day.

Highway runoff and melt water from Alternatives 2 through 2C would have lesser quantities of potential contaminants than what was observed in the Anchorage studies due to a lower traffic volume and less development in the Lynn Canal corridor. Snow would be cleared from the highway and deposited along its length, instead of being disposed of in one location. DOT&PF does not usually use de-icing chemicals on rural roads. Sanding would be performed, as conditions required. Typically, up to five percent sodium chloride per total weight of sand is added to keep sand friable in winter. Potential pollutants would not be concentrated in one area. Runoff from the proposed highway and bridges would not exceed AWQS or adversely impact the water quality of receiving waters for the long term. Potential contamination from oil or hazardous substance spills would be low due to the rural setting of the highway and the low predicted highway traffic volume.

The following Best Management Practices (BMPs) would be implemented to minimize long-term water quality impacts. See Section 4.8.6 for BMPs to minimize water quality impacts during construction.

- Only clean fill material would be used for the roadway and ferry terminal embankments.
- Rock would be used to stabilize toes of slopes at ponds and stream crossings.
- Grass seed would be placed on any road slope not constructed of shot rock. To protect the integrity of the natural plant communities, plant species indigenous to the area would be used for vegetating road slopes, except that non-native annual grasses may be used to provide initial soil cover.
- Roadside swales would be designed to keep surface water within the natural drainage basins.
- Culverts would be installed through fill slopes in appropriate locations to maintain natural flow patterns for surface water.

Ferry operations under Alternatives 2 through 2C would have little effect on area water quality. AMHS mainline ferry wastewater discharges in Lynn Canal north of Auke Bay would be eliminated. The ferries that would be used for Alternatives 2 through 2C would have sanitary waste holding tanks,[21]or would discharge treated wastewater meeting applicable standards. Sewage treatment facilities with a permitted outfall would be installed at the Katzehin (Alternatives 2, 2A, and 2B) and Sawmill Cove and Slate Cove Ferry Terminals (Alternative 2A). Discharges from the sewage treatment facilities would be within permit guidelines. Aeration and ultraviolet light disinfection, similar to the system used at the Auke Bay Ferry Terminal, would be used; therefore, no adverse impacts to water quality would occur. Accidental discharges, spills, and leaks are possible during ferry operations. Historically, these have been minor, with only

[21] Holding tanks would be pumped out and the waste treated onshore for disposal.

minimal and temporary impacts to water quality. This low level of impact would likely continue under Alternatives 2 through 2C.

Highway and bridge runoff would contribute small amounts of turbidity and pollutant loads to local drainages flowing to Lynn Canal. Contaminant concentrations in runoff from the proposed highway and/or bridges would not exceed AWQS or adversely impact the water quality of receiving waters for the long term.

4.3.10 Air Quality

The increase in traffic on Egan Expressway and Glacier Highway predicted for Alternatives 2 through 2C would not affect the Mendenhall Valley non-attainment area based on consultations with the EPA for the 1997 Draft EIS, the current status of the area, and the impact analysis presented in this section.

4.3.10.1 Carbon Monoxide

Simplified dispersion modeling was conducted for CO emissions from projected peak traffic volumes for the construction year (2008) and design year (2038) for Alternatives 2 through 2C. Using the most conservative climatic conditions (i.e., low wind speeds and a stable atmosphere that produces the highest pollutant concentrations), the modeling indicated that the maximum one-hour average CO concentration associated with these emissions would be 1 ppm. Adding this concentration to an assumed background value of 1 ppm and 2 ppm for rural and urban (e.g., Haines, Skagway, and Auke Bay) segments of Alternatives 2 through 2C indicates that CO concentrations would not approach the 9 ppm CO NAAQS with any of the alternatives.

Marine vessel CO emissions were not modeled for Alternatives 2 through 2C. Marine vessel traffic in the Lynn Canal would decrease with these alternatives, as mainline ferry service north of Juneau would be discontinued. However, ferry operations under all alternatives would have little effect on air quality. This conclusion is supported qualitatively by the fact that Juneau has no reported exceedances of CO standards with much larger port facilities, a larger concentration of marine vessels, and larger frequency of marine vessel operations than elsewhere in Lynn Canal.

4.3.10.2 Particulates

A qualitative analysis was done for PM_{10} for Alternatives 2 through 2C. This analysis compared project-related traffic with traffic in an area with similar meteorological conditions where PM_{10} has been monitored.

PM_{10} is monitored at Floyd Dryden Middle School on Mendenhall Loop Road in Juneau. Peak-hour traffic volume on this road was 1,201 vehicles in 2000. The 24-hour and annual average PM_{10} concentrations measured at this monitoring station were 27 and 7.5 $\mu g/m^3$, respectively, in that year. Projected peak hour traffic for Alternative 2, which would have the highest traffic volumes of all the alternatives considered on the east side of Lynn Canal, was estimated at nine percent of the summer average daily traffic (summer ADT). Summer ADT for Alternative 2 is projected to be 910 and 1,640 vehicles in 2008 and 2038, respectively. Therefore, the peak hour traffic for this alternative would be about 80 and 150 vehicles in 2008 and 2038, respectively. These traffic volumes are 15 (2008) and 8 (2038) times smaller than the volumes recorded on Mendenhall Loop Road in 2000. Multiplying these factors by the PM_{10} concentrations measured at Floyd Dryden provides the following estimates for PM_{10} concentrations that could result from peak hour traffic volumes for Alternative 2:

- Year 2008 – 24-hour average: 2.0 μg/m^3 annual average: 0.6 μg/m^3
- Year 2038 – 24-hour average: 3.4 μg/m^3 annual average: 1.0 μg/m^3

These estimates are substantially below the 150 μg/m^3 24-hour average NAAQS and 50 μg/m^3 annual average NAAQS for PM_{10}. Because the Mendenhall Loop Road PM_{10} data include dust from unpaved roads in the valley and paved roads generally contribute only a small fraction of the total PM_{10}, this estimate of project-related PM_{10} concentrations overestimates the actual concentrations that would result from Alternatives 2 through 2C.

Alternatives 2 through 2C would burn approximately the same amount of fuel as the No Action Alternative (Table 4-65); however, the No Action Alternative would burn twice as much diesel fuel in ferries than Alternatives 2 through 2C. Diesel combustion emits 20 times more particulates than combustion of gasoline (California Air Resources Board, 1998).

4.3.10.3 Conformity

The project area is located in an air quality attainment area where the SIP does not contain any transportation control measures. Therefore, conformity procedures do not apply to this project, and a conformity determination is not required per 40 CFR 51.

4.3.11 Hazardous Materials

From the ISA review, 29 sites along the alignment of Alternatives 2 through 2C were identified as having the potential for hazardous materials involvement (Figure 3-12). As explained in Section 4.1.10, an impact rating was assigned to those sites within a 300-foot corridor centered on the alternative alignments and facility sites. The impact rating was based on contaminant type, contaminant quantity, groundwater and groundwater gradient, age of contaminant, extent (if any) of previous or ongoing cleanup actions, and potential clearup costs.

Based on the ISA screening process, no preliminary site investigations were recommended for any of the sites associated with Alternatives 2 through 2C because no sites were determined to have a high or moderate impact rating.

The Skagway White Pass & Yukon Route Railroad Coach Cleaning Shop is upgradient of the proposed alignment for Alternatives 2, 2A, and 2C on the edge of the 300-foot screening corridor used for this evaluation. The right-of-way required for these alternatives in Skagway would be 150 feet or less. Therefore, the probability that soil or groundwater contaminated with diesel fuel would occur within the right-of-way at this location is low.

The proposed alignment for Alternatives 2, 2A, and 2C would cross perpendicular to the former Skagway to Whitehorse fuel pipeline. There is no documentation that any spills related to the pipeline occurred in the immediate area of the alignment crossing. The highway would be elevated above grade in this area; therefore, no substantial excavations would take place here as part of the proposed project. For these reasons, the probability for hazardous materials involvement at this location is low.

The alignment for Alternatives 2 through 2C would come within about 150 feet of three above ground diesel fuel storage tanks at Comet. There have been no recorded leaks or spills from these tanks. Therefore, the probability for hazardous materials involvement at this location is low. See the *Initial Site Assessment Technical Report* (Appendix M) for further information on the hazardous waste assessment for the proposed project alternatives.

4.3.12 Wetlands

Alternatives 2 through 2C would result in filling approximately 100.4 to 118.6 acres of wetlands and other waters of the U.S. The specific aquatic habitats that would be filled for Alternatives 2 through 2C, including habitats impacted by the proposed ferry terminals, are provided in Table 4-17. The preliminary alignment for highway segments of Alternatives 2 through 2C has been adjusted several times to avoid wetlands and reduce the impacts to wetlands that could not be avoided. During design DOT&PF will investigate additional measures to reduce impacts, including further small alignment changes, steepened slopes, and reduced embankment heights.

Approximately 70 to 80 percent of the wetlands impacted by Alternatives 2 through 2C would be forested wetlands. The wetland functions and values that would be affected by a highway include a reduction in groundwater recharge and discharge, lateral flow, surface hydrologic control, wildlife habitat functions, and riparian support.

The proposed highway would act as a partial barrier to the flow of shallow groundwater and surface water. Flow of surface water as well as shallow groundwater blocked by the highway embankment that would eventually flow to the surface would be conveyed downgradient by culverts under the highway embankment. Alteration of hydrology because of the highway embankment could result in corresponding changes to the vegetation and over time could affect wetland functions within and outside the highway right-of-way. The extent of this effect would depend on localized hydrologic patterns; however, effects would be minimized through the use of porous fill material and cross-drainage structures.

Comments on the 1997 Draft EIS requested further analysis of the impacts of development on the Berners Bay region. The Berners Bay region is an ecologically diverse area that supports several species of migratory birds, mammals, and plant species. Alternatives 2, 2B, and 2C would require the fill of 3.4 acres of palustrine emergent, 19.1 acres of palustrine forested, and 0.7 acre of palustrine scrub-shrub wetlands in the Berners Bay area from Echo Cove to the Slate Creek drainage.

The salt marsh at the head of Berners Bay and adjacent to the Lace and Berners Rivers provides several important ecological functions, including surface hydrologic control, riparian support, and wildlife habitat functions. This wetland is rated very high for wildlife functions based on documented use by waterfowl, bald eagles, and marine mammals. Portions of this wetland provide fish habitat functions, depending on the elevation of the wetland. Regional ecological diversity is rated high, as this wetland receives substantial use by wildlife and this type of wetland is limited in the project study area. The alignment for Alternatives 2, 2B, and 2C was adjusted in 2003 to avoid this wetland.

Adjacent to the Antler and Berners Rivers and on the west shore of Berners Bay, the proposed alignment for Alternatives 2, 2B, and 2C would fill primarily palustrine forested wetlands. The effects of this action would include modifying the groundwater recharge functions, the discharge/lateral flow functions, the surface hydrologic control functions, and the sediment retention functions of these wetlands. Large areas of similar habitat in the surrounding areas, and adequate ditching and drainage structures, would moderate losses of any of these functions. Wildlife habitat functions would be reduced due to the loss of forest, but an abundance of similar habitat is adjacent to the alignment.

From Slate Creek to Sherman Point, Alternatives 2, 2B, and 2C would impact 62.4 acres of wetlands and Alternative 2A would impact 53.4 acres of wetlands, approximately 95 percent of which are palustrine forested wetlands. Approximately 3.2 acres of emergent wetlands would

be filled. These wetlands are open fens and muskegs. No salt marsh would be affected. The functions affected by Alternatives 2 through 2C in this area would be the same as those described for the palustrine forested wetlands along Berners Bay. Regional ecological diversity would not be substantially affected by this loss of wetlands, as this habitat type is common and widespread throughout the surrounding area. The proposed alignment avoids the seasonally flooded emergent/scrub-shrub wetland between Slate Cove and Sherman Point. Approximately 27 acres of the wetlands that would be impacted in this subregion are the result of an alignment adjustment to avoid bald eagle nest trees. From about five miles north of Point St. Mary to Comet there is a narrow band of uplands along the shore. The alignment was shifted up hill into forested wetlands in this area in order to avoid the numerous eagle nest trees along the shore.

From Sherman Point to the Katzehin River, Alternatives 2 through 2C would affect just over 1 acre of palustrine forested wetland near Independence Lake. This would have little effect on wetland functions and values in the area. Approximately 94 percent of all of the rocky shoreline impacts of Alternatives 2 through 2C would occur in this portion of the proposed alignment. A total of 19.2 acres of marine habitat would be filled in this area. Potential impacts of this fill are discussed in Section 4.3.14.

Alternatives 2, 2A, and 2B would result in fill of approximately 4.7 acres and Alternative 2C would result in fill of 2.2 acres of estuarine emergent wetlands at the Katzehin River crossing and along the upper levels of the large flats on the north side of the delta. This fill would modify the surface hydrologic control functions and reduce riparian support and wildlife habitat functions in the area. Salt marsh habitat on the Katzehin River outwash plain is quite extensive, and the portion of the marsh potentially affected by Alternatives 2 through 2C is a narrow band located at the highest levels of the marsh. Impacts to the wildlife habitat functions would consist of direct loss of habitat and potential disruption of wildlife corridors between the estuary and the adjacent forested uplands. This potential fragmentation of habitat is discussed further in Section 4.3.16.

Sand would be used on the highway in the winter. A small quantity of salt (up to five percent of the total weight of the sand) is used to keep the sand friable. Because the amount of salt is minimal, it is unlikely to substantially damage adjacent vegetation.

The indirect effects of Alternatives 2 through 2C on wetlands include the potential introduction of contaminants from accidental spills of fuels and lubricants, the introduction of non-native plant species inadvertently transported to the area on vehicles and their occupants, and damage to wetlands from increased human recreational activity in the area. These activities could cause the further loss of wildlife habitat functions, reduction of ecological diversity, and sediment/toxicant retention functions. Implementation of BMPs in maintaining the highway, including not using salt to the extent possible, limiting the use of sand near wetlands, and posting educational signs for wetland users, would minimize the risk of these effects occurring.

DOT&PF has avoided wetlands to the extent practicable during development of the preliminary alignment for Alternatives 2 through 2C. The roadway would be constructed using the minimum-width fill footprint necessary for a stable road base in wetland areas. During final engineering design of the selected alternative, DOT&PF would continue to coordinate with resource agencies to further minimize encroachment on wetlands. Compensatory mitigation would be provided for wetland losses associated with the selected alternative (see Section 5.2 for further information on mitigation).

Table 4-17
Alternatives 2, 2A, 2B, and 2C Total Fill
in Wetlands and Other Waters of the U.S. (Acres)

Subregion	Classification	Alternatives and Areas of Fill (acres)			
		2	2A	2B	2C
Echo Cove to Slate Creek	**Wetlands**				
	Palustrine Emergent	3.4	0.01	3.4	3.4
	Palustrine Forested	19.1	10.3	19.1	19.1
	Palustrine Scrub-Shrub	0.7	0.7	0.7	0.7
	Subtotal	**23.2**	**11.0**	**23.2**	**23.2**
	Marine Areas				
	Rocky Shores	0.0	1.9	0.0	0.0
	Subtotal	**0.0**	**1.9**	**0.0**	**0.0**
Slate Creek to Sherman Point	**Wetlands**				
	Palustrine Emergent	3.2	3.2	3.2	3.2
	Palustrine Forested	59.2	50.2	59.2	59.2
	Subtotal	**62.4**	**53.4**	**62.4**	**62.4**
	Marine Areas				
	Beach Bars	0.0	1.1	0.0	0.0
	Subtotal	**0.0**	**1.1**	**0.0**	**0.0**
Sherman Point to Katzehin River	**Wetlands**				
	Palustrine Forested	1.3	1.3	1.3	1.3
	Estuarine Emergent	0.8	0.8	0.8	0.8
	Subtotal	**2.1**	**2.1**	**2.1**	**2.1**
	Marine Areas				
	Rocky Shores	19.2	19.2	19.2	19.2
	Subtotal	**19.2**	**19.2**	**19.2**	**19.2**
Katzehin River to Skagway	**Wetlands**				
	Estuarine Emergent	4.7	4.7	4.7	2.2
	Subtotal	**4.7**	**4.7**	**4.7**	**2.2**
	Marine Areas				
	Beach Bar	1.3	1.3	1.3	1.3
	Rocky Shores	5.7	5.7	5.7	1.4
	Subtotal	**7.0**	**7.0**	**7.0**	**2.7**
All East Lynn Canal Subregions	**Wetlands**				
	Palustrine Emergent	6.6	3.2	6.6	6.6
	Palustrine Forested	79.6	61.8	79.6	79.6
	Palustrine Scrub-Shrub	0.7	0.7	0.7	0.7
	Estuarine Emergent	5.5	5.5	5.5	3.0
	Subtotal	**92.4**	**71.2**	**92.4**	**89.9**
	Marine Areas				
	Beach Bars	1.3	2.4	1.3	1.3
	Rocky Shores	24.9	26.8	24.9	20.6
	Subtotal	**26.2**	**29.2**	**26.2**	**21.9**
	Subregion Totals				
	Total Wetlands	92.5	71.2	92.5	90.0
	Total Unvegetated Marine Areas	26.2	29.2	26.2	21.9
	Total Acres	**118.6**	**100.4**	**118.6**	**111.8**

Note: This total does not include fill associated with culvert placement in non-anadromous streams. This additional acreage would be determined during design and permitting.

4.3.13 Marine and Freshwater Habitat and Species (Including Essential Fish Habitat)

During environmental studies for the Supplemental Draft EIS, the FHWA determined that the project alternatives may adversely affect essential fish habitat as defined by the Magnuson-Stevens Fishery Conservation and Management Act. Following this determination, DOT&PF prepared an EFH Assessment to assess the effects of project alternatives on commercial fish stocks in all life stages and associated habitats. This section summarizes that assessment, which is provided in the *Essential Fish Habitat (EFH) Assessment* (Appendix N).

Construction of Alternatives 2 through 2C would include deposition of materials from sidecasting of shot rock into marine waters. Areas where sidecasting would be done are typically steep. Therefore, most of the material would pass through the intertidal zone and be deposited in subtidal areas. Intertidal and subtidal areas would also be impacted by placement of fill for road embankment and construction of ferry terminals.

Alternative 2 and 2C would generate approximately 8.7 million cubic yards of excess excavation material, mostly rock. Alternative 2A would generate approximately 7.9 million cubic yards, and Alternative 2B would generate approximately 3.3 million cubic yards. Under these alternatives, up to 2.3 million cubic yards of shot rock would be stockpiled at the ends of the project for future use. For Alternatives 2, 2A, and 2C, 6.4 million cubic yards of rock would be sidecast: 4.4 million cubic yards in Taiya Inlet and 2 million cubic yards in Lynn Canal between Comet and the Katzehin River. For Alternative 2B, only the Comet to Katzehin sidecasting would occur. During design, DOT&PF would evaluate raised grades, flattened slopes, and short tunnel segments to determine locations where this would be a cost effective method to reduce excess rock quantities. Intertidal areas impacted by sidecasting exhibit typical zonation with various narrow band combinations of *Fucus*, mussels, barnacles, and *Verucaria*. While these areas may support prey organisms for commercial fish species, they are not likely to serve as refuge or areas important for the spawning or gowth to maturity of those species. The intertidal areas are typically narrow and steep, and much of the sidecast material would pass by them and settle in the adjacent subtidal zone. For these reasons, direct effects on marine fish habitat due to sidecasting of materials in intertidal areas would be below measurable levels.

Bryozoan complexes often dominate deeper subtidal areas. Common macroinvertebrates in subtidal areas that would be impacted by sidecasting include mussels, urchins, small crabs, and shrimp. These areas principally serve as foraging habitat for commercial fish species, and are not likely to serve as refuge or areas important for the spawning or growth to maturity of those species. The sidecasting would be dispersed over a broad area along the shore down steep slopes, and most of the material would be deposited in deep subtidal habitat. The sidecast rock would be large and would not produce evenly blanketing fill. This sidecasting would not produce substantially different habitat than already exists except where the bottom consists of mud. Benthic plants and animals would become established on this substrate. Therefore, direct effects on essential fish habitat due to sidecasting of materials in subtidal areas would be below measurable levels.

The approximate losses of essential fish habitat (intertidal and subtidal habitat) due to highway and ferry terminal construction are:

- Alternative 2: 30.7 acres (21.9 acres filled for highway, 4.3 acres filled for Katzehin Ferry Terminal, and 4.5 acres dredged for ferry mooring basin).
- Alternative 2A: 35 acres (21.9 acres filled for highway, 4.3 acres filled for Katzehin Ferry Terminal, 4.5 acres dredged for Katzehin mooring basin, 1.1 acres filled for Slate Cove

Ferry Terminal, 1.9 acres filled for Sawmill Cove Ferry Terminal, and 1.3 acres dredged for Sawmill Cove mooring basin).

- Alternative 2B: 30.7 acres (21.9 acres filled for highway, 4.3 acres filled for Katzehin Ferry Terminal, and 4.5 acres dredged for ferry mooring basin).
- Alternative 2C: 21.9 acres filled for highway.

Placement of in-water fill in 21.9 acres for highway construction would bury all intertidal and subtidal organisms at the specific fill locations and alter the habitat. Intertidal and subtidal invertebrate species are opportunistic, and the slopes of fill areas would likely be colonized by similar intertidal and subtidal species over a few seasons. However, because the amount and character of the area available for recolonization would be different from the undisturbed intertidal and subtidal zone, recolonization would not restore the community to its original state, reducing its value as foraging habitat for commercial fish species. Because of the small amount of intertidal and subtidal habitat that would be filled by Alternatives 2 through 2C relative to the total available, this impact would not affect regional populations of any fish or invertebrate species.

A new ferry terminal would be constructed north of the Katzehin River for Alternatives 2, 2A, and 2B. Because the terminal would not be located near the river mouth, it would not interfere with anadromous fish passage in the Katzehin River.

The proposed Katzehin Ferry Terminal site consists of a steep boulder beach transitioning to a less steep cobble beach. There is a boulder-cobble-gravel substrate in the upper subtidal/lower intertidal zone and a muddy substrate in the lower subtidal zone at this site. Vegetation is present in the shallow intertidal zone, and stalked kelp is present in one part of the lower intertidal zone; however, no seabed vegetation was seen in video imagery of the lower subtidal zone. Due to the steepness of the beach, potential wave exposure, and lack of subtidal vegetation, the proposed Katzehin Ferry Terminal site is less important to commercial fish and crab species than other more protected coves. For this reason, the loss of up to 8.8 acres of intertidal and subtidal habitat from construction of a new ferry terminal[22] would not measurably alter fish populations in the Katzehin River delta area or Lynn Canal. Operations of this ferry terminal would not impact Pacific salmon, Pacific herring, or eulachon because of the spatial separation of the terminal from the Katzehin River and other areas of Lynn Canal important to these species.

Alternative 2A includes new ferry terminals at Sawmill and Slate coves. The Sawmill Ferry Cove Terminal site is over a mile north of the mouth of Sawmill Creek, and the Slate Cove Ferry Terminal site is about 3,000 feet south of Slate Creek. Because of the distance of the terminal sites from the creeks, terminal activities would not impact anadromous fish use of the creek.

The Slate Cove Ferry Terminal site has a highly uniform muddy substrate. A few boulders and cobbles were observed at the southern portion of the site within the intertidal zone during a 2003 survey. No kelp or eelgrass was observed in the subtidal zone. Because of its lack of intertidal and subtidal vegetation, the terminal site is not high value fish habitat or spawning habitat for Pacific herring. No crabs were observed in the subtidal underwater camera survey of Slate Cove. The loss of 1.1 acre of this substrate from terminal construction would not measurably alter fish populations in the Berners Bay area or Lynn Canal.

[22] The fill area for the proposed terminal would be 4.3 acres. Another 4.5 acres would be dredged for a ferry mooring basin.

The seabed at the Sawmill Cove Ferry Terminal site consists almost exclusively of muds, sand, and gravels with some bedrock outcrops and occasional cobbles. Gravel content is highest in the intertidal zone and drops off rapidly in the subtidal zone, where sands and muds predominate. Vegetation cover is closely linked to the gravel component; therefore, cover drops off rapidly offshore. Video surveys of the site conducted in 2003 and 2004 indicated dense rockweed at the headlands on the north and south sides of the cove to about the zero foot tidal elevation. In the lower intertidal zone, rockweed is interspersed with two kinds of large-blade kelp. While this kelp is sparse, it is persistent and evenly distributed throughout the site. No eelgrass or stalked kelp is present at the site. Crabs use the subtidal and intertidal zones in Sawmill Cove and a variety of fish species have been observed at the site including yellowfin sole, rock sole, gunnels, snake prickleback, sculpin, and Pacific herring. The impact to 3.2 acres of intertidal and subtidal habitat, the replacement of natural substrates due to terminal construction, and the dredging of approximately 16,000 cubic yards for a mooring basin would alter habitat usage in the disturbed area. Filling would result in the loss of habitat while dredging and ongoing use would substantially reduce habitat value in the dredged areas. The footprint of the ferry terminal would impact approximately 300 feet (0.06 mile) of shoreline at mean lower low water, which is equivalent to less than two percent of the alongshore herring spawn length (approximately three miles) observed in Berners Bay in 2003. This habitat loss would not measurably affect other fish populations in the Berners Bay area.

The shuttle ferries that would be used in Alternative 2A would increase turbidity in the terminal areas at Slate Cove and Sawmill Cove due to vessel maneuvering. At Slate Cove, where the mud substrate is easily resuspended by natural processes, ambient turbidity is already high and turbidity caused by ferry operations would be within the existing natural range. At Sawmill Cove, turbidity could be increased over ambient conditions for short periods. Short-term turbidity increases and propeller scour could displace some Pacific herring eggs and larvae in the immediate vicinity of the Sawmill Cove Ferry Terminal. Because the ferry terminal would impact less than two percent of the spawning area for Pacific herring, the loss of eggs and larvae would not likely affect the population of this species.

There is the potential for accidental fuel spills from ferries at terminals and while traveling Lynn Canal routes. To date, no in-water fuel spills have been associated with AMHS operations in Lynn Canal. The effects of a spill would depend on its size and location. Spill prevention and cleanup plans would be in place for shuttle ferry operations to minimize potential impacts from accidental spills.

The ferries that would be used for Alternatives 2 through 2C would have sanitary waste holding tanks[23]or would discharge treated wastewater meeting applicable standards. Sanitary waste generated at the ferry terminals would undergo treatment. Wastewater would undergo aeration and disinfection with ultraviolet light. The treated wastewater would be discharged to Lynn Canal under permit by the EPA (National Pollutant Discharge Elimination System [NPDES] permit) and/or ADEC (Water Quality Permit) and would meet EPA- and Alasaka-established waste discharge limitations. For this reason, the effluent should not impact fish or crab habitat or affect fish and crab populations in Lynn Canal, including Berners Bay.

Alternatives 2, 2B, and 2C would bridge nine streams that support anadromous fish populations, including the Lace, Antler, and Katzehin Rivers. Alternative 2A would bridge five of these streams, including the Katzehin River. The bridges crossing all but the Lace, Antler, and Katzehin Rivers would not encroach on the stream channel. Piers for the bridges over the Lace, Antler, and Katzehin Rivers would be placed approximately 130 feet apart and would not impede fish movement in these rivers.

[23] Holding tanks would be pumped out and the waste treated onshore for disposal.

Most other, smaller non-anadromous streams crossed by the project alternatives would be channeled through culverts. Culverts in waters with the potential to have resident fish would be designed in accordance with the standards provided in the Memorandum of Agreement between ADF&G and DOT&PF for the "Design, Permitting, and Construction of Culverts for Fish Passage" (August 3, 2001).

Stormwater and melt water runoff from bridges over anadromous fish streams would not alter water quality sufficiently to impact crab or anadromous and marine fish habitat. As discussed in Section 4.3.9.3, studies of highway runoff in Alaska indicate that the volume of traffic on Alternatives 2 through 2C would not be large enough for runoff from the highway to cause the exceedance of any AWQS in receiving waters.

In summary, the construction of Alternatives 2 through 2C would result in the direct loss of 21.9 (Alternative 2C) to 35 (Alternative 2A) acres of essential fish habitat as a result of filling for highway and ferry terminal construction and dredging, as well as the modification of subtidal habitat resulting from sidecasting shot rock. With Alternative 2A, the habitat loss would include 3.2 acres of historically documented spawning habitat for Lynn Canal Pacific herring stock in Sawmill Cove (Battelle, 2004). Ferry maneuvers at Sawmill Cove could increase turbidity in the vicinity of the terminal sufficiently to impact Pacific herring eggs and larvae at the terminal site. Alternatives 2 through 2C would bridge all streams crossed by highway segments that support anadromous fish populations. Piers for the bridges over the Lace, Antler, and Katzehin Rivers that would be required for Alternatives 2, 2B, and 2C would be placed approximately 130 feet apart and would not impede fish movement in these rivers.

The incremental effect of Alternative 2A on Pacific herring stock is relatively small; therefore, this loss alone is not expected to adversely affect the stock's ability to recover to previous population levels. For other commercial fish species, the direct loss of between 21.9 to 35 acres of foraging habitat through highway fill and ferry terminal construction with Alternatives 2 through 2C, as well as the modification of some subtidal habitat as a result of sidecasting, would not substantially affect any fish and invertebrate populations in Lynn Canal. FHWA has determined that Alternatives 2 through 2C would not have a substantial adverse affect on essential fish habitat.

The alignment for Alternatives 2 through 2C and ferry terminals have been adjusted through preliminary engineering studies to limit intertidal and subtidal fill. During design of the selected alternative, DOT&PF would continue to investigate ways to further reduce this fill. Compensatory mitigation would be provided for the loss of intertidal and subtidal habitat (see Section 5.4 for further information on mitigation).

4.3.14 Terrestrial Habitat

Alternatives 2, 2A, 2B, and 2C would result in the loss of vegetation within the cut-and-fill limits of the highway and a narrow band of right-of-way clearing adjacent to the highway. The acreage of vegetation types that would be removed for each alternative is provided in Table 4-18. As indicated in that table, virtually all of the vegetation that would be removed by each of the alternatives is forest. Between 55 (Alternative 2A) and 71 (Alternative 2B) percent of this forest is classified as old-growth. Old-growth forest in the project area was defined as forest over 150 years old with an average diameter-at-breast-height greater than 9 inches, and timber volume greater than 8,000 board feet per acre. Other forest consists of timber stands smaller than this, a small area of which is second growth. Old-growth and other forests consist of the following coniferous forest plant series: western hemlock, western hemlock-yellow cedar, Sitka spruce, mixed conifer, mountain hemlock, and Sitka spruce-black cottonwood. The remaining

vegetation that would be removed for Alternatives 2 through 2C consists of shrub (non-forest brush) and open meadow or muskeg vegetation communities.

Table 4-18
Acreage of Terrestrial Habitat Impacted by Alternatives 2, 2A, 2B, and 2C

Habitat Type	Alternative (acres)			
	2	2A	2B	2C
Old-Growth Forest	382[1]	294[1]	314[1]	382[1]
Other Forest	233	230	128	233
Open Meadow/Muskeg and Shrub	13[2]	9[2]	13[2]	13[2]
Rock	1	1	1	1
Total Acres	**629**	**534**	**456**	**629**

Note: [1]Includes 80 acres of forested wetlands for Alternatives 2, 2B, and 2C and 62 acres of forested wetlands for Alternative 2A.

[2]Includes 7.3 acres of palustrine emergent and scrub-shrub wetlands for Alternatives 2, 2B, and 2C and 3.9 acres of palustrine emergent and scrub-shrub wetlands for Alternative 2A.

As discussed in Section 4.3.14, Alternatives 2, 2A, and 2C would involve sidecasting 6.4 million cubic yards of rock in Taiya Inlet and Lynn Canal. Alternative 2B would involve sidecasting 2 million cubic yards in Lynn Canal. Sidecasting would be located in areas where the highway is either next to the shoreline or in steep cliff or slide areas where impacts to terrestrial vegetation would be minimized.

The loss from each vegetation type represents less than one percent of that type in the study area and is minimal compared to the approximate forest cover of 117,000 acres in the Lynn Canal region (NPS, 2003). The loss of this vegetation would not adversely affect any rare or unique community types or any known rare or sensitive plant species.

Clearing of the highway right-of-way would increase the potential for blow-down of trees adjacent to the right-of-way or slides in unstable areas. These effects would likely occur more frequently in the steeper terrain along the alignment north of Point Sherman.

Alternatives 2 through 2C could have indirect effects on terrestrial vegetation. By improving the access to the area, human activity would increase along the highway corridor. This increase could lead to some degradation or disturbance of terrestrial habitat adjacent to the highway through camping and hiking, illegal dumping, and unauthorized collection of firewood. Invasive plant species could be introduced from visitors, vehicles, and pets.

4.3.15 Wildlife

4.3.15.1 Marine Mammals

Harbor seals, minke whales, killer whales, harbor porpoises, Dall's porpoises, and sea otters are considered in this section. Humpback whales and Steller sea lions are discussed in Section 4.3.18, Threatened and Endangered Species.

Harbor seals frequently haul out at a number of rocky beaches and sand bars in the study area, including sand bars in Berners Bay and at the mouth of the Katzehin River. Many harbor seals use Berners Bay in the spring and summer for feeding and hauling out, especially near the confluence of the Antler and Lace Rivers (Marston, Willson, and Gende, 2002; USFWS, 2003). Vehicle traffic would not have any effect on harbor seals where the proposed highway is at least

100 yards from the shoreline. Beyond this distance, traffic noise would be at a level that often occurs in the natural environment. The alignment of Alternatives 2, 2B, and 2C are several hundred yards away from beaches and sand bars in Berners Bay. The proposed highway alignment for Alternatives 2 through 2C would be immediately adjacent to the beach at a number of locations north of Sherman Point. It is possible that harbor seals could abandon haulouts they may currently use in these locations. Seals may habituate to highway traffic at the Katzehin River or may choose to utilize areas further down stream from the bridge. Operation of ferry terminals at Sawmill and Slate coves and Katzehin are not expected to cause disturbance to harbor seals because of the distance between these terminals and seal haulouts. The alignment of Alternatives 2, 2A, and 2C is adjacent to the shoreline along Taiya Inlet; however, this shoreline is very steep and there are few places where seals could haul out even at low tide. Therefore, these alternatives are unlikely to affect the population of this species in the project study area.

Minke whales tend to be attracted to motor vessels and would likely not be displaced by increased vessel traffic in Chilkoot and Taiya inlets associated with Alternatives 2 through 2C. Because of this attraction, increased ferry traffic may increase the risk of collision; however, collision accidents with minke whales are very rare (Angliss and Lodge, 2003). Therefore, Alternatives 2 through 2C are unlikely to impact the population of this species in Lynn Canal.

Fast-moving and maneuverable species such as the killer whale, harbor porpoise, and Dall's porpoise can readily avoid motor vessels and would not be impacted by the ferry traffic associated with Alternatives 2 through 2C.

Sea otters occur in low numbers in Lynn Canal. Like the harbor seal, sea otters are sensitive to noise and would likely avoid ferry traffic associated with Alternatives 2 through 2C. Alternatives 2 through 2C are unlikely to impact the small sea otter population in Lynn Canal.

4.3.15.2 Marine Birds

This group includes species that nest on land but forage in marine waters at least part of the year. Species considered in this group include great blue herons, marbled murrelets, Kittlitz's murrelets, harlequin ducks, and trumpeter swans.

Great blue herons nest in trees near preferred feeding areas, typically quiet shorelines and marshy areas. Alternatives 2 through 2C would result in the loss of potential nest trees on the banks at large river crossings. The type of nesting and feeding habitat preferred by great blue herons is not limited in Berners Bay or the Katzehin River delta. Great blue herons have habituated to human presence and vehicle traffic in many urban areas, including Juneau, so they would be expected to habituate to normal vehicle traffic on Alternatives 2 through 2C. For these reasons, Alternatives 2 through 2C should not result in population level effects on this species.

Marbled murrelets are common in nearshore waters along the eastern shore of Lynn Canal and in Berners Bay and are presumed to nest throughout the study area (USFWS, 2003). This species nests in old-growth trees, often near the coast. Alternatives 2 through 2C would impact a small percent of the available nesting habitat preferred by marbled murrelets. Therefore, Alternatives 2 through 2C would not have population-level effects on this species.

The Kittlitz's murrelet appears to be rare in the project area. It nests in high-elevation talus slopes and feeds in nearshore waters. This species is not expected to be affected by highway traffic.

Harlequin ducks are also common in nearshore waters along the eastern shore of Lynn Canal and in Berners Bay (USFWS, 2003) and nest along the banks of swift-running streams. These birds are wary of people and will swim or fly away when approached (Rosenberg, Patten, and Rothe, 1994). Highway traffic noise could disturb harlequins in nearshore resting and feeding areas where the highway alignment is at the shoreline. The majority of the highway is not located on the shoreline. Therefore, disturbances that would result in population level effects on this species are not expected.

Trumpeter swans typically nest in marshy areas near small lakes and are very sensitive to disturbance, with consistent disturbance causing abandonment of nests (Rosenberg and Rothe, 1994). They nest and rear young from April through September in the wetlands of the Antler, Lace, and Berners River drainages, with a concentration of nests on the Lace River near its confluence with Berners Bay (USFS, 2001). Most of these nests are well upstream of the alignment for Alternatives 2, 2B, and 2C. At least one nest site is known to exist approximately 3,200 feet from the highway alignment on the delta between the Antler and Lace Rivers (USFS, 2001). This site is separated from the alignment by a wide belt of spruce forest. At this distance, vehicle noise would not be noticeable at the nesting site and the forest would prevent visual disturbance of swans using the site.

The USFWS conducted all-season surveys of water birds in Berners Bay but did not record trumpeter swans. However, these surveys did not go upstream into the estuarine areas most likely to be used by swans. Given the number of nesting trumpeter swans in the area, it is likely that some of them, and perhaps wintering swans from other parts of Alaska, spend at least some time foraging in estuarine and marshy areas of the Berners Bay drainages. Alternatives 2, 2B, and 2C pass primarily through forested areas as they approach the Antler and Lace Rivers, so vehicle traffic would not be expected to cause disturbance of wintering swans.

4.3.15.3 Terrestrial Mammals

Species considered in this group include the black bear, brown bear, marten, river otter, wolf, Sitka black-tailed deer, moose, and mountain goat. The assessment of project effects for these animals considered habitat loss and fragmentation, traffic disturbance, mortality caused by collisions with vehicles, and indirect impacts of increased human activity in the study area.

The loss of wetland and terrestrial habitat described in Sections 4.3.12 and 4.3.14 would have a minor effect on terrestrial mammals because this loss would amount to less than 1 percent of these habitats available in the study area. Additional loss of habitat because of windblown trees adjacent to the right-of-way or changes in local hydrologic patterns may add to the total habitat loss but not by enough to measurably affect wildlife populations in the study area.

Behavioral avoidance of a highway on the alignment for Alternatives 2 through 2C or physical features of the highway such as steep embankments or retaining walls may function as a barrier to movement for some species and may fragment their habitat by limiting their ability to use all of their range. Alternatives 2 through 2C would have little effect on the movement of moose or mountain goats. Moose readily cross highways; therefore, habitat fragmentation is not an issue for that species. Mountain goat habitat is primarily at higher elevations than the proposed highway alignment, and even when they venture down to low elevations to escape deep snow, they seldom venture far from steep escape terrain. Therefore, little of the winter range for mountain goats would be affected by Alternatives 2 through 2C. The HCI model prepared for the 1997 Draft EIS predicted that an East Lynn Canal Highway would decrease mountain goat habitat capability on the east side of Lynn Canal by only one percent compared to present conditions.

Sitka black-tailed deer use a variety of habitat types, so it is unclear how habitat fragmentation might affect their survival (USFS, 1997). They appear to be limited by heavy snow conditions and the quality of winter habitat. Based on a lack of high-quality winter habitat, the deer population is considered very small on the east side of Lynn Canal north of Berners Bay (Barten, 2001).

Black bears in Southeast Alaska tend to migrate seasonally between winter dens at higher elevations and summer feeding grounds at lower elevations. For this reason, many bears would likely have to cross portions of the proposed highway alignment at least twice a year. A lack of escape cover near some portions of Alternatives 2 through 2C and traffic disturbance could block some bears from portions of their existing home ranges. Because black bears are highly adaptable and often learn to coexist near human development, a highway is not expected to result in a substantial effect on black bear populations in the study area. The highway would likely result in mortality of some black bear from vehicle collisions. The HCI model results for the 1997 Draft EIS predicted that an East Lynn Canal Highway would decrease black bear habitat capability on the east side of Lynn Canal by about seven percent compared to present conditions.

Brown bears also move seasonally between higher elevation dens and lower elevation foraging habitat, for example, in Berners Bay in the isthmus between the Lace and Antler rivers (Christensen and Van Dyke, 2004). Brown bears tend to avoid highway traffic more than black bears. One study found that brown bears avoided roads regardless of traffic volume (McLellan and Shackleton, 1988). Thus, they would be more likely than black bears to abandon certain parts of their range rather than cross a highway. Because Alternatives 2 through 2C would separate higher elevation habitats from beach fringe and estuary habitats and because those areas often contain important resources for brown bears, the effective loss of habitat could reduce the reproductive success or survival of some bears (Schoen et al., 1993). The HCI model results for the 1997 Draft EIS predicted that an East Lynn Canal Highway would decrease brown bear habitat capability on the east side of Lynn Canal by 29 percent compared to present conditions. To reduce this habitation fragmentation, bridges over streams would be designed to provide underpasses for wildlife migration. In addition, if Alternative 2, 2B, or 2C is the selected alternative, a wildlife underpass would be constructed for the brown bear migration corridor identified in the inland area between the Lace and Antler rivers.

A highway on the alignment for Alternatives 2 through 2C is not likely to fragment the range of marten, as they would readily cross the road to access favorable habitat. The largest impact of these alternatives on marten would be the indirect impact of trapping. Marten are highly desirable as a furbearing species and are relatively easy to trap. Alternatives 2 through 2C would increase human presence and access in the region, probably increasing the number of marten trapped in the East Lynn Canal region. The HCI model results for the 1997 Draft EIS predicted that an East Lynn Canal Highway could decrease marten habitat capability on the east side of Lynn Canal by 38 percent primarily because of trapping. The effects of this increased pressure could be controlled by ADF&G through season duration, take limits, lottery drawings, etc.

Wolves travel widely in pursuit of prey and strongly avoid areas of human activity (USFS, 2000; Person, 2001). The proposed highway would provide more access for people to beaches and riparian areas, potentially inhibiting the use of these areas by wolves.

Alternatives 2 through 2C would not fragment the ranges of marten and river otter except possibly in the area of Gran Point and Met Point. As discussed in Section 4.3.18.1, Gran Point and Met Point are important haulout areas for Steller sea lions. To discourage people from accessing them, the design for Alternatives 2 through 2C would include cut banks, retaining

walls, and screening structures, where necessary, within approximately 3,000 feet of each location. These barriers could inhibit the movement of martens and river otters in these two areas although there would be culverts these animals could use to cross the highway. Although a highway could impact individual animals, it is not expected to have population-level effects on martens and river otters in the study area.

Collisions with vehicles would result in an increase in mortality among many terrestrial mammal species in the project area. Species most likely to be affected are those attracted to roads to feed on roadside grasses, forbs, and brush and to escape deep snow, such as moose and deer, and those that do not appear to have a substantial aversion to crossing roads, such as river otters, martens, and black bears. Fewer vehicle collisions are expected to occur with species that tend to avoid roads such as the wolf and brown bear. Mountain goats would probably not be substantially impacted by collisions, as they would generally not be found adjacent to the highway. It is not possible to quantify the effect of mortality from vehicle collisions on wildlife populations in the study area, but there would be some losses.

The moose population around Berners Bay consists of only about 100 to 150 animals and is subject to a highly popular but very limited permit-only hunt (Barten, 2001). The number of moose killed by vehicles each year would fluctuate with weather conditions and the density of moose near the highway. ADF&G would have to consider this source of mortality in its management plans for the Berners Bay herd and the hunting limits on that herd.

DOT&PF would use helicopters to deliver explosive devices to unstable avalanche zones along Alternatives 2 through 2C during the winter. Mountain goats are very sensitive to human disturbance in their alpine habitats, especially from helicopters (USFS, 2001). During heavy snow conditions, when avalanche danger is highest, goats tend to retreat to lower elevations and seek shelter under dense-canopied old-growth forests. However, goats have also been observed at high elevations and traversing slide zones during late winter in the study area. Therefore, mountain goats could be susceptible to disturbance from helicopters and explosive devices used to keep the highway clear during the winter, and could be injured or killed in slides induced for highway maintenance. However, regular maintenance of avalanche chutes would reduce the frequency that debris from large avalanches reaches forested areas. This would minimize the likelihood of goat mortality from these larger events.

Alternatives 2 through 2C would make a large area more accessible to hunters and trappers. As is the case elsewhere in Alaska where roads from populated areas have been built into semi-remote and remote areas, hunting and trapping pressure on species such as black and brown bears, moose, deer, mountain goats, martens, and river otters would increase on the east side of Lynn Canal with Alternatives 2 through 2C. To limit this pressure, DOT&PF would not provide additional pullouts other than those identified in Section 4.3 unless requested by USFS[24]. The effects of this increased hunting and trapping pressure could be controlled by ADF&G through season duration, take limits, lottery drawings, etc. Therefore, it is expected that this increased pressure would not result in undesirable population-level effects in addition to those due to habitat loss and fragmentation.

See Section 5.8 for a discussion of mitigation measures for terrestrial wildlife.

4.3.15.4 Terrestrial Birds

Species considered in this group include the Queen Charlotte goshawk, peregrine falcon, olive-sided flycatcher, gray-cheeked thrush, blackpoll warbler, and Townsend's warbler. Goshawks

[24] The USFS is the agency responsible for management of most land adjacent to the alignment for Alternatives 2 through 2C.

are the only resident species in this group. Peregrine falcons could be present during migration in spring and fall. The other species are neo-tropical migrants that could be present either during migration or during the nesting season. Except for the peregrine falcon, all of these species favor primarily old-growth forest habitat. Conservation concerns for these species are the result of landscape-scale loss of habitat due to commercial logging (BPIF, 1999). There are approximately 76,279 acres of old-growth forest on the east side of Lynn Canal. Alternatives 2 through 2C would affect up to approximately 382 acres, or 0.5 percent, of the old-growth forest. Therefore, the proposed project is not expected to result in population-level impacts to these species.

Alternatives 2 through 2C would cause some direct loss of habitat through clearing. The opening in the forest canopy created by the highway could cause some birds to avoid the highway area, leading to an effective loss of additional nesting habitat. Openings in the forest canopy also create "edge effects," which is the edge between forest and grass or shrub lands that can be used by some avian predators such as ravens, jays, and crows. These effects would add to the decreased value of nesting habitat for neo-tropical migrants near the highway.

4.3.15.5 Amphibians

Frogs and toads such as the wood frog, spotted frog, and boreal toad live in both marshy and forested wetlands. Because amphibians have small home ranges and do not appear to travel far from their natal pools (NatureServe, 2003), the potential impacts resulting from highway maintenance and operation would be limited to those animals that live near the proposed alignment. The potential impacts of a highway to amphibians would occur through mortality from roadkill and potential pollution of habitat from highway runoff of pollutants from accidental spills. These impacts are not expected to affect amphibian populations on an area-wide basis.

4.3.16 Bald Eagles

The principal concerns for maintenance and operation of Alternatives 2 through 2C with regard to bald eagles is disturbance of nesting birds and abandonment of nesting sites. The alignment for Alternatives 2 through 2C has been located to avoid the direct loss of known trees with eagle nests based on USFWS nest surveys of the project area. However, a number of trees with eagle nests are located near the alignment. As indicated in Section 4.1.15, the USFWS has developed a set of distance guidelines for construction activities near active eagle nests that have been used for this impact assessment. Table 4-19 lists the known trees with eagle nests within specified distances from the proposed highway alignment for Alternatives 2 through 2C. Based on a USFWS survey, 37 of the 100 nests within 0.5 mile of Alternatives 2 and 2C were actively being used by bald eagles in 2003.

Table 4-19
Known Eagle Nest Trees within the Vicinity of Alternatives 2 through 2C

Distance from Highway	Alternative (No. of Eagle Nests)			
	2	2A	2B	2C
0 to 0.5 mile	100	97	88	100
0 to 330 feet	57	54	45	57

In Southeast Alaska, bald eagles that have chosen nest sites in or near urban areas are often acclimated to high levels of human activity (Johnson, 1990). Bald eagles are most susceptible to disturbance during the breeding and nesting season, which in Lynn Canal begins in March and continues through August.

Maintenance and operation of Alternatives 2 through 2C would involve a persistent source of noise that may result in the relocation of individual eagle pairs to alternate nest trees within their nesting territory. Individual eagle pairs may even abandon their nesting territory and associated hunting perches altogether, especially during the summer months, when traffic volumes are predicted to peak. Because food availability has been identified as a key factor that influences breeding success, eagle pairs less sensitive to noise disturbance would likely habituate to highway operation near prime feeding areas. In addition, opportunistic bald eagle pairs from other territories may use previously abandoned nest sites along the east shoreline of Lynn Canal. As a result, Alternatives 2 through 2C are not likely to adversely affect the overall population of bald eagles in the Lynn Canal area. See Section 4.8.12.6 for construction impacts and mitigation regarding bald eagles.

4.3.17 Threatened and Endangered Species

Consultation on Steller sea lions and humpback whales with NMFS under Section 7 of the Endangered Species Act will be concluded after the comment period for the Supplemental Draft EIS. Following consideration of comments received on the Supplemental Draft EIS, a final preferred alternative will be identified for the proposed project. Section 7 consultation will be concluded based on that alternative.

4.3.17.1 Steller Sea Lions

There are two principal haulouts along the proposed alignment for Alternatives 2 through 2C that are used on an annual basis by Steller sea lions: Gran Point and Met Point. Gran Point is designated as critical habitat under the Endangered Species Act. Although Met Point is not used by sea lions as extensively as Gran Point, it is still an important haulout for this species. Steller sea lions also haul out seasonally on Point St. Mary approximately two miles southwest of Slate Cove during the spring when feeding on spawning aggregations of eulachon and Pacific herring in Berners Bay.

Modeling was done to estimate traffic noise from Alternatives 2 through 2C at the Gran Point haulout (see the *Steller Sea Lion Technical Report* [Appendix S]). The modeling results indicated that peak hour traffic noise levels in the haulout area would range from approximately 35 to 41 dBA. Background noise levels in the area were measured in the mid-30 to upper-40 dBA range. Therefore, traffic noise from Alternatives 2 through 2C would not increase noise levels at the Gran Point haulout, and Steller sea lions would not be impacted by traffic noise. Based on the distances from the haulouts to the highway and background noise levels, traffic noise impacts on Steller sea lions at Met Point would be the same as those projected for Gran Point. Highway noise at Point St. Mary is not a concern because of the distance between the haulout and the proposed highway and ferry terminal.

Sea lions have been observed to approach and investigate marine vessels and other noise sources and appear to adapt to noise and human presence under some conditions (Richardson et al., 1995). Several major haulouts are located near busy shipping lanes and ports along the Pacific coast, with sea lions exhibiting little disturbance even as human activities increase (Johnson et al., 1990). In some areas, sea lions haul out on man-made structures close to humans (Richardson et al., 1995). In a study of Steller sea lions at a haulout in Glacier Bay National Park, the proximity and behavior of approaching marine vessels affected the activity rate of sea lions at the haulout (Mathews, 1997). Vessels that maintained a slow, steady course and kept the engines on seemed to disturb sea lions less than vessels with an erratic course or speed. This study may indicate that private vessels, which are more maneuverable and whose operators may be less aware of protection rules, might disturb Steller sea lions more than larger commercial vessels (NPS, 2003). Alternatives 2 through 2C would not include any new boat

launch sites for private or commercial vessels. Because the ferry traffic associated with Alternative 2A would be relatively slow and consistent in both direction and speed, it is expected that sea lions at Point St. Mary would habituate to these vessels in the same way they have habituated to marine vessels including ferries that currently pass the Gran Point and Met Point haulouts.

In response to NMFS concerns about potential pedestrian access and disturbance at the Gran Point and Met Point haulouts, highway design elements have been incorporated into Alternatives 2 through 2C that are intended to prevent motorists from leaving the highway corridor and approaching these haulouts. The measures include steep embankments and eight- to 10-foot-high concrete barriers within 3,000 feet of either haulout. DOT&PF would monitor the effectiveness of these design elements after highway construction and make additional changes, if necessary, to keep people away from these haulouts. The proposed ferry terminal at Slate Cove is approximately three miles from the sea lion haulout at Point St. Mary. Although this haulout is potentially accessible to pedestrians along the beach at low tide, the difficulty of traversing the rocky shoreline and adjacent forested area would deter most people from walking out to the area.

During highway construction, work within 1,000 feet of the Gran and Met points haulouts would only be done when the haulouts are vacant. The haulouts would be monitored when construction work is being done within 3,000 feet of the haulouts to ensure that Steller sea lions are not disturbed.

FHWA has made a preliminary determination that Alternatives 2 through 2C are not likely to adversely affect Steller sea lions or adversely modify the Gran Point Critical Habitat Area.

4.3.17.2 Humpback Whales

Alternative 2 would increase marine traffic in Chilkoot Inlet. Alternative 2A would result in a substantial increase in marine traffic in Berners Bay as well as increased traffic in Chilkoot Inlet. Alternatives 2B and 2C would increase marine traffic in Chilkoot and Taiya inlets. The increase in ferry traffic associated with Alternatives 2, 2B, and 2C would not be high enough to substantially increase the risk of collisions with humpback whales. The number of trips across Berners Bay with Alternative 2A (20 per day during the summer and eight per day during the winter) may be high enough to discourage the use of the bay by some humpback whales.

Pile driving for construction of the ferry terminal at Katzehin could disturb humpback whales in the area. Monitors would be used during pile driving to ensure that this activity does not occur when humpback whales are within 660 feet of the construction area.

FHWA has made the preliminary determination that Alternatives 2, 2B, and 2C are not likely to adversely affect humpback whales. FHWA has made the preliminary determination that Alternative 2A may affect humpback whales.

4.3.18 Permits and Approvals

Alternatives 2 through 2C would require the following permits and approvals:

- USFS special use permit for project facilities in the Tongass National Forest
- USACE Section 404 (Clean Water Act) permit for fill in wetlands and other waters of the U.S.

- USACE Section 10 permit (Rivers and Harbors Act) for dredge, fill, and structures placed below mean high water
- U.S. Coast Guard Section 9 permits (Rivers and Harbors Act) for bridges over navigable waters
- ADEC Section 401 (Clean Water Act) Water Quality Certification in support of Section 404 permits
- ADNR Title 41 fish habitat permit for any work below ordinary high water in streams with anadromous or resident fish
- ADNR Coastal Consistency Determination
- ADNR Interagency Land Management Assignment for use of tidelands at the Sawmill Cove (Alternative 2A), Slate Cove (Alternative 2A), and Katzehin (Alternatives 2, 2A, and 2B) Ferry Terminals, and easements for highway segments built below mean high water
- Authorization from EPA and/or ADEC for treated wastewater discharge from the Sawmill Cove (Alternative 2A), Slate Cove (Alternative 2A), and Katzehin (Alternatives 2, 2A, and 2B) Ferry Terminals

4.4 Alternative 3 – West Lynn Canal Highway

Alternative 3 proposes a new highway primarily on the west side of Lynn Canal. This alternative would include a highway from Echo Cove to Sawmill Cove on the same alignment as Alternative 2A (on the east side of Lynn Canal) and a highway on the west side of the canal from William Henry Bay to Mud Bay Road in Haines. New ferry terminals would be located at Sawmill Cove and William Henry Bay to provide for shuttle ferry service across Lynn Canal.

DOT&PF and the USFS considered appropriate sites for pullouts and scenic overlooks for Alternative 3 in 2003. The locations of these sites are provided in Figure 4-19.

- A pullout at William Henry Bay Ferry Terminal.
- A scenic overlook would be located on the shoreline near Lance Point.
- A pullout would be located near the Endicott River.
- A pullout and scenic overlook would be located north of the Cant geodetic marker.
- A pullout would be located near the Sullivan River.
- A pullout and scenic overlook would be located near the Gen geodetic marker.
- A pullout would be located near the Deep geodetic marker.

The environmental impact assessment provided in Section 4.4 includes consideration of the potential impacts of the proposed pullouts and scenic overlooks. The USFS may develop trails at some of the pullouts in the future. (See March 25, 2004 letter from USFS in Chapter 7.) A separate environmental assessment would be completed by the USFS for these trails.

4.4.1 Land Use

4.4.1.1 Land Ownership and Management

Current ownership of the land that would be required for the highway right-of-way and new ferry terminal facilities for Alternative 3 is presented in Table 4-20. As indicated in that table, approximately 69 percent of the 1,324 acres of required right-of-way for Alternative 3 is federal

land in the Tongass National Forest under the management of the USFS. This land would remain under federal ownership with a highway easement conveyed to the state. About 246 acres, or 19 percent, of the right-of-way is already owned by the state. The remaining land required for the Alternative 3 right-of-way is under private or University of Alaska ownership. Private landowners, including Goldbelt and University of Alaska would be compensated for lands required for a new highway right-of-way at fair market value in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

Table 4-20
Land Ownership of Required Right-of-Way for Alternative 3

Ownership (acres)						Total (acres)
USFS	State of Alaska	Alaska Native Allotment	Goldbelt	University of Alaska	Private	
912	246	35	55	35	42	1,324

Note: Based on the maximum right-of-way width of 300 feet on federal and state lands and 150 feet on private and municipal lands.

4.4.1.2 Consistency with Land Use and Management Plans

As described in Section 3.1.1.1, the TLMP for the Tongass National Forest identifies a transportation corridor along the alignment for Alternative 3; therefore, this alternative is consistent with the TLMP (USFS, 1997b). The USFS land crossed by the alternative along the east shore of Berners Bay is currently managed under Semi-Remote Recreation and Scenic Viewshed designations (Figure 3-3). Most of the USFS land crossed by Alternative 3 on the west side of Lynn Canal is currently managed under the designations Semi-Remote Recreation and Modified Landscape. A small area around William Henry Bay is managed as Scenic Viewshed. If Alternative 3 is selected as the final preferred alternative for the proposed project and a highway is constructed on the alignment, the USFS would change the designation of the highway corridor to Transportation and Utility Systems.

The regional transportation policy set forth in the CBJ Comprehensive Plan is to support the improvement and expansion of air, marine, and highway transportation systems to maintain and expand Juneau's role as the capital city and a regional transportation center (CBJ, 1996). The 1996 update to the CBJ Comprehensive Plan maintains plans for the consideration of all alternatives, including highways, high-speed ferries, and light rail or railroad, to improve transportation links throughout Southeast Alaska and Canada. Therefore, Alternative 3 is consistent with the CBJ Comprehensive Plan.

The majority of the land on the west side of Lynn Canal from north of the Tongass National Forest to the Pyramid Harbor area (Figure 3-2) is owned by the State of Alaska and is managed by the ADNR under the Haines State Forest Plan. Alternative 3 would cross approximately 15 miles of this state forest. The plan identifies preferred uses for forest land and the policies for managing these uses, emphasizing management flexibility. Transportation projects are consistent with the plan as long as they follow the State of Alaska Forest Resources and Practices Act and its regulations.

On the west side of Lynn Canal, the Alternative 3 highway would be located within the Haines Borough. The Haines Comprehensive Plan was updated in April 2004. The plan discusses the importance of daily AMHS service and expresses concern about a highway link to Juneau. The proposed highway alignment is within the general use zoning district of the plan outside the city limits of the former City of Haines. The intent of this general use designation is to provide a

minimum of planning, platting, and land use regulation in rural areas. A transportation facility would be consistent with this zoning designation.

The Alternative 3 alignment crosses the Chilkat River/Inlet at Pyramid Island and joins Mud Bay Highway within the Haines Townsite Planning Zone boundaries. The highway would pass through or adjacent to land zoned Residential, Business Transition and Residential, and Development. Alternative 3 terminates at Mud Bay Road in Haines and would be consistent with this existing transportation use.

4.4.1.3 Land and Resource Uses

The West Lynn Canal Highway would improve opportunities for recreational activities such as hiking, camping, sightseeing, boating, bicycling, fishing, and hunting. These opportunities would provide benefits for residents and visitors, and spread out recreation activities that are currently concentrated along the existing highway systems in Juneau, Haines, and Skagway. The Haines State Forest is already a popular location for remote and semi-remote recreation. A highway through this area would make it more accessible for people looking for a rustic but not completely remote outdoor experience. A highway could also provide opportunities for outfitters to make more recreational trips available to the public in the region. A highway and Sawmill Cove ferry terminal would improve access to Berners Bay for canoers and kayakers. Opening up these recreational opportunities on the coastline along the east side of Lynn Canal to Sawmill Cove and the west side of Lynn Canal from William Henry Bay to Haines would have a negative effect on the quality of the experience to those who enjoy the existing remote nature of the region, including some outfitters who currently provide wilderness trips there.

Many of the rivers and streams that would be crossed by the West Lynn Canal Highway contain resident and anadromous fish stocks available for sport fishing. The region also supports populations of mountain goat, bear, and moose available for take by resident and out-of-state hunters. Hunting and fishing pressure has increased along every highway in Alaska that has opened formerly remote areas. Increases in hunting and fishing would occur along the West Lynn Canal Highway. As in other readily accessible regions of the state, the Alaska Department of Fish and Game (ADF&G) would monitor the resources along Lynn Canal and adjust fish and game regulations, as necessary, to protect these resources from overutilization.

The commercial activities of Goldbelt could be expanded with improved access to its Echo Cove lands. Better access would facilitate development opportunities, including transportation-related activities, recreation, tourism, and residential development.

A highway would provide easier and less expensive access to mineral occurrences, prospects, and claims along the west side of Lynn Canal; however, it is unlikely that this improved access alone would enhance the economic viability of any of these mineral deposits. Development of mineral resources is capital intensive, involving many other costs besides access. Market conditions must be high enough to account for all of these costs before development can occur.

4.4.1.4 Parks and Recreation Facilities

No land from a municipal, state, or federal park or recreation area would be required by Alternative 3. See Chapter 6 for further discussion of potential impacts to public recreation facilities.

4.4.2 Coastal Zone Management

The proposed West Lynn Canal Highway and ferry terminals are located in the coastal zone. The highway from Echo Cove to Sawmill Cove and the proposed Sawmill Cove Ferry Terminal

are within the CBJ coastal management area. The West Lynn Canal Highway connection to Mud Bay Road would be in the Haines Borough coastal management area. Therefore, Alternative 3 would need to comply with the enforceable policies of the ACMP and segments of the alternative would need to comply with the CBJ and Haines coastal management plans.

The topics addressed by the enforceable policies of the ACMP and the coastal management plans that are relevant to Alternative 3 are coastal development; geophysical hazards; recreation; transportation and utilities; timber harvest; mining and mineral processing; subsistence; biological habitats; air, land, and water quality; and prehistoric and historic resources. These policies provide goals and performance criteria for activities within the coastal zone, including transportation projects.

Alternative 3 has been sited in consideration of the enforceable policies of the ACMP and district coastal management plans. These enforceable policies would also be considered in the development of design parameters for the alternative selected for the proposed project. In accordance with the Coastal Zone Management Act, DOT&PF will obtain a determination from ADNR of consistency of the selected alternative with the state coastal management program and Juneau and Haines coastal management plans prior to obtaining the necessary state and federal permits for the project.

4.4.3 Visual Resources

Visual simulations were made for Alternative 3 at viewpoints in each of the major landscape units described in Section 3.1.2. The locations of those viewpoints are provided in Figure 4-2. A description of the visual character of the alternative at each viewpoint is provided below.

4.4.3.1 Berners Bay

Views from the Bay – In Berners Bay, the most susceptible views to potential impacts from Alternative 3 are views from boats in the bay. Figure 4-20 provides a visual simulation of the highway in background views from the southern end of Berners Bay. From this location, the highway is approximately 2.4 miles from the viewer and is located in an area not requiring substantial cuts and fills. Therefore, the highway is not likely to dominate the existing natural setting. At closer distances, the ferry terminal at Sawmill Cove and the highway would be more noticeable. It is likely that visitors to Berners Bay and Point Bridget in the Point Bridget State Park would notice the highway; however, this condition is highly dependent on the view distance.

Figure 4-21 is a visual simulation of the highway in the foreground at the Sawmill Cove Ferry Terminal proposed for Alternative 3. The highway would be noticeable intermittently along the eastern edge of Berners Bay. However, the proposed ferry terminal would likely be highly visible from this distance (approximately one mile) and through the middleground viewing threshold. The changes to form, line, color, and texture introduced by the ferry terminal would dominate the existing viewshed.

Views from the Highway – Views from a highway along the east shore of Berners Bay looking east would be limited to the foreground by dense old-growth forest in most places. Many of the views looking west from the highway would be panoramic, taking in Berners Bay and Lynn Canal with the snow-capped peaks of the Chilkat Range in the background approximately 12 miles away.

4.4.3.2 William Henry Bay to Sullivan Island

Views from Lynn Canal – Views most susceptible to potential impacts from Alternative 3 in this area include:

- Views from within the Endicott River Wilderness
- Views from Sullivan Island and Sullivan Island State Marine Park
- Views from cruise ships, ferries, and small boats
- Views from private land

Figure 4-22 is a visual simulation of Alternative 3 from William Henry Bay, approximately 0.3 mile from the proposed project. Topography along this portion of the proposed alignment consists primarily of rolling to steep hills. Vegetation is of a closed canopy forest character. William Henry Bay is a small enclosed bay. Middleground and background views of the proposed highway would be limited for marine travelers. The roadway itself would be visible intermittently as it traverses east and north around the outer edge of the bay. The proposed ferry terminal is likely to dominate the existing viewshed because it would introduce a high degree of change in form, line, color, and texture to the existing natural setting.

Figure 4-23 is a visual simulation of Alternative 3 looking west from Lynn Canal toward William Henry Mountain. Viewers of the proposed highway from this location are likely to notice an intermittent linear band around the toe of William Henry Mountain. The Alternative 3 alignment has reduced linear visibility based on the roadway being sited on a gentle topographic bench. This view demonstrates the effectiveness of vegetative screening.

Figure 4-24 is a visual simulation of Alternative 3 looking from Lynn Canal to the Endicott River delta with the Alternative 3 alignment in the foreground. Topography consists mainly of rolling hills within a closed-canopied forest and wetlands associated with the Endicott River. It is likely that the proposed highway would be intermittently noticeable from foreground and middleground views. The proposed bridge crossing the Endicott River may become a dominant feature within this viewshed. The existing natural setting contains many features that dominate the viewshed (e.g., the Endicott River delta and mountain ranges as well as coastline features [rock outcrops]). Minimal, if any, areas of cuts would be visible within the river delta.

Views from the Highway – Views from the highway would typically alternate between confined foreground and middleground views of dense forest to panoramic scenes of Lynn Canal. Those panoramic views would include the Canal in the middle- and background, with background views of the rugged, snow-capped peaks alone the east side of Lynn Canal. The crossings of the Sullivan and Endicott Rivers would open scenes to the west up forested valleys.

4.4.3.3 Sullivan Island to Chilkat River

Views from Lynn Canal – Views most susceptible to potential impacts from Alternative 3 in this area include:

- Views from residential areas in Haines and along roadways
- Views from small boats
- Views from Chilkat State Park
- Views from cabins
- Views from resorts/camps

- Views from the Haines State Forest Resource Management Area
- Views from visitors accessing Davidson Glacier

Figure 4-25 is a visual simulation of Alternative 3 from Lynn Canal where the proposed highway would traverse the headwater delta of the Davidson Glacier. The topography is very flat along this portion of the proposed alignment. The highway would have limited, if any, visible cuts in this area. In addition, vegetative screening would not make it very visible from Lynn Canal.

Figure 4-26 is a visual simulation of Alternative 3 from Chilkat River near Pyramid Island looking north to the proposed bridge that would cross the Chilkat River under this alternative. From this viewpoint, the bridge would provide a contrast in line, form, and color to the existing natural/semi-modified setting. This proposed crossing is of such a large scale that it may be noticeable even in background views. It is likely that the bridge would dominate views when it is in the foreground to middleground.

Views from the Highway – At the southern end of this segment of the highway, views would alternative between confined foreground and middleground views of dense forest to panoramic scenes of Lynn Canal. Those panoramic views would include the Canal in the middle- and background, with background views of the rugged, snow-capped peaks alone the east side of Lynn Canal. Davidson Glacier would be very prominent in views from the road where the alignment crosses below it. At the northern end of the highway, views would encompass the Chilkat River/Inlet and the community of Haines.

4.4.3.4 Consistency with Visual Quality Objectives

The VQO for the Transportation and Utility Systems LUD is Modification with only the foreground of views considered. Alternative 3 would be consistent with this VQO. Where ever possible, the alignment has been located to maintain a buffer between the highway and the shore to reduce the visibility of the highway from Lynn Canal. In many locations, the alternative would exceed the VQO of Modification. In order to demonstrate the overall visual effect of the alternatives, DOT&PF also evaluated the consistency of Alternative 3 with the VQOs of the adjacent LUDs.

USFS lands on the west side of Lynn Canal have a VQO of Retention at river deltas and William Henry Bay and a VQO of Partial Retention to Modification in all other areas. The West Lynn Canal Highway would be largely masked from views from Lynn Canal except at river crossings and the ferry terminal proposed at William Henry Bay. Therefore, the highway would conform to the VQOs of adjacent LUDs except at river crossings and in views from within William Henry Bay, where it would be visible in foreground and middleground views.

4.4.4 Historical and Archeological Resources

The Dalton Trail would be crossed by Alternative 3 just north of Pyramid Harbor. This is the only property within the APE that is eligible for the NRHP.

The Dalton trail would be bridged. Alternative 3 would have a visual effect on the trail. However, this effect would not be adverse because the visual context of the trail has changed from historical conditions and the primary view would be from the highway, as the trail is not currently in use. For this reason, FHWA has determined that Alternative 3 would not have an adverse effect on the Dalton Trail.

Indirect effects on historical and archeological resources for Alternative 3 could result from increased access. Implementation of Alternative 3 would increase human access in the west

Lynn Canal area. Increased access could result in disturbance of historic and prehistoric cultural sites from hikers, hunters, and other recreational users.

4.4.5 Socioeconomic Resources

4.4.5.1 Overview

Improved access in Lynn Canal resulting from Alternative 3 would facilitate the movement of goods and people and create closer links between the economies of Juneau, Haines, Skagway, and Whitehorse.

A redistribution of the independent visitor market would result if Alternative 3 were implemented. Overall, the number of independent travelers passing through Juneau and Haines is expected to increase. Cruise ship traffic to Juneau, Haines, and Skagway would not be affected by Alternative 3.

Alternative 3 would not substantially affect the population and demographics of Juneau, Haines, and Skagway. Haines would experience the largest population growth due to improved access. This growth would translate into a demand for approximately 55 additional housing units in Haines.

4.4.5.2 Juneau

Population, Economics, Housing, and Municipal Revenues – The total increase in non-Juneau resident traffic to and from Juneau associated with Alternative 3 is estimated at 40 annual ADT in 2008. Assuming all traffic is round-trip, 2 annual ADT equals one additional visiting vehicle carrying an average of 2.3 people. Therefore, Juneau is projected to receive a total of about 17,000 new non-Juneau resident visitors in 2008. From the 2003 Alaska Travelers Survey and the 1994 Household Survey conducted for this project (McDowell, 1994), it is reasonable to assume that in-state visitors to Juneau would spend $80/visitor/trip and non-Alaskan visitors (e.g., Canadians and people from the Lower 48 states) would spend $160/visitor/trip. Based on these assumptions, visitor spending in Juneau would increase by about $2 million in 2008 because of Alternative 3 (Table 4-21). This increase in visitor spending in Juneau would generate about $1.1 million in new payroll and an annual average of about 40 additional jobs.

Table 4-21
2008 West Lynn Canal Highway Alternative
Visitor Spending and Related Impacts in Juneau

Description	Impact
Highway Traffic (Annual ADT)	310
Traffic Less Local Residents and Baseline Traffic	40
Total New Visitors[1] per Year	17,000
Total New Visitor Spending per Year	$2,000,000
New Local Payroll per Year	$1,100,000
New Local Employment	40

Note: Annual ADT = annual average daily traffic
[1]New visitors are all visitors who are not Juneau residents.

Alternative 3 traffic is predicted to increase at an annual rate of approximately 1.8 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth,

annual spending, employment, and payroll related to new highway traffic in 2038 would be approximately 70 percent higher than in 2008 (Table 4-22).

Table 4-22
2038 West Lynn Canal Highway Alternative
Visitor Spending and Related Impacts in Juneau

Description	Impact
Highway Traffic (Annual ADT)	530
Traffic Less Local Residents and Baseline Traffic	70
Total New Visitors[1] per Year	28,900
Total New Visitor Spending per Year	$3,400,000
New Local Payroll per Year	$1,870,000
New Local Employment	70

Note: Annual ADT = annual average daily traffic
[1]New visitors are all visitors who are not Juneau residents.

Each new job in the Juneau economy results in an increase in population of about 1.5 people[25]. Therefore, the 40 new jobs in Juneau resulting from Alternative 3 in 2008 would result in a population increase of 60 residents. In 2038, Juneau's population would increase by about 100 residents. This increase would represent an overall increase of about 0.3 percent in Juneau's current population (approximately 31,000).

Assuming 2.6 persons per household, a population increase of 60 residents would result in additional demand for about 25 housing units in 2008. In 2038, housing demand would increase by about 40 units. The latest available data indicate that Juneau had approximately 320 vacant housing units in 2001. The demand generated by Alternative 3 is well within the existing vacant housing capacity of Juneau.

Alternative 3 would increase the value of private property along the highway, though the extent of the increase cannot be estimated. For example, Goldbelt's property in and north of Echo Cove would increase in value.

Sales tax revenues (plus hotel, liquor, and tobacco taxes) for Juneau would increase at a rate proportional to the increase in spending. Total additional visitor spending of $2 million in 2008 would generate (assuming all of the spending is taxable) $100,000 in additional sales tax revenues (based on a 5 percent tax rate). In 2038, new visitor spending would increase sales tax revenues by about $170,000. Property values along Glacier Highway would increase. The CBJ would have an increase in property tax revenues because of this increase in property values. Residents in this area would pay higher property taxes.

Industry/Commercial Sectors – Alternative 3 would not impact the cruise ship industry in Juneau. Port-of-call decisions are based on a combination of factors, including the availability of berthing space, appeal to passengers, and the overall capacity and profitability of tour offerings. Also considered are operational issues such as vessel speed, fuel consumption, docking fees, and safety. Alternative 3 would not impact any of these factors.

As indicated in the above discussion on population, economics, housing, and municipal revenues, the independent visitor industry in Juneau would benefit under Alternative 3. With

[25] Based on an estimated participation rate of 65 percent, meaning that 65 percent of the Juneau population participates in the local labor force.

completion of a highway, Juneau would become the mainline terminus for the AMHS, resulting in a number of independent visitors stopping in Juneau that otherwise might not visit the community. The number of RVs traveling to Juneau would increase.

The total number of 2002 RV nights (i.e., nights that RVs spend in Juneau) is estimated to have been between 3,000 and 4,000. The total number of annual Juneau RV nights expected in the first year of highway access is estimated to be less than 10,000. There are several RV parks in Juneau with a capacity of about 12,000 RV nights from May 15 to September 15. It is estimated that by 2038 the demand for RV accommodations with Alternative 3 would exceed this existing capacity and additional RV parks or expansion of existing parks would be required.

The process of planning and building an RV park in Juneau would present some challenges to prospective RV park operators. According to city officials, it is difficult to find developable land in Juneau appropriate for RV parks. The land would need to have easy highway access, water and electrical utilities, and accommodating neighbors. Such a location is likely to be desirable to a variety of interests, and in the past RV parks have not been able to promise the revenues that other operations would.

Construction of Alternative 3 would result in logging incidental to clearing the highway right-of-way. A highway would improve access to timber stands that at some future date could be made available for harvest. The USFS manages most of the Tongass National Forest within the study area primarily as a natural setting, though that portion of the National Forest north of Sullivan Rock is classified as Moderate Development, which allows logging. The state's current forest management plan for that portion of the Haines State Forest, which is in effect for another 10 to 15 years, precludes commercial logging. Mental Health Trust and University Trust lands are managed to provide income to the trusts. Highway access would increase the likelihood that logging would occur on these lands. Although a highway would help facilitate logging in the area, it would not be the main impetus for future logging. State and federal management policies and market conditions for Alaska's forest products in general would have a greater effect on future logging possibilities.

The West Lynn Canal Highway would provide access to areas with known mineral potential, such as the area west of Sullivan Island. Improved access would increase the likelihood of future exploration.

Water transportation is the primary method of moving freight to and from Juneau, with Seattle being the primary port of origin and destination. This barge service is provided by AML and Northland Services. Although improved access would provide some short-term transportation benefit, transportation by barge would likely remain the mode by which most freight is shipped to Juneau. The economies of scale possible with barge service, and the relatively frequent service offered into Juneau (three barges/week) places the economics on the side of barge transportation.

Utilities and Public Services – Much of the information provided below on the effects of Alternative 3 are based on interviews with industrial representatives and public service providers. References to these interviews are provided in the *Socioeconomic Effects Technical Report* (Appendix H).

A West Lynn Canal Highway would not impact Juneau utilities. All of the utilities are adequate to accommodate any population increases attributable to the improved access afforded by Alternative 3 through 2038.

School enrollment is a function of population. Because population impacts are expected to be minimal, the same would be true of impacts on enrollment. The maximum impact on Juneau's population from Alternative 3 would be an increase of less than one percent. This would mean an additional 10 students spread across all grades.

Health and social services demand is mainly a function of population, and would therefore not be expected to change substantially under Alternative 3. Additional independent visitors to Juneau, particularly older retirees, would place some new demands on emergency room and other medical and dental services in Juneau. Demand for health care services resulting from additional highway accidents would be negligible when compared with existing demand.

Traffic increases resulting from improved access would not affect fire and emergency medical services within the current service area. According to local officials, a new highway might warrant consideration of another station further north and/or redeployment of a light-duty/fast-response vehicle to the existing Lynn Canal station at Lena Cove.

In response to concerns voiced in the 2003 public scoping meetings for this Supplemental Draft EIS, the Juneau Police Department has discussed whether connecting Juneau to the outside highway system would result in new types of crime or more serious crime. Currently, only 5 percent of arrests in the City and Borough of Juneau involve non-residents and less than 2 percent involve people from outside Alaska. Juneau also has very low rates for many of the crimes associated with more "connected" communities, such as gang activity and car theft. It has relatively higher incidents of crime that may be associated with isolation (e.g., domestic and alcohol-related crimes). One possibility raised in public scoping is that ending either a highway or mainline ferry service in Juneau would precipitate an "end-of-the-road" effect, bringing to town more transients who are unable to support themselves and individuals with mental and behavioral problems. However, the U.S. and Canadian customs stations on the Haines and Klondike highways act as a significant filter in this regard, and Haines and Skagway do not have this problem.

The Juneau Police Department believes that there is not enough evidence or precedents to suggest that simply improving access would affect the nature and rates of local crime. Much more of a factor than access is Juneau's distance from other population centers, particularly large cities. The Juneau Police Department believes a highway connection might be associated with some increase in teen runaways and perhaps some additional auto theft and credit card incidents. There could be an increase in importation of illegal drugs; however, local officials indicate it is already relatively easy to move these substances in and out of Juneau.

Quality of Life – According to the 2003 household survey, more than three-quarters of Juneau residents agree that improved access to their community is important. There is less agreement on whether quality of life is best served by highway access. Many proponents of a highway acknowledge that better ferry service would improve quality of life, but not by enough. Many proponents of ferry service believe that better access is important, but only ferry access would result in an overall improvement in the quality of life. The household survey indicated 36 percent of Juneau residents preferred an East Lynn Canal Highway, 36 percent preferred improved ferry service, and 16 percent preferred the West Lynn Canal Highway.

The reasons for these differing views are complex and interwoven with how individuals view Juneau's lack of highway access. Research and public comment over the past two decades have shown that some residents cherish this condition while others deplore it. Further, improved transportation is generally associated with growth opportunities, and growth typically affects the quality of life. Finally, as noted in the *Socioeconomic Effects Technical Report* for the 1997 Draft EIS, the isolation associated with lack of highway access induces a sense of

psychological comfort in some residents and a feeling of frustration and claustrophobia in others. Alternative 3 would still leave Juneau unconnected by a direct highway link to the continental highway system; therefore, for those that perceive quality of life in terms of connectedness the quality of life would not substantially change.

4.4.5.3 Haines

Population, Economics, Housing, and Municipal Revenues – Currently, northbound ferry travelers with vehicles can take mainline ferry service to either Haines or Skagway. With Alternative 3 these mainline ferry travelers would disembark in Juneau and then all travel through Haines, creating a substantial increase in traffic to the community. The total increase in non-Haines resident traffic to Haines associated with this alternative is estimated to be 220 annual ADT in 2008. Growth in Juneau resident travel accounts for the majority of this traffic increase, as the 2003 household survey measured a strong interest among Juneau residents in more travel to Haines.

This annual ADT of 220 is projected to result in an increase of 93,000 visitors to Haines in 2008. Assuming that visitors would spend an average of $50 to $60 per trip in Haines, visitor spending in the community would increase up to $5.6 million in 2008 as a result of Alternative 3. In terms of economic impact, increased spending in Juneau by Haines residents would offset approximately $1 million of this new visitor spending in Haines, resulting in a net increase in spending in Haines of $4.6 million (Table 4-23). A net increase in visitor spending in Haines of $4.6 million would generate $1.8 million in new payroll and an annual average of 90 additional jobs.

Table 4-23
2008 West Lynn Canal Highway Alternative
Visitor Spending and Related Impacts in Haines

Description	Impact
Highway Traffic (annual ADT)	310
Traffic Less Local Residents and Baseline Traffic	220
Total New Visitors[1] per Year	93,000
Total New Visitor Spending per Year	$5,600,000
Less Haines Resident Spending in Juneau	$1,000,000
Net Annual Change in Spending in Haines	$4,600,000
New Local Payroll per Year	$1,800,000
New Local Employment	90

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Haines.

Traffic on the West Lynn Canal Highway is predicted to increase at an annual rate of approximately 1.8 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to new highway traffic in 2038 would be approximately 70 percent higher than in 2008 (Table 4-24).

Table 4-24
2038 West Lynn Canal Highway Alternative
Visitor Spending and Related Impacts in Haines

Description	Impact
Highway Traffic (annual ADT)	530
Traffic Less Local Residents and Baseline Traffic	375
Total New Visitors[1] per Year	158,100
Total New Visitor Spending per Year	$9,520,000
Less Haines Resident Spending in Juneau	$1,700,000
Net Annual Change in Spending in Haines	$7,820,000
New Local Payroll per Year	$3,060,000
New Local Employment	155

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Haines.

Generally, each new job in the Haines economy results in a population increase of about 1.5 people[26]. Therefore, for the maximum of 90 new jobs in Haines in 2008, the population would increase by about 135 residents, or about six percent of the existing Haines population (2,360). In 2038, population would increase by about 230 residents, which is about 10 percent of the existing Haines population.

A population increase of 135 to 230 residents would result in additional demand for about 55 housing units in 2008 and 95 units in 2038, assuming 2.4 persons per household. Improved access would enhance Haines' reputation as a retirement community through better access to Juneau's retail and service sectors. To the extent that this occurs, demand for property in Haines would increase. Also, because of land availability in Haines and its drier climate when compared to Juneau, it is possible that additional Juneau residents may seek seasonal homes in Haines with the West Lynn Canal Highway. It is likely that few residents of Juneau would seek year-round housing in Haines because of the ferry link Alternative 3 would require.

Alternative 3 would improve the opportunity for development of some type on property owned by the University of Alaska. The university owns a substantial amount of land in the Glacier Point and Pyramid Point areas, and would manage these lands to the maximum financial benefit of the university. Development could include logging, which would depend on market conditions, subdivision development, leases for commercial development, or some combination of these options. The Alaska Mental Health Trust also owns a small parcel of the land in the Glacier Point area and could pursue similar profit-oriented development with improved access. Highway access to private property near Haines would increase the value of land in that area with a corresponding increase in the property taxes associated with the land.

Sales tax revenues would increase at a rate proportional to the increase in spending in Haines. Total additional visitor spending in Haines of $4.6 million in 2008 would generate $250,000 in additional sales tax revenues (based on a 5.5 percent tax rate). New visitor spending of about $7.8 million in 2038 would generate about $430,000 in additional sales tax revenues. Haines would also experience an increase in property tax revenues because of the increase in private property values mentioned above.

Industry/Commercial Sectors – Haines is struggling to maintain a position in the independent and cruise visitor markets. Independent visitor travel to Haines has been declining, direct cruise

[26] Based on an estimated participation rate of 65 percent, meaning that 65 percent of the Haines population participates in the local labor force.

traffic has been erratic, and the local visitor industry has a growing dependence on Skagway cruise passengers taking excursions to the Haines area. As indicated above, Alternative 3 would substantially improve Haines' independent visitor market, but would not affect the cruise market.

Utilities and Public Services – Much of the information provided below on the effects of Alternative 3 is based on interviews with industrial representatives and public service providers. References to these interviews are provided in the *Socioeconomic Effects Technical Report* (Appendix H).

School enrollment is a function of population. Because population impacts are expected to be minimal, the same would be true of impacts on enrollment. The maximum increase in students resulting from Alternative 3 would be about 20 in 2038 spread across all grades.

Haines' water supply and wastewater treatment system is adequate to accommodate 10 percent population growth. Population growth associated with Alternative 3, which is projected to be about 10 percent by 2038, would result in the need for expansion of these facilities if any other population growth occurs in Haines.

Improved access would make it somewhat easier and faster to transport patients either on an emergency or scheduled basis to Juneau from Haines. However, air transport for medical emergencies would remain the method of choice. The medical clinic in Haines is operated by SEARHC, a regional organization with a large presence in Juneau. Improved access between Juneau and Haines would reduce cost and increase the efficiency of SEARHC operations by facilitating movement of staff and supplies between SEARHC locations.

Increased traffic through and to Haines would place additional demands on the community's fire and emergency response services. If fire and emergency response personnel respond to incidents outside current service areas, such as currently inaccessible parts of the borough south of Haines, it would substantially reduce their capacity to deliver normal services while those personnel and equipment are occupied.

The Haines Police Department does not expect substantial impacts from improved access. Most crime in Haines involves local residents in spite of the highway connection to the north.

Quality of Life – Haines' quality of life would change in a number of ways under Alternative 3. The household surveys indicate that 87 percent of Haines residents agree that improved access to their community is important. In the 1994 household survey, Haines residents cited increased recreation opportunities, economic growth, and better access to health care and job markets as potential improvements to quality of life that could result from a highway. The principal negative impact on quality of life cited by Haines residents was social change such as increased crime and the appearance of undesirable transients, increased traffic, and declining local businesses. As indicated above, traffic would increase in Haines with Alternative 3. It is also projected that residents of Haines would increase their spending in Juneau. For Alternative 3, increased spending in Juneau would be off-set by increased visitor spending, though a shift in consumer type may have an impact on the types of retail businesses in Haines. There is no evidence that crime would increase in Haines with Alternative 3 because most crime in Haines involves local residents in spite of the community's highway connection to the north.

4.4.5.4 Skagway

Population, Economics, Housing, and Municipal Revenues – The total increase in non-Skagway resident traffic to Skagway associated with Alternative 3 is estimated to be 10 annual ADT in 2008. This annual ADT is projected to result in an increase of 3,000 independent

visitors to Skagway in 2008. Assuming that visitors would spend an average of $50 per trip in Skagway, visitor spending in the community would increase by up to $200,000 in 2008 as a result of Alternative 3. This small increase in visitor spending is not expected to increase local payroll or employment (Table 4-25). Therefore, the alternative would not stimulate population growth in the community.

Table 4-25
2008 West Lynn Canal Highway Alternative
Visitor Spending and Related Impacts in Skagway

Description	Impact
Highway Traffic (annual ADT)	90
Traffic Less Local Residents and Baseline Traffic	10
Total New Visitors[1] per Year	3,000
Total New Visitor Spending per Year	$200,000
New Local Payroll per Year	-
New Local Employment	-

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Skagway.

Traffic on the West Lynn Canal Highway is predicted to increase at an annual rate of approximately 1.8 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to new highway traffic in 2038 would be approximately 70 percent higher than in 2008 (Table 4-26). Independent visitor spending in 2038 would not be high enough to increase local payroll or employment. Therefore, the alternative would not stimulate population in Skagway over the period of analysis for the proposed project.

Table 4-26
2038 West Lynn Canal Highway Alternative
Visitor Spending and Related Impacts in Skagway

Description	Impact
Highway Traffic (annual ADT)	155
Traffic Less Local Residents and Baseline Traffic	20
Total New Visitors[1] per Year	5,100
Total New Visitor Spending per Year	$340,000
New Local Payroll per Year	-
New Local Employment	-

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Skagway.

Skagway would experience an increase in sales and bed tax revenues associated with increased visitor spending. The estimated initial increase in visitor spending would generate about $8,000 in additional sales tax revenues in 2008. This additional sales tax would increase to about $17,000 in 2038.

Industry/Commercial Sectors – Construction of the West Lynn Canal Highway would not alter cruise lines' decisions on port calls in Skagway. Port-of-call decisions are based on a combination of factors, including the availability of berthing space, appeal to passengers, and the overall capacity and profitability of tour offerings. Also considered are operational issues such as vessel speed, fuel consumption, docking fees, and safety.

Members of the NWCA recently discussed the proposed highway alternatives during the NWCA Operations and Technical Committee meeting as well as the Government Affairs and Community Relations Committee meeting. As a follow-up to their discussions, NWCA sent a letter to the Governor of Alaska stating that construction of a highway would have no effect on members' itineraries. The NWCA consists of Carnival Cruise Line, Celebrity Cruises, Crystal Cruises, Holland America, Norwegian Cruise Line, Princess Cruises, Royal Caribbean International, Seabourne Cruise Line, World Explorer Cruises, and Radisson Seven Seas Cruises. NWCA estimates its member lines carry 97 percent of Alaska cruise passengers.

Regional managers for Princess Tours and Gray Line, the primary ground transportation providers for all large ships, have stated that terminating voyages in Juneau and busing cruise ship passengers to Skagway is not feasible due to limitations regarding tour capacity, pricing, and timing. A round-trip bus excursion to Skagway on a West Lynn Canal Highway could not be accomplished in a single day, requiring two shuttle ferry trips as well as the highway link. Therefore, passengers on ships terminating their cruise in Juneau could not experience the sites and activities in Skagway or the popular rail excursion.

Skagway is also an important transshipment point linking Inside Passage barge and ferry traffic to the Yukon and Interior Alaska. In 2001, 84,000 tons of freight moved through the Skagway port, primarily (85 percent) petroleum products (USACE, 2001). Skagway would continue to be an important transshipment point with Alternative 3. Freight moving through Skagway to the Yukon from barge shipments would still be less expensive than transporting it via the West Lynn Canal Highway.

Utilities and Public Services – Because Alternative 3 would not stimulate population growth in Skagway, it would not appreciably impact utilities and public services.

Quality of Life – Skagway currently has about 800,000 visitors a year, primarily in the summer months (in 2003, 630,000 cruise ship visitors and another 160,000 visitors arriving by other modes of transportation). Alternative 3 would increase the number of annual visitors by less than one percent. This increase would not result in a change in the quality of life in the community.

Alternative 3 would improve access to Skagway by improving trip opportunity. Improved access would be considered a beneficial effect on quality of life by some. Other residents would not feel that it improved their quality of life because of the two ferry trips required to and from Juneau.

For more information on the economic and social effects of Alternative 3 on Juneau, Haines, and Skagway, see the *Socioeconomic Effects Technical Report* (Appendix H).

4.4.6 Subsistence

A West Lynn Canal Highway would have no direct effects on subsistence uses. Improved access to subsistence use areas along the West Lynn Canal Highway in the Sullivan River area could indirectly affect the intensity of subsistence harvest and the availability of resources. Alternative 3, together with USFS plans for potential public access locations along the highway, would make Lynn Canal much more accessible for other hunters. Alternative 3 could increase competition for subsistence resources from recreational hunting and fishing. These changes to subsistence opportunities would be viewed as beneficial for some subsistence harvesters, but for others the increased competition for resources would be perceived as a negative impact.

4.4.7 Transportation

The 2004 SATP calls for the construction of a highway from Juneau to Skagway with a shuttle from Katzehin to Haines. The plan would need to be amended if Alternative 3 is selected.

4.4.7.1 Capacity and Demand

Traffic demand on Alternative 3 was projected for 2008 and 2038 using the transportation model summarized in Section 4.1.5. These projections were based on 2002 traffic in Lynn Canal, the unmet travel demand in the region, projected growth in the region, costs of travel, travel distance and speed, value of time, accident costs, and frequency of delay.

Table 4-27 compares projected traffic demand and capacity for Alternative 3 with the No Action Alternative. As indicated in the table, the West Lynn Canal Highway is projected to generate and accommodate substantially higher travel demand in the Lynn Canal corridor than the No Action Alternative. Three times as much traffic would travel on the West Lynn Canal Highway than on the AMHS system under the No Action Alternative in 2008.

Table 4-27
2008 Forecast Demand and Capacity for the No Action Alternative and Alternative 3

Alternative	Annual ADT	Summer ADT	Winter ADT	Peak Week ADT	Summer Capacity (vehicles per day)
1 – No Action	90	170	40	330	96/71[1]
3	310	550	140	1,100	1,008/408[2]

Note: [1]The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Juneau and Skagway.
[2]The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Haines and Skagway.

As traffic demand grows with time, the ability of the West Lynn Canal Highway to accommodate that demand relative to the No Action Alternative would become more pronounced. Based on an annual growth rate of 1.8 percent, projected traffic demand and capacity for the West Lynn Canal Highway and the No Action Alternative in 2038 is provided in Table 4-28. As indicated in Tables 4-27 and 4-28, Alternative 3 has the capacity to meet the projected summer ADT in 2008 and 2038. Because of the capacity limit of the shuttle between Sawmill Cove and William Henry Bay, Alternative 3 would provide capacity for 95 percent of peak week ADT in 2008 and 60 percent of the projected peak week ADT for 2038. As indicated in Table 4-28, four times as much traffic would travel on the West Lynn Canal Highway as on the AMHS system under the No Action Alternative in 2038.

Table 4-28
2038 Forecast Demand and Capacity for the No Action Alternative and Alternative 3

Alternative	Annual ADT	Summer ADT	Winter ADT	Peak Week ADT	Summer Capacity (vehicles per day)
1—No Action	130	230	60	460	96/71[1]
3	530	940	250	1,860	1,008/408[2]

Note: [1]The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Juneau and Skagway.
[2]The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Haines and Skagway.

By providing a highway on the west side of Lynn Canal, Alternative 3 would have the indirect effect of increasing travel demand between Haines and Skagway. Under the No Action Alternative, the summer ADT between Haines and Skagway is projected to be 67 vehicles in 2008 and 98 vehicles in 2038. With Alternative 3, travel demand between Haines and Skagway is projected to increase to 89 vehicles in 2008 and 138 vehicles in 2038.

The summer ADT between Juneau and Skagway is projected to be 166 vehicles in 2008 and 281 vehicles in 2038. The number of ferry trips and ferry capacity between Haines and Skagway has been sized to accommodate the total projected demand.

4.4.7.2 Travel Flexibility and Opportunity

Alternative 3 would improve flexibility and opportunity for travel between Juneau and Haines relative to the No Action Alternative. Travelers would be dependent on the shuttle ferry schedule between Sawmill Cove and William Henry Bay, which is projected to make 12 round-trips per day in the summer. This level of service is a substantial improvement over the No Action Alternative, which offers eight ferry round-trips per week between Juneau and Haines.

An indirect impact of the forecast demand for Alternative 3 would be increased opportunities for travelers to take shuttle ferry trips between Haines and Skagway. Under the No Action Alternative, the shuttle would operate up to three times per day in the summer. Shuttle ferries between Haines and Skagway in the summer would operate six times per day under Alternative 3.

The West Lynn Canal Highway would be susceptible to avalanches in the winter, and is estimated to be closed an average of 6.4 days per year due to avalanches (Table 4-34). No closure is expected to exceed a day.

4.4.7.3 Travel Time

Table 4-29 provides a comparison of travel times between the No Action Alternative and Alternative 3. The travel time between Juneau and Haines with Alternative 3 is estimated to be about half an hour less than under the No Action Alternative, when taking the FVF. The travel time between Juneau and Haines would be four hours faster under Alternative 3 than traveling on a mainliner under the No Action Alternative.

Travel time between Juneau and Skagway under Alternative 3 would be a half hour longer than under the No Action Alternative, when taking the FVF. This is because there would be two ferry links to Skagway under Alternative 3. With Alternative 3, traveling between Juneau and Skagway would take almost five hours less than the time required to travel on a mainliner under the No Action Alternative.

Alternative 3 would have no impact on travel times between Haines and Skagway. The travel time would be the same for the Haines/Skagway shuttle under the No Action Alternative and Alternative 3, 1.3 hours.

Table 4-29
Travel Times for the No Action Alternative and Alternative 3

Route	Summer (hours)
No Action Alternative	
Auke Bay – Haines	3.5/7.1[1]
Auke Bay – Skagway	3.8/9.1[1]
Haines – Skagway	1.3
Alternative 3	
Auke Bay – Haines	2.9
Auke Bay – Skagway	4.3
Haines – Skagway	1.3

Note: [1]The first number is the time for the trip on the fast vehicle ferry, and the second number is the time for the trip on a mainline vessel.

4.4.7.4 State and User Costs

The 30-year life cycle costs for the No Action Alternative and Alternative 3 discounted to present (January 2004) dollars are provided in Table 4-30. These costs include state and federal capital costs and state maintenance and operating expenses. Capital costs include design, right-of-way acquisition, highway, vessel, and terminal construction, vessel refurbishment, and vessel replacement.

Table 4-30
Thirty-Year Life Cycle Costs for the No Action Alternative and Alternative 3 ($millions)

Alternative	Capital Cost	Operating Cost	Total Life Cycle Cost
No Action	$87	$179	$267
3	$214	$161	$375

Table 4-31 provides an estimate of the state's portion of these costs. As indicated in the table, the capital cost of Alternative 3 would be higher than the No Action Alternative due to the cost of required highway, shuttle ferries, and ferry terminal facilities. However, because the operating cost is lower for the West Lynn Canal Highway, the total state cost, before considering revenues, would be less for Alternative 3 than the No Action Alternative. As explained in Chapter 2, Alternative 3 would have an annual operating cost of approximately $9.2 million versus $10.2 million for the No Action Alternative.

Table 4-31
Present Value of Capital and Operating Costs to State of Alaska for the No Action Alternative and Alternative 3

Alternative	State Funds[1]					
	Capital Costs ($million)	Operating Costs ($million)	Total State Cost ($million)	Revenue ($million)	Net State Cost ($million)	State Cost/Vehicle (dollars)
No Action	$8	$179	$187	$126	$61	$51
3	$19	$161	$180	$94	$86	$19

Note: [1]Present value of 2004 to 2038 costs as of January 1, 2004, at private-sector rate of return.

Table 4-31 indicates that the West Lynn Canal Highway would have a larger net cost to the state than the No Action Alternative. This is partly due to its higher capital cost than the No Action Alternative and partly because the state would receive more revenue from the longer ferry runs under the No Action Alternative than under Alternative 3. The overall lower net cost to the state of the No Action Alternative would be the direct result of higher out-of-pocket costs for travelers under that alternative. The West Lynn Canal Highway would carry more vehicles than the No Action Alternative. Therefore, Alternative 3 would cost the state less than the No Action Alternative on a per vehicle basis.

The total cost[27] and out-of-pocket cost of travel between Juneau and Haines or Skagway on the West Lynn Canal Highway for a family of four in a vehicle 19 feet long are provided in Table 4-32. As indicated in the table, Alternative 3 would cost the traveler to Haines 39 percent of the cost of the same travel on a mainline vessel under the No Action Alternative. For a traveler to Skagway, Alternative 3 would cost 47 percent of the cost of the same travel on a mainline vessel under the No Action Alternative. The savings to the traveler would be greater in comparison to travel on a FVF. Based on total user costs, travel time cost, and the projected travel in the Lynn Canal corridor through 2038, total user benefits in terms of reduced travel cost for the West Lynn Canal Highway are estimated to be about $173 million relative to the No Action Alternative over a 35-year period.

Table 4-32
Juneau to Haines and Skagway Total and Out-of-Pocket User Costs for Family of Four in 19-Foot Vehicle for the No Action Alternative and Alternative 3

Alternative	Haines User Cost[1]	Skagway User Cost[1]
No Action	$/180$180[2]	$237/$237[2]
3	$70/$45	$111/$85

Note: [1]Fist number is total user cost and second number is out-of-pocket cost. Total cost is based on fares plus $0.44 per mile for vehicular travel (AASHTO, 2003). Out-of-pocket cost based on fares and gasoline consumption.
[2]Cost is for mainline ferry. Cost for FVF is 10 percent higher.

The cost of taking the shuttle ferry between Haines and Skagway would remain the same as the No Action Alternative with Alternative 3. That fare is estimated to be about $40 for a family of four.

One of the best economic measures of an alternative is its net present value. Net present value is the total user benefits minus the net costs of an alternative over and above the net cost of the No Action Alternative for a given period of time. The total user benefit of Alternative 3 from 2004 to 2038 is $205 million. The incremental cost of Alternative over the No Action Alternative for this same period is $173 million. Therefore, the 2004 to 2038 net present value of Alternative 3 is approximately $32 million.

4.4.7.5 Other Transportation Impacts

Water transportation is the primary method of moving freight within Lynn Canal. Freight is transported from Seattle by barge to Juneau, Skagway, and Haines. AMHS ferries also move freight in vans between the three communities. Haines and Skagway are important

[27]Total user costs are out-of-pocket cost, vehicle maintenance and ownership costs, and accident costs.

transshipment points linking Inside Passage barge and ferry freight to the Yukon and Interior Alaska.

The West Lynn Canal Highway would not substantially alter freight traffic between Juneau and Seattle. Trucking companies servicing other Alaska communities were asked to approximate the cost of trucking between these two cities if a highway were available. Those estimates averaged about $0.15 per pound of freight compared to the existing barge freight cost of $0.05 per pound. Although trucking goods from Seattle is not competitive with barge service, a highway link to Juneau may provide opportunities for transporting time-sensitive freight, such as fresh fish. Air freight, which currently serves this function, costs between $0.33 and $0.46 per pound between Juneau and Seattle.

The West Lynn Canal Highway would not result in a change in scheduled barge service to Haines and Skagway. Because of the ferry links involved in Alternative 3, barge service would continue to be the preferred mode of shipping freight to these two communities.

Alternative 3 is likely to divert some traffic from the air taxi operations currently serving Lynn Canal. In interviews conducted for the Supplemental Draft EIS, local air taxi operators noted that the addition of the Lynn Canal day ferry in 1998 reduced air passenger loads in Lynn Canal. For example, the air traffic from Juneau to Haines dropped from 10,014 passengers in 1998 to 6,939 passengers in 2001. The *Traffic Forecast Report* (Appendix C) estimated a diversion of about 32 percent of the air traffic with Alternative 3.

With Juneau serving as the northern terminus for mainline AMHS service under Alternative 3, the AMHS would only need to operate short shuttles in Lynn Canal. The projected annual AMHS operating costs and estimated AMHS state subsidy for Alternative 3 in 2008 is provided in Table 4-33. As indicated in the table, the No Action Alternative is estimated to require a state subsidy of about $3.3 million in 2008. Ferry operations for Alternative 3 are estimated to require a similar state subsidy of $3.1 million. Therefore, Alternative 3 would not have a substantial impact on AMHS funding requirements; consequently, this alternative would likely not affect service in other parts of the AMHS system.

Table 4-33
Annual AMHS Operating Costs and Estimated AMHS State Subsidy in 2008 for the No Action Alternative and Alternative 3

Alternative	AMHS Operating Cost ($million)	Estimated AMHS State Subsidy ($million)
No Action	$10.2	$3.3
3	$8	$3.1

Note: source DOT&PF, 2004h.

Based on the 2004 SATP, the mainline ferry fleet would be reduced in the future. Service south of Lynn Canal would be augmented by greater use of point-to-point shuttles. Because of the high cost of mainline ferry operations and the inconvenience of their schedules, DOT&PF envisions reduced mainline service south of Lynn Canal even if a highway alternative is not constructed.

Lack of highway access is often cited by capital move proponents as one of the reasons to move the state capital. Alternative 3 would provide highway access to Juneau, which would

reduce the perception that it is difficult and expensive for the majority of Alaska residents to visit the state capital.

The highway proposed for Alternative 3 would include 4-foot paved shoulders suitable for bicyclist and pedestrian use. Predicted traffic volumes would be compatible with bicycle or pedestrian use of the shoulders. Shuttle ferries for these alternatives would accommodate bicyclists and foot passengers.

As indicated in the *Traffic Forecast Report* (Appendix C), many current walk-on passengers would choose to travel by car if a highway were available in the Lynn Canal corridor. Travelers without vehicles would be forced to rent vehicles, take a commuter flight, or travel on private carriers if they develop to accommodate this demand.

See the *Traffic Forecast Report* (Appendix C) for additional information on the transportation demand forecast for the proposed project alternatives and the *Socioeconomic Effects Technical Report* (Appendix H) for additional information on the transportation industry in Lynn Canal.

4.4.8 Geology

4.4.8.1 Geologic Hazards

Seismic Activity –As indicated in Section 3.2.1.2, the Queen Charlotte/Fairweather fault system located within 75 miles of the project area has the capability of producing earthquakes with magnitudes greater than 7.0 on the Richter scale. Based on USGS hazard maps published in 1999, this fault system has a 10 percent probability of producing an earthquake in the next 50 years that would cause ground accelerations in excess of 1.1 to 1.15 g[28] in the project region. Geotechnical investigations would be used in support of the final engineering design of the selected alternative. These studies would minimize the impact of geologic hazards on the road embankment and related structures. It is probable that a maximum ground acceleration in the study area would cause damage to a highway, as is the case with many other Alaskan highways in seismic areas.

Avalanche – The proposed Alternative 3 alignment crosses 17 avalanche paths, of which 11 are considered large or very large. Using survey data, refined alignments, long-term climate studies, and additional winter observations, the calculated unmitigated AHI for Alternative 3 is 100. The average predicted closure would be about a half day long, with no closures lasting longer than a day. This unmitigated figure is considered high, but is in the middle range for highways operated with good safety records in avalanche terrain. (For example, Rogers Pass, B.C., has an unmitigated AHI of 1004, the previous alignment of Seward Highway from Anchorage to Seward had an unmitigated AHI of 331, the previous Seward Highway from Anchorage to Girdwood had an unmitigated AHI of 188, and Loveland, Colo., has an unmitigated AHI of 80.) Through the use of appropriate hazard reduction and operational risk management, the mitigated AHI for Alternative 3 would be reduced to an AHI value of 30 or less. Hazard reduction methods are physical changes such as constructing barriers or adjusting the alignment of a highway. Risk management methods include forecasting, warnings, temporary highway closures, and use of explosives to release unstable snow during temporary highway closures. A mitigated AHI value of 30 or less is within the North American standard for safe operation of a highway.

[28] Seismic ground acceleration is measured in units of gravity or *g*. The acceleration of *g* is 32 feet/second/second.

For Alternative 3, DOT&PF would use howitzer fire to release unstable snow. A howitzer could hit all of the avalanche paths on the West Lynn Canal Highway from five firing locations accessible from the highway. The *Snow Avalanche Report* (Appendix J) calculated closure periods for the West Lynn Canal Highway. An estimate of average closure time/year, average number of closures/year, closure length, and capital and operating budgets for highway maintenance relative to avalanche hazards for Alternative 3 is provided in Table 4-34. The capital costs of avalanche control equipment and facilities have been included in the construction cost estimate, and the annual operating cost for avalanche control has been included in the maintenance and operating cost estimate for Alternative 3.

Table 4-34
Costs, Closures, and Mitigated Avalanche Hazard Index for Alternative 3

Alternative	Capital Cost	Annual Operating Cost	Average Closure Time per Year (days)	Average Number of Closure per Year	Closure Length (days)	Mitigated Avalanche Hazard Index
Alternative 3	$2,642,055	$733,969	6.4	10.8	0.4 to 0.9	14.6

Landslides – Two rockslides have been identified in the vicinity of Alternative 3. Neither slide reaches the proposed alignment. Avalanche paths can also produce slides during the spring and summer months, but these slides tend to be smaller than the avalanches on the same path and generally do not extend to the bottom of the path. Geotechnical studies during design would identify any areas where alignment adjustments, rockfall barriers, or slope stabilization are appropriate to reduce rockfall hazard.

4.4.8.2 Geologic Resources

Approximately 10 percent of the Alternative 3 alignment overlaps moderate-vulnerability karst areas and less than 2 percent of the alignment overlaps high-vulnerability karst areas on the west side of Lynn Canal. Direct effects from Alternative 3 would include the alteration of hydrologic patterns, the disturbance and removal of protective surficial material and vegetation, and the destruction of surficial karst features. No known caves or other important karst features would be impacted by Alternative 3.

The strength of downgradient soil cover may be reduced over time by concentrated water flow through highway culverts, which could allow sediment, nutrients, and debris transport into subsurface karst features. Surface soils, which are typical above karst features, and vegetation create a protective barrier between surface water and karst systems. The disturbance or removal of protective surficial material, vegetation, and trees could change the karst vulnerability rating, which is based on the presence or absence of surface material. The removal of the protective barrier could also alter water table recharge rates. Cave entrances could also become blocked or permanently filled by loose sediment, debris, and downed trees.

Alternative 3 could indirectly affect karst resources due to increased accessibility to areas where karst is known to occur. Increased accessibility could result in recreational use or vandalism to caves and other karst features.

4.4.9 Hydrology and Water Quality

4.4.9.1 Floodplains

Planning and preliminary design of Alternative 3 have been done in compliance with EO 11988, Floodplain Management and FHWA regulations 23 CFR 650.11.

Flooding Risks - The alignment for the West Lynn Canal Highway runs perpendicular to the natural drainages along the west side of the canal. Therefore, it is not possible to avoid transverse encroachments of these drainages. The alternative would have no longitudinal encroachments of any drainages. There are no regulatory floodways in the study area. The transverse encroachments have been designed so that the West Lynn Canal Highway would not create a significant flood risk.

Impacts on Natural and Beneficial Floodplain Values - Alternative 3 would cross 32 streams, 26 of which would be bridged. Single-span bridges would be used to cross 10 streams. For these streams, each bridge and its piers would be located outside of the predicted 100-year flood elevation of the streams, as determined by hydraulic studies to be conducted during the final engineering design of the selected alternative. Multi-span bridges would be constructed at other crossings, including the Endicott, Sullivan, and Chilkat Rivers. These larger bridges would extend beyond the outfall channels at each river delta to protect their natural, meandering flow. The bridges would require placement of supports in the river floodplain. These supports would be spaced approximately 130 feet apart and designed to accommodate the predicted 100-year flood volume with no more than a one-foot rise in backwater. These bridges would be constructed to maintain navigation at all tide stages.

The Sullivan, Endicott, and Chilkat rivers are navigable in accordance with U.S. Coast Guard guidelines. The bridges over these rivers would require a Rivers and Harbor Act Section 9 permit from the U.S. Coast Guard.

Potential for Incompatible Floodplain Development - Alternative 3 crosses the Endicott and Sullivan Rivers in the Tongass National Forest, where floodplain development would not be allowed. The floodplain of the Chilkat River on the west side of the proposed bridge crossing is state land. Therefore, Alternative 3 would not encourage incompatible floodplain develop in that area. The floodplain on the east side is already accessible and Alternative 3 would not increase accessibility. In this location, the Chilkat River floodplain is a silt deposition area not conducive to development.

Alternative 3 would provide a highway where there are currently no roads. The highway would serve as a new evacuation route for emergencies from private properties adjoining the road and for Haines.

Measures to Minimize Floodplain Impacts and Preserve Natural and Beneficial Floodplain Values – All of the larger floodplains would be crossed with bridges. Bridge abutments would be located outside the floodplains. Multiple-span bridges would be supported on piles no more than 24 inches in diameter with groups of in-line piles spaced approximately 130 feet apart.

4.4.9.2 Hydrology

A highway on the Alternative 3 alignment would act as a partial barrier to the flow of shallow groundwater and surface water. Shallow groundwater blocked by the highway would eventually flow to the surface. Roadside drainage ditches would collect surface water on the upgradient side of the highway and channel it to the downstream side through culverts. This flow diversion would be minor and would adequately maintain the water's natural downgradient flow. Culverts would be designed for the 50-year rainfall event, and end sections or rock dissipaters would be used to disperse high-volume/high-velocity flows to protect soils and vegetation below culvert outfalls from erosion.

The ferry terminals at William Henry Bay and Sawmill Cove would require the placement of fill in Lynn Canal and Berners Bay (shot-rock generated during highway construction) at each

proposed terminal site. These small encroachments would not measurably change circulation and currents in Lynn Canal or Berners Bay. The proposed terminals are sited so as not to obstruct discharge from nearby streams and creeks. Breakwaters are currently not planned for either terminal.

4.4.9.3 Water Quality

Highway construction, maintenance, and operations can affect water quality through earth-moving activities, equipment oil and fuel spills/leaks, debris generation, winter sanding, and vehicular traffic. These activities could introduce metals, fuel, oil, and other potential contaminants to water courses whose drainages include the highway on the Alternative 3 alignment, principally through runoff from the highway.

Results from stormwater research by the FHWA indicate that stormwater runoff from low to medium traffic volumes (under 30,000 vehicles per day) on rural highways exerts minimal to no impact on the aquatic components of most receiving waters (USDOT & FHWA, 1987). Studies conducted in Anchorage, Alaska, under the Municipality of Anchorage Watershed Management Program similarly concluded that street runoff has minimal impacts to the water quality of receiving waters from most potential pollutants (MOA, 2000b). Results showed dissolved concentrations of calcium, chromium, magnesium, and zinc below their AWQS. Only dissolved concentrations of copper and lead were noted above their AWQS; however, modest dilution would likely reduce these concentrations below their AWQS. Identified concentrations would not adversely impact streams with flow rates greater than 0.5 cubic foot per second (MOA, 2000e). Polynuclear aromatic hydrocarbons were at concentrations below the EPA water quality criteria.

Because of the rural setting of Alternative 3 and the predicted low annual ADT, fewer impacts to water quality in the study area are expected than were found in the Anchorage studies. The studied runoff was collected from Anchorage roadways, which ranged from residential (<2,000 ADT) to major arterial (>20,000 ADT). The studied melt water was from snow collected from a mix of these types of roads. In comparison, the West Lynn Canal Highway would have a maximum peak week ADT of 1,008 vehicles. During all but that week, the ADT would be on the order of less than 1,000 vehicles per day.

Highway runoff and melt water from the West Lynn Canal Highway would have lesser quantities of potential contaminants than what was observed in the Anchorage studies due to a lower traffic volume and less area development. Snow would be cleared from the highway and deposited along its length rather than being disposed of in one location. DOT&PF does not usually use de-icing chemicals on rural roads. Sanding would be performed, as conditions required. Typically, up to five percent sodium chloride per total weight of sand is added to keep sand friable in winter. Potential pollutants would not be concentrated in one area on the highway. Runoff from the highway and bridges would not be expected to exceed AWQS or adversely impact the water quality of receiving waters for the long term. Potential contamination from oil or hazardous substance spills would be low due to the rural setting of the highway and the low predicted highway traffic volume. Cut slopes that are composed of soil would be hydroseeded with non-invasive Alaska cultivars to minimize erosion.

The following BMPs would be implemented to minimize long-term water quality impacts. See Section 4.8.6 for BMPs to minimize water quality impacts during construction.

- Only clean fill material would be used for the roadway and ferry terminal embankments.
- Rock would be used to stabilize toes of slopes at ponds and stream crossings.

- Grass seed would be placed on any road slope not constructed of shot rock. To protect the integrity of the natural plant communities, plant species indigenous to the area would be used for vegetating road slopes, except that non-native annual grasses may be used to provide initial soil cover.
- Roadside swales would be designed to keep surface water within the natural drainage basins.

Culverts would be installed through fill slopes in appropriate locations to maintain natural flow patterns for surface water.

Ferry operations under Alternative 3 would have little effect on area water quality. AMHS mainline ferry wastewater discharges in Lynn Canal north of Auke Bay would be eliminated. The ferries that would be used for Alternative 2 would have sanitary waste holding tanks,[29] or would discharge treated wastewater meeting applicable standards. Sewage treatment facilities with a permitted outfall would be installed at the Sawmill Cove and William Henry Bay Ferry Terminals. Discharges from the sewage treatment facilities would operate within permit guidelines. Aeration and ultraviolet light disinfection, similar to the system used at the Auke Bay Ferry Terminal, would be used; therefore, no adverse impacts to water quality would occur. Accidental discharges, spills, and leaks are possible during ferry operations. Historically, these have been minor, with only minimal and temporary impacts to water quality. This low level of impact would likely continue under Alternative 3.

Highway and bridge runoff would contribute a small amount of turbidity and pollutant loads to local drainages flowing to Lynn Canal. Contaminant concentrations in runoff from the proposed highway and/or bridges would not be expected to exceed AWQS or adversely impact the water quality of receiving waters for the long term.

4.4.10 Air Quality

The increase in traffic on the Glacier Highway would not affect the Mendenhall Valley non-attainment area based on consultations with the EPA during the 1994 Draft EIS. Traffic forecasts conducted for the Supplemental Draft EIS indicate that future traffic volumes would be less than those developed for the 1994 Draft EIS.

4.4.10.1 Carbon Monoxide

As discussed in Section 4.3.10.1, simplified dispersion modeling was conducted for CO emissions from peak 2008 and 2038 traffic volumes projected for Alternatives 2 through 2C. Peak traffic volumes for Alternative 3 in those years would be approximately 60 percent of the peak volumes projected for Alternative 2. The modeling predicted that maximum one-hour average CO concentrations associated with Alternative 2 traffic combined with background CO concentrations would total 2 to 3 ppm. The NAAQS for one-hour average CO concentrations is 9 ppm. The maximum one-hour average CO concentrations associated with Alternative 3 traffic would be less than the concentrations associated with Alternative 2; therefore, Alternative 3 would not result in an exceedance of the NAAQS for CO.

4.4.10.2 Particulates

PM_{10} is monitored at Floyd Dryden Middle School on Mendenhall Loop Road in Juneau. Peak-hour traffic volume on this road was 1,201 vehicles in 2000. The 24-hour and annual average PM_{10} concentrations measured at this monitoring station were 27 and 7.5 $\mu g/m^3$, respectively, in

[29] Holding tanks would be pumped out and waste treated onshore for disposal.

that year. Projected peak hour traffic for Alternative 3 was estimated at nine percent of the summer average daily traffic (summer ADT). Summer ADT for Alternative 3 is projected to be 550 and 940 vehicles in 2008 and 2038, respectively. Therefore, the peak hour traffic for this alternative would be about 50 and 85 vehicles in 2008 and 2038, respectively. These traffic volumes are 24 (2008) and 14 (2038) times smaller than the volumes recorded on Mendenhall Loop Road in 2000. Multiplying these factors by the PM_{10} concentrations measured at Floyd Dryden provides the following estimates for PM_{10} concentrations that could result from peak hour traffic volumes for Alternative 3:

- Year 2008 – 24-hour average: 1.0 $\mu g/m^3$ annual average: 0.3 $\mu g/m^3$
- Year 2038 – 24-hour average: 2.0 $\mu g/m^3$ annual average: 0.5 $\mu g/m^3$

These estimates are substantially below the 150 $\mu g/m^3$ 24-hour average NAAQS and 50 $\mu g/m^3$ annual average NAAQS for PM_{10}. Because the Mendenhall Loop Road PM_{10} data include dust from unpaved roads in the valley and paved roads generally contribute only a small fraction of the total PM_{10}, this estimate of project-related PM_{10} concentrations overestimates the actual concentrations that would result from Alternative 3.

4.4.10.3 Conformity

The project area is located in an air quality attainment area where the SIP does not contain any transportation control measures. Therefore, conformity procedures do not apply to this project, and a conformity determination is not required per 40 CFR 51.

4.4.11 Hazardous Materials

From the ISA review, three sites along the West Lynn Canal Highway alignment were identified as having the potential for hazardous materials involvement. As explained in Section 4.1.10, an impact rating was assigned to those sites within a 300-foot corridor centered on the alternative alignment and facility sites. The impact rating was based on contaminant type, contaminant quantity, groundwater and groundwater gradient, age of contaminant, extent (if any) of previous or ongoing cleanup actions, and potential clearup costs.

Based on the ISA screening process, no preliminary site investigations were recommended for Alternative 3 because no sites were determined to have a moderate or high impact rating. The AT&T Alascom Sullivan River Microwave Repeater Station is located approximately 600 feet from the centerline of the alignment for Alternative 3, outside the study area used for this evaluation. Because of the distance between the station and the alignment, the probability of hazardous materials involvement at this location is low.

See the *Initial Site Assessment Technical Report* (Appendix M) for further information on the hazardous waste assessment for the proposed project alternatives.

4.4.12 Wetlands

A total of 35.5 acres of wetlands and 11.8 acres of other aquatic habitat would be filled on the east and west side of Lynn Canal under Alternative 3. The preliminary alignment for highway segments of Alternative 3 has been adjusted several times to avoid wetlands and reduce the impacts to wetlands that could not be avoided. During design DOT&PF would investigate additional measures to reduce impacts, including further small alignment changes, steepened slopes, and reduced embankment heights.

As indicated in Table 4-35, approximately 88 percent of the wetlands impacted by the West Lynn Canal Highway would be forested wetlands. The wetland functions and values that would be affected by a highway include a reduction in groundwater recharge and discharge, lateral flow, surface hydrologic control, wildlife habitat functions, and riparian support.

Alternative 3 would require the fill of 0.01 acre of palustrine emergent, 0.7 acre of palustrine scrub-shrub, and 10.3 acres of palustrine forested wetlands between Echo Cove and Sawmill Cove. Impacts to wetland functions would primarily consist of reduction in wildlife habitat and riparian support, and alteration of surface hydrologic control and groundwater discharge functions. Waters of the U.S. filled includes 11.8 acres of marine habitat discussed in Section 4.4.14.

From William Henry Bay to the Davidson Glacier outwash plain, Alternative 3 would impact 18.7 acres of palustrine forested wetlands in five locations. The effects of filling these wetlands would include reduced groundwater recharge and groundwater discharge/lateral flow functions, modification of the surface hydrologic control, and a slight reduction in wildlife habitat function with the loss of forest habitat. One forested wetland north of the Sullivan River is rated high for nutrient transformation/export due to the amount of surface water flowing through it. Alternative 3 would fill a total of 1.9 acres of palustrine emergent wetlands in two locations of this segment. Impacts to functions of these wetlands would affect groundwater discharge and lateral flow. At three locations, the proposed alignment is forced toward the beach due to steep terrain. In these areas, fill in intertidal habitats includes 0.4 acre of salt marsh and 0.09 acre of beach bar habitat.

Most of the small wetlands associated with kettle ponds on the Davidson Glacier outwash plain would be avoided by the proposed Alternative 3 alignment. However, two small isolated emergent wetlands and a small pond with floating vegetation would be partially filled by the highway. These areas are small and would affect approximately 0.4 acre of palustrine emergent wetlands as well as 0.2 acre of palustrine aquatic bed. North of the Davidson River crossing, a 1.1-acre fill would be required across a portion of a newly created beaver pond. Fill of portions of the two isolated emergent wetlands and the pond would primarily reduce the sediment retention functions and the nutrient transformation/export function of these wetlands. Wildlife habitat functions would also be reduced slightly, but these wetlands are quite small and there are many similar wetlands in the area. Fill of a portion of the beaver pond would reduce the wildlife habitat functions of this wetland to a small degree. Impacts to beavers as a result of this fill would be minor.

North of the Davidson Glacier, Alternative 3 would intersect the uphill portion of a small area of palustrine forested wetland. At this location, the highway would reduce the groundwater recharge function, groundwater discharge/lateral flow function, and the surface hydrologic control function of wetlands.

The proposed highway would act as a partial barrier to the flow of shallow groundwater and surface water. The surface water or shallow groundwater blocked by the highway embankment would eventually flow to the surface and be diverted by ditches to culverts under the highway embankment. Alteration of hydrology due to the highway embankment could result in corresponding changes to the vegetation and over time, these changes could affect wetland functions within and outside the highway right-of-way. The extent of this effect would depend on localized hydrologic patterns; however, effects could be minimized with porous fill material and cross-drainage structures.

Table 4-35
Wetlands and Other Waters of the U.S. Filled by Alternative 3 (Acres)

Sub-Region	Classification	Area of Fill (acres)
Echo Cove to Sawmill Cove	**Wetlands**	
	Palustrine Forested	10.3
	Palustrine Emergent	0.01
	Palustrine Scrub-Shrub	0.7
	Sub Total	11.0
	Marine Areas	
	Rocky Shores	1.9
	Sub Total	1.9
William Henry Bay to Davidson Glacier Outwash Plain	**Wetlands**	
	Palustrine Forested	18.7
	Palustrine Emergent	1.9
	Estuarine Emergent	0.4
	Sub Total	21.0
	Marine Areas	
	Beach Bars	0.09
	Rocky Shores	4.8
	Sub Total	**4.9**
Davidson Glacier Outwash Plain	**Wetlands**	
	Palustrine Forested	1.1
	Palustrine Emergent	0.4
	Sub Total	**1.5**
	Freshwater Aquatic Areas	
	Palustrine Aquatic Beds	0.2
	Sub Total	**0.2**
Davidson Glacier Outwash Plain to Haines	**Wetlands**	
	Palustrine Forested	0.9
	Estuarine Emergent	1.1
	Sub Total	**2.0**
	Marine Areas	
	Beach Bars	4.8
	Sub Total	**4.8**
Total Wetland Fill for Alternative 3	**Wetlands**	
	Palustrine Forested	31.0
	Palustrine Emergent	2.3
	Palustrine Scrub-Shrub	0.7
	Estuarine Emergent	1.5
	Total	**35.5**
Total Other Waters of the U.S. Filled for Alternative 3	**Freshwater Aquatic Areas**	
	Palustrine Aquatic Beds	0.2
	Sub Total	**0.2**
	Marine Areas	
	Beach Bars	4.9
	Rocky Shores	6.7
	Sub Total	**11.6**
	Total	**11.8**
	Total Waters of the U.S.	**47.3**

Note: This total does not include fill associated with culvert placement in non-anadromous streams. This additional acreage would be determined during design and permitting.

The use of salt-treated sand to improve road conditions during the winter could potentially affect roadside vegetation; however, high rainfall in this region would minimize most impacts from road salt (Stormwater, 2001). Due to the small quantity of salt (up to five percent per total weight of sand) used to keep the sand friable for winter maintenance, no detectable impacts on adjacent vegetation are likely.

The indirect effects of Alternative 3 on wetlands include the potential introduction of contaminants from accidental spills of fuels and lubricants, the introduction of non-native plant species inadvertently transported to the area on vehicles and their occupants, and damage to wetlands from increased human recreational activity in the area. These activities could cause the further loss of wildlife habitat functions, reduction of ecological diversity, and a reduction in sediment/toxicant retention functions. Implementation of BMPs in maintaining the highway, including not using salt to the extent possible, limiting the use of sand near wetlands, and posting educational signs for wetland users, would minimize the risk of these effects occurring.

DOT&PF has avoided wetlands to the extent practicable during development of the preliminary alignment for Alternative 3. The roadway would be constructed using the minimum-width fill footprint necessary for a stable road base in wetland areas. During final engineering design of the selected alternative, DOT&PF would continue to coordinate with resource agencies to further minimize encroachment on wetlands. Compensatory mitigation would be provided for wetland losses associated with the selected alternative.

4.4.13 Marine and Freshwater Habitat and Species (Including Essential Fish Habitat)

During environmental studies for the Supplemental Draft EIS, the FHWA determined that the project alternatives may adversely affect essential fish habitat as defined by the Magnuson-Stevens Fishery Conservation and Management Act. Following this determination, DOT&PF prepared an EFH Assessment to assess the effects of project alternatives on commercial fish stocks in all life stages and associated habitats. This section summarizes that assessment, which is provided in the *Essential Fish Habitat (EFH) Assessment* (Appendix N).

The alignment for the West Lynn Canal Highway would be forced toward the beach at two locations between William Henry Bay and Davidson Glacier. This would result in the fill of 0.09 acre of intertidal beach. This small area of fill would result in the loss of some habitat for benthic organisms that form the base of the food web for some commercial fish species but would not have population-level effects on any marine species in Lynn Canal.

Under Alternative 3, 4.8 acres of intertidal habitat would be filled for the construction of the causeway on the north side of Pyramid Island. The fill would be located in an area that is subject to continuous deposition of glacial silt and does not support a substantial benthic community. Therefore, the loss of this habitat would not measurably alter the food web in this portion of the Chilkat River/Inlet. For this reason, fill placement in this area would have no measurable effect on any populations of marine organisms in Lynn Canal.

William Henry Bay was investigated as part of the 2003 intertidal survey. The intertidal zone at William Henry Bay is a rich and biologically diverse area. The ferry terminal proposed for this site consists of a sand, gravel, cobble, and boulder beach changing to boulders towards the north, away from the head of the bay. This site exhibits high value as fish habitat. Salmon, sculpins, and other small fish were observed in the intertidal zone and numerous clumps of fish eggs, likely sculpin eggs, were found in crevices and tidal pools in the lower intertidal zone. Crabs were occasionally observed on subtidal underwater camera surveys and flatfish were common throughout the subtidal survey area at depths greater than 23 feet. The proposed

terminal site is habitat used for spawning, rearing, and growth to maturity by sculpin and other fish species.

The terminal would cover 800 feet of shoreline, or about 6 percent of the available shoreline in William Henry Bay. The loss of 4.8 acres of the intertidal and subtidal zones at the proposed terminal site would have a small impact to fish and crab species, as similar value intertidal and subtidal fish habitat is extensive in William Henry Bay. Although the character of the terminal substrate would differ from natural habitat, benthic organisms would recolonize it and provide some recovery of the habitat.

The seabed at the Sawmill Cove Ferry Terminal site consists almost exclusively of muds, sand, and gravels with some bedrock outcrops and occasional cobbles. Gravel content is highest in the intertidal zone and drops off rapidly in the subtidal zone, where sands and muds predominate. Vegetation cover is closely linked to the gravel component; therefore, cover drops off rapidly in the offshore. Video surveys of the site conducted in 2003 and 2004 indicated dense rockweed at the headlands on the north and south sides of the cove to about the zero foot tidal elevation. In the lower intertidal zone, rockweed was interspersed with two kinds of large-blade kelp. While this kelp is sparse, it is persistent and evenly distributed throughout the site. No eelgrass or stalked kelp is present at the site. Crabs use the subtidal and intertidal zones in Sawmill Cove Cove and a variety of fish species have been observed at the site including yellowfin sole, rock sole, gunnels, snake prickleback, sculpin, and Pacific herring. The impact to 3.2 acres of intertidal and subtidal habitat (1.9 acres of fill and 1.3 acres of dredge), the replacement of natural substrates due to terminal construction, and the dredging of approximately 16,000 cubic yards for a mooring basin would alter habitat usage in the disturbed area. Filling would result in the loss of habitat while dredging and ongoing use would substantially reduce habitat value in the dredged areas. The footprint of the ferry terminal would impact approximately 300 feet (0.06 mile) of shoreline at mean lower low water, which is equivalent to less than two percent of the alongshore herring spawn length (approximately three miles) observed in Berners Bay in 2003. This habitat loss would not measurably affect other fish populations in the Berners Bay area.

At the Sawmill Cove Ferry Terminal, turbidity could be increased over ambient conditions for short periods as ferries maneuver into and out of the terminal. Short-term turbidity increases and propeller scour could displace some Pacific herring eggs and larvae in the immediate vicinity of the Sawmill Cove Ferry Terminal.

There is the potential for accidental fuel spills from ferries to occur at terminals and while traveling Lynn Canal routes. To date, no in-water fuel spills have been associated with AMHS operations in Lynn Canal. The effects of a spill would depend on its size and location.

The ferries that would be used for Alternative 3 would have sanitary waste holding tanks[30] or would discharge treated wastewater meeting applicable standards. Sanitary waste generated at the ferry terminals would undergo treatment. Wastewater would undergo aeration and disinfection with ultraviolet light. The treated wastewater would be discharged under an NPDES and/or Water Quality permit and would meet EPA- and Alaska-established waste discharge limitations. For this reason, the effluent would not impact fish habitat or affect fish populations in Lynn Canal, including Berners Bay.

Alternative 3 would cross 11 streams on the west side of Lynn Canal that support anadromous fish populations, including the Endicott and Sullivan Rivers and the Chilkat River/Inlet, as well as Sawmill Creek on the east side of Lynn Canal. The bridges crossing all but the Endicott,

[30] Holding tanks would be pumped out and the waste would be treated onshore for disposal.

Sullivan, and Chilkat rivers would not encroach on the stream channel. The piers for the bridges on these rivers would be placed approximately 130 feet apart and would not impede fish movement in these rivers.

Other, smaller non-anadromous streams crossed by the project alternatives would be channeled through culverts. Culverts in waters with the potential to have resident fish would be designed in accordance with the standards provided in the Memorandum of Agreement between ADF&G and DOT&PF for the "Design, Permitting, and Construction of Culverts for Fish Passage" (August 3, 2001).

Stormwater and melt water runoff from bridges over anadromous fish streams and the Chilkat River would not alter water quality sufficiently to impact crab or anadromous and marine fish habitat. As discussed in Section 4.4.9, studies of highway runoff in Alaska indicate that the volume of traffic on the West Lynn Canal Highway would not be large enough for runoff from the highway to cause the exceedance of any Alaska Water Quality Standards in receiving waters.

In summary, the construction of Alternative 3 would result in the direct loss of 12.9 acres of essential fish habitat as a result of filling for highway and ferry terminal construction at Sawmill Cove and William Henry Bay. The habitat loss would include 3.2 acres of historically documented spawning habitat for Lynn Canal Pacific herring stock in Sawmill Cove. Ferry maneuvers at Sawmill Cove could increase turbidity in the vicinity of the terminal sufficiently to impact Pacific herring eggs and larvae at the terminal site. Alternative 3 would bridge all streams crossed by highway segments that support anadromous fish populations. Piers for the bridges over the Sullivan and Endicott rivers and the Chilkat River/Inlet that would be required for Alternative 3 would be placed approximately 130 feet apart and would not impede fish movement in these rivers.

The incremental effect of the Sawmill Cove Ferry Terminal on Pacific herring stock is relatively small; therefore, this loss is not expected to adversely affect the stock's ability to recover to previous population levels. For other commercial fish species, the direct loss of 13.1 acres of habitat through highway fill and ferry terminal construction would not adversely affect any fish and invertebrate populations in Lynn Canal. The FHWA has determined that Alternative 3 would not have a substantial adverse effect on essential fish habitat.

The alignment for Alternative 3 and design of ferry terminals have been adjusted through preliminary engineering studies to limit intertidal and subtidal fill. During design of the selected alternative, DOT&PF will continue to investigate ways to further reduce this fill. Compensatory mitigation would be provided for the loss of intertidal and subtidal habitat.

4.4.14 Terrestrial Habitat

Alternative 3 would result in the loss of vegetation within the cut-and-fill boundaries of the highway and a narrow band of right-of-way clearing adjacent to the highway. The acres of vegetation types that would be removed are estimated to be:

- 314 acres of old-growth forest
- 95 acres of other forest
- 14 acres of shrub and open meadow/muskeg

Old-growth forest in the project area was defined as forest over 150 years old with an average diameter-at-breast-height greater than 9 inches, and timber volume greater than 8,000 board feet per acre. Other forest consists of timber stands smaller than this, a small area of which is second growth. Old-growth and other forests consist of the following coniferous forest plant

series: western hemlock, western hemlock-yellow cedar, Sitka spruce, mixed conifer, mountain hemlock, and Sitka spruce-black cottonwood.

The loss from each vegetation type represents less than one percent of that type in the study area and is small compared to the approximate forest cover of 117,000 acres in the Lynn Canal region (NPS, 2003). The loss of this vegetation would not adversely affect any rare or unique community types or any known rare or sensitive plant species. Clearing of the highway right-of-way would increase the potential for blowdown of trees adjacent to the right-of-way or slides in unstable areas.

The West Lynn Canal Highway would have indirect effects on terrestrial vegetation. By improving the access to the area, human activity would increase along the highway corridor. Increased human activity could lead to some degradation or disturbance of terrestrial habitat adjacent to the highway through camping and hiking, illegal dumping, and unauthorized collection of firewood. Invasive plant species could be introduced from visitors, vehicles, and pets.

4.4.15 Wildlife

4.4.15.1 Marine Mammals

Harbor seals, minke whales, killer whales, harbor porpoises, Dall's porpoises, and sea otters are considered in this section. Humpback whales and Steller sea lions are discussed in Section 4.4.18.

Harbor seals haul out on rocky beaches and sandbars in protected waters along the west side of Lynn Canal, including beaches near the Sullivan River, Davidson Glacier delta, and Pyramid Island. It is unlikely that vehicle traffic would have any effect on harbor seals where the proposed highway is at least 100 yards from the shoreline. Depending on the location and weather conditions, at a distance of 100 to 300 yards traffic noise would be at a level that often occurs in the natural environment. Therefore, Alternative 3 would not impact harbor seal haulouts at Sullivan River and Davidson Glacier. The crossing over the Chilkat River would pass immediately north of Pyramid Island. Highway traffic in this area could lead to harbor seals abandoning this island as a haulout.

Minke whales tend to be attracted to motor vessels and would likely not be displaced by increased vessel traffic associated with Alternative 3. Because of this attraction, increased ferry traffic across Lynn Canal and in Chilkoot and Taiya inlets may increase the risk of collision; however, collision accidents with minke whales are very rare (Angliss and Lodge, 2003). Therefore, Alternative 3 is unlikely to impact the population of this species in Lynn Canal.

Fast-moving and maneuverable species such as the killer whale, harbor porpoise, and Dall's porpoise can readily avoid motor vessels and would not be impacted by the ferry traffic associated with Alternative 3.

Sea otters occur in low numbers in Lynn Canal. Like harbor seals, sea otters are sensitive to noise and would likely avoid ferry traffic associated with Alternative 3. Alternative 3 is unlikely to impact the sea otter population in Lynn Canal.

4.4.15.2 Marine Birds

This group includes species that nest on land but forage in marine waters at least part of the year. Species considered in this group include great blue herons, marbled murrelets, Kittlitz's murrelets, harlequin ducks, and trumpeter swans.

Great blue herons nest in trees near preferred feeding areas, typically quiet shorelines and marshy areas. They are likely to be present in small numbers at river and stream outlets all along the Alternative 3 alignment. A West Lynn Canal Highway would result in the loss of potential nest trees on the banks at large river crossings. The type of nesting and feeding habitat preferred by great blue herons is not limited in the Sullivan River or the Endicott River deltas. Great blue herons have habituated to human presence and vehicle traffic in many urban areas, including Juneau, so they would be expected to habituate to normal vehicle traffic on the West Lynn Canal Highway. For these reasons, the West Lynn Canal Highway is not expected to result in population-level effects on this species.

Marbled murrelets are common in nearshore waters along the western shore of Lynn Canal and are presumed to nest throughout the study area (USFWS, 2003). This species nests in old-growth trees, often near the coast. Alternative 3 would impact a small portion of the nesting habitat preferred by marbled murrelets. For this reason, the West Lynn Canal Highway should not result in population-level effects on this species.

Kittlitz's murrelets appear to be rare in the study area. It nests in high-elevation talus slopes and feeds in nearshore waters. This species is unlikely to be affected by highway traffic.

Harlequin ducks are also common in nearshore waters along the western shore of Lynn Canal, and nest along the banks of the larger rivers and streams along the alignment of Alternative 3. These birds are wary of people and will swim or fly away when approached (Rosenberg, Patten, and Rothe, 1994). Highway traffic noise could disturb harlequins in nearshore resting and feeding areas where the highway alignment is at the shoreline. The majority of the highway is not located on the shoreline. Therefore, it is expected that any disturbance would not result in population-level effects on this species.

Trumpeter swans do not nest near the Alternative 3 alignment. They would not be affected by the West Lynn Canal Highway.

Blue herons and trumpeter swans do not feed and nest in open marine waters of Lynn Canal and therefore would not be affected by Alternative 3. Marbled murrelet, Kittlitz's murrelet, and harlequin ducks do use open marine waters for foraging. They most frequently use nearshore, protected areas for feeding and resting; therefore, they would not be present along the ferry routes for Alternative 3 in the main channel of Lynn Canal. These birds may be flushed by ferries approaching terminals. This disturbance would affect a small portion of the available feeding and nesting habitat, and would not have a population-level effect on these species.

4.4.15.3 Terrestrial Mammals

Species considered in this group include the black bear, brown bear, marten, river otter, wolf, Sitka black-tailed deer, moose, and mountain goat. The assessment of project effects on these animals considered habitat loss and fragmentation, traffic disturbance, mortality caused by collisions with vehicles, and indirect impacts from increased human activity in the project area.

The loss of wetland and terrestrial habitat described in Sections 4.4.13 and 4.4.15 would have a minor effect on terrestrial mammals because this loss would amount to less than one percent of these habitats available in the study area. Additional loss of habitat because of windblown trees adjacent to the right-of-way or changes in local hydrologic patterns may add to the total habitat loss but not by enough to measurably affect wildlife populations in the study area.

The beach fringe and numerous riparian areas along the west side of Lynn Canal provide high-value habitats for many terrestrial mammals, including bears, martens, river otters, moose, and wolves. The Alternative 3 alignment is more inland that the Alternative 2 alignment and

therefore affects more forest habitat and less beach fringe habitat. The 1997 HCI models predicted that the direct loss of habitat would reduce the habitat capability for brown bear, black bear, marten, and mountain goat by about one percent or less. However, behavioral avoidance of the West Lynn Canal Highway may function as a barrier to movement for some species, and may fragment their habitat by limiting their ability to use all of their range.

Because black bears are highly adaptable and often learn to coexist near human development, habitat fragmentation is not expected to result in a substantial effect on black bear populations in the study area. The highway would likely result in mortality of some black bears from collisions with vehicles. The HCI model results for the 1997 Draft EIS predicted that the West Lynn Canal Highway would decrease black bear habitat capability in the areas crossed by or adjacent to the alignment by two percent compared to present conditions.

Brown bears tend to avoid highway traffic more than black bears. As indicated in Section 4.3.15, one study found that brown bears avoided roads regardless of traffic volume. Thus, they would be more likely than black bears to abandon certain parts of their range rather than cross the highway, and less likely to be involved in vehicle collisions. Because the West Lynn Canal Highway would separate higher elevation habitats from beach fringe and estuary habitats and because these latter areas often contain important resources for brown bears, the effective loss of habitat could reduce reproductive success or survival of some bears (Schoen et al., 1993). The HCI model results for the 1997 Draft EIS predicted that the West Lynn Canal Highway would decrease brown bear habitat capability in the areas crossed by or adjacent to the alignment by 23 percent compared to present conditions. To reduce this habitation fragmentation, bridges over streams would be designed to provide underpasses for wildlife migration.

The West Lynn Canal Highway is not likely to fragment the range of marten, as they would readily cross the road to access favorable habitat. The largest impact of these alternatives on marten would be the indirect impact of trapping. Marten are highly desirable as a furbearing species and are relatively easy to trap. Alternative 3 would increase human presence and access in the region, probably increasing the number of marten trapped in the west Lynn Canal region. The HCI model results for the 1997 Draft EIS predicted that the West Lynn Canal Highway could decrease marten habitat capability in the areas crossed by or adjacent to the alignment by 30 percent primarily because of trapping. The effects of this increased pressure could be controlled by ADF&G through season duration, take limits, lottery drawings, etc. Therefore, it is expected that this increased pressure would not result in additional population-level effects.

Wolves travel widely in pursuit of prey and strongly avoid highways (USFS, 2000; Person, 2001). Because the proposed highway alignment is mostly at lower elevations, its presence may limit access to beaches and riparian areas along the alignment for wolves.

The West Lynn Canal Highway would not fragment the ranges of marten and river otter. As indicated above, the amount of habitat that would be lost for these species because of Alternative 3 is small relative to the total available habitat. It is expected that the largest impact from the West Lynn Canal Highway would be direct loss of individuals from collisions with vehicles and the increased trapping pressure resulting from improved access to the region.

Sitka black-tailed deer use a variety of habitat types, so it is unclear how small-scale habitat loss and fragmentation might affect their populations. Based on the lack of hunter success with this species, the deer population is considered very small on the west side of Lynn Canal north of William Henry Bay (Barten, 2001).

Moose distribution is more widespread on the west side of Lynn Canal than on the east side. St. James Bay, William Henry Bay, the Endicott River Valley, and the southern part of the Chilkat River Valley all have moose populations that are connected with larger herds in Glacier Bay and the Chilkat River Valley (Hessing, 2002). Direct loss of habitat would be small compared to the available habitat, and because moose readily cross roads, habitat fragmentation is not an issue with this species.

The west side of Lynn Canal does not offer as much mountain goat habitat as the east side of Lynn Canal. Mountain goat habitat is primarily at higher elevations than the proposed highway alignment, and even when they venture down to low elevations to escape deep snow, they seldom venture far from steep escape terrain. Therefore, the home range of mountain goats would not be substantially affected by the West Lynn Canal Highway.

Collisions with vehicles would result in an increase in mortality among many terrestrial mammal species in the project area. Species most likely to be affected are those attracted to roads to feed on roadside grasses, forbs, and brush and to escape deep snow, such as moose and deer, and those that do not appear to have a substantial aversion to crossing roads, such as river otters, martens, and black bears. Fewer vehicle collisions are likely to occur with species that tend to avoid roads, such as the wolf and brown bear. Mountain goats would probably not be substantially impacted, as they would seldom be found adjacent to the highway alignment. It is not possible to quantify the effect of mortality from vehicle collisions on wildlife populations in the project area, but there would be some losses.

As indicated above, the moose population along the west side of Lynn Canal is substantially larger than along the east side. Because there are more moose and moose concentration areas on the west side of Lynn Canal than on the east side, moose mortality from traffic accidents would be likely with Alternative 3. Because of the size of the moose population on the west side of Lynn Canal, it is not likely that traffic mortality would become an important factor in the maintenance of this population.

DOT&PF would conduct snow studies along the West Lynn Canal Highway during the winter as part of an avalanche control program. Some of these studies would be conducted by helicopter. Mountain goats are very sensitive to human disturbance in their alpine habitats, especially from helicopters (USFS, 2001). During heavy snow conditions, when avalanche danger is highest, goats tend to retreat to lower elevations and seek shelter under dense-canopied old-growth forests. However, goats have also been observed at high elevations and traversing slide zones during late winter in the study area. Therefore, mountain goats could be susceptible to disturbance from helicopters and howitzer fire used to keep the highway clear during the winter, and could be injured or killed in slides induced for highway maintenance. However, regular maintenance of avalanche chutes would reduce the frequency of debris from large avalanches reaching forested areas and minimize the likelihood of goat mortality from these larger events.

The West Lynn Canal Highway would make a large area more accessible to hunters and trappers. As is the case elsewhere in Alaska where roads from populated areas have been built into semi-remote and remote areas, hunting and trapping pressure on species such as black and brown bears, moose, deer, mountain goats, martens, and river otters would increase on the west side of Lynn Canal with Alternative 3. The effects of this increased pressure could be controlled by ADF&G through season duration, take limits, lottery drawings, etc. Therefore, it is expected that this increased pressure would not result in population-level effects.

4.4.15.4 Terrestrial Birds

Species considered in this group include the Queen Charlotte goshawk, peregrine falcon, olive-sided flycatcher, gray-cheeked thrush, blackpoll warbler, and Townsend's warbler. Goshawks are the only resident species in this group. Peregrine falcons could be present during migration in spring and fall. The other species are neo-tropical migrants that could be present either during migration or during the nesting season. Except for the peregrine falcon, all of these species favor primarily old-growth forest habitat. Conservation concerns for these species are the result of landscape-scale loss of habitat due to commercial logging (BPIF, 1999). There are approximately 74,470 acres of forest on the west side of Lynn Canal, most of which is old-growth. Alternative 3 could affect approximately 314 acres of old-growth forest, or 0.4 percent of the total. Therefore, the proposed project is not expected to result in population-level impacts to these species.

A West Lynn Canal Highway would cause some direct loss of habitat through clearing. The opening in the forest canopy created by the highway could cause some birds to avoid the highway area, leading to an effective loss of additional nesting habitat. Openings in the forest canopy also create "edge effects," which are used by some avian predators such as ravens, jays, and crows. These effects would add to the decreased value of nesting habitat for neo-tropical migrants near the highway. Other suitable nesting habitat is not limited in the area; therefore, the proposed project is not expected to result in population-level impacts to these species.

4.4.15.5 Amphibians

Frogs and toads live in both marshy and forested wetlands. Because amphibians have small home ranges and do not appear to travel far from their natal pools (NatureServe, 2003), potential impacts from highway maintenance and operation would be limited to those animals that live near the proposed alignment. The potential impacts of a highway to amphibians would be through mortality from roadkill and potential pollution of habitat from highway runoff involving pollutants from accidental spills. These impacts are not expected to affect amphibian populations on an area-wide basis.

4.4.16 Bald Eagles

The principal concerns for maintenance and operation of the West Lynn Canal Highway with regard to bald eagles is disturbance of nesting birds and abandonment of nesting sites. The alignment for Alternative 3 has been located to avoid the direct loss of known trees with eagle nests based on USFWS nest surveys of the project area. However, a number of trees with eagle nests are located near the alignment. As indicated in Section 4.1.15, the USFWS has developed a set of distance guidelines for construction activities near active eagle nests, and these guidelines have been used for this impact assessment. Based on surveys, there are 45 trees with bald eagle nests within 0.5 mile of the Alternative 3 alignment, seven of which are on the east side of Lynn Canal between Echo Cove and Sawmill Cove. Twenty-five of these nest trees are within 330 feet of the alignment. Of the total nests surveyed in 2003, 19 (42 percent) were found to be active.

Bald eagle studies in Alaska and other parts of North America have found that the species regularly habituates to human presence. Maintenance and operation of the West Lynn Canal Highway would involve a persistent source of noise that may result in the relocation of individual eagle pairs to alternate nest trees within their nesting territory. Individual eagle pairs may even abandon their nesting territory and associated hunting perches altogether, especially during the summer months when traffic volumes are predicted to peak. Because food availability is

identified as a key factor that influences breeding success, eagle pairs less sensitive to noise disturbance would likely habituate to highway operation near prime feeding areas. In addition, opportunistic bald eagle pairs from other territories may use previously abandoned nest sites along the west shoreline of Lynn Canal. As a result, Alternative 3 is not likely to adversely affect the overall population of bald eagles in the Lynn Canal area. See Section 4.8.12.6 for construction impacts and mitigation regarding bald eagles.

4.4.17 Threatened and Endangered Species

Consultation on Steller sea lions and humpback whales with NMFS under Section 7 of the Endangered Species Act will be concluded after the comment period for the Supplemental Draft EIS. Following consideration of comments received on the SDEIS, a final preferred alternative will be identified for the proposed project. Section 7 consultation will be concluded based on that alternative.

4.4.17.1 Steller Sea Lions

Alternative 3 does not affect any identified Steller sea lion haulout sites or designated critical habitat. Maintenance and operations of the Sawmill Cove Ferry Terminal could cause temporary disturbance to Steller sea lions in Berners Bay while they are feeding on spring forage fish aggregations; however, this is not likely to affect the Steller sea lion population in Lynn Canal. Alternative 3 does not include any new boat launch facilities and is therefore unlikely to increase recreational or commercial use of motorized vessels in the area. For these reasons, the FHWA has made the preliminary determination that Alternative 3 is not likely to adversely affect Steller sea lions.

4.4.17.2 Humpback Whales

Highway traffic and maintenance activities associated with Alternative 3 would not cause disturbance of whales in Lynn Canal. Ferry traffic across Lynn Canal would increase as a result of this alternative, but mainline ferry service would be terminated. The increased ferry traffic may increase the risk of collisions with humpback whales, but such events have been rare in the past and would likely continue to be rare.

Pile driving for construction of the ferry terminals at Sawmill Cove and William Henry Bay could disturb humpback whales in the area. Monitors would be used during pile driving to ensure that this activity does not occur when humpback whales are within 660 feet of the construction area.

Based on the above, the FHWA has made the preliminary determination that Alternative 3 is not likely to adversely affect humpback whales.

For further information on threatened and endangered species, refer to the *Wildlife Technical Report* (Appendix Q) and the *Steller Sea Lion Technical Report* (Appendix S).

4.4.18 Permits and Approvals

Alternative 3 would require the following permits and approvals:

- USFS special use permit for project facilities in the Tongass National Forest
- USACE Section 404 permit for fill in wetlands and other waters of the U.S.
- USACE Section 10 permit for dredge, fill, and structures placed below mean high water
- U.S. Coast Guard Section 9 permits for bridges over navigable waters

- ADEC Section 401 Water Quality Certification in support of Section 404 permits
- ADNR Title 41 fish habitat permit for any work below ordinary high water in streams with anadromous or resident fish
- ADNR Coastal Consistency Determination
- ADNR Interagency Land Management Assignment for use of tidelands at the Sawmill Cove and William Henry Bay Ferry Terminals, and an easement for highway segments with fill below mean high water
- Authorization from EPA and/or ADEC for treated wastewater discharge from the Sawmill Cove and William Henry Bay Ferry Terminals

4.5 Alternatives 4A and 4C – FVF and Conventional Monohull Shuttle Service from Auke Bay

This section discusses the direct and indirect effects of Alternatives 4A and 4C. Under both of these alternatives, ferry service would be provided to Haines and Skagway from Auke Bay. With Alternative 4A, service would be provided by new fast vehicle ferries. With Alternative 4C, service would be provided by conventional monohull ferries. Mainline ferry service would continue with an average of two roundtrips per week year round.

4.5.1 Land Use

4.5.1.1 Land Ownership

Alternatives 4A and 4C would not require acquisition of any property for transportation facilities. There would be no direct impact to land ownership.

4.5.1.2 Consistency with Land Use and Management Plans

The regional transportation policy set forth in the CBJ Comprehensive Plan is to support the improvement and expansion of air, marine, and highway transportation systems to maintain and expand Juneau's role as the capital city and a regional transportation center (CBJ, 1996). The 1996 update to the CBJ Comprehensive Plan maintains plans for the consideration of all alternatives, including highways, high-speed ferries, and light rail or railroad, to improve transportation links throughout Southeast Alaska and Canada. Therefore, Alternatives 4A and 4C are consistent with the CBJ Comprehensive Plan.

The Haines Borough and Skagway plans support improvement of the AMHS to provide better access to these two communities (Haines Borough, 1999; City of Skagway, 1999). Therefore, Alternatives 4A and 4C are consistent with these plans.

4.5.1.3 Land Use

Alternatives 4A and 4C would have no direct impact on land use, as they would involve existing transportation facilities in Lynn Canal. These alternatives would result in relatively small changes in the number of travelers between Juneau, Haines, and Skagway. The improved access resulting from these alternatives would have negligible indirect impacts on land use.

4.5.2 Coastal Zone Management

Modifications of the existing ferry terminal at Auke Bay would need to be consistent with the enforceable policies of the ACMP and the CBJ coastal management plan. In accordance with

the Coastal Zone Management Act, DOT&PF will obtain a determination from ADNR of consistency of the selected alternative with the state coastal management program and the Juneau coastal management plan prior to obtaining the necessary state and federal permits for the project.

4.5.3 Visual Resources

Alternatives 4A and 4C would result in more frequent views of ferries on Lynn Canal from the land. However, the frequency would not increase to the extent that noticeably different visual impressions of the region would be created relative to the impressions that currently exist.

4.5.4 Historical and Archeological Resources

Alternatives 4A and 4C would not require acquisition of any new property for transportation facilities. The only construction would be reconfiguring the Auke Bay terminal. There are no eligible properties in the APE of the Auke Bay terminal. Therefore, FHWA has determined that Alternatives 4A and 4C would not affect any historic properties.

4.5.5 Socioeconomic Resources

4.5.5.1 Overview

Alternatives 4A and 4C would not create any substantial change in economic conditions in Juneau, Haines, or Skagway. Both the population and the overall demographics of Juneau, Haines, and Skagway would not be substantially affected by these alternatives. These alternatives would not measurably affect public services or make major changes in the perceived quality of life in Juneau, Haines, or Skagway. The following subsections provide a more detailed discussion of the economic and social effects to Juneau, Haines, and Skagway for Alternatives 4A and 4C.

4.5.5.2 Juneau

Population, Economics, Housing, and Municipal Revenues – Alternatives 4A and 4C include continuing mainline AMHS service to Haines and Skagway. For this reason, these two alternatives would have little effect on independent visitor traffic to Juneau. The total increase in non-Juneau resident traffic to and from Juneau associated with Alternative 4A is estimated to be 20 annual ADT in 2008 (Table 4-36). It is estimated that Alternative 4C would have no effect on non-Juneau resident traffic to and from Juneau. Therefore, Alternative 4C would provide no change in economic conditions in Juneau relative to the No Action Alternative, and the changes resulting from Alternative 4A would be minor, as described below.

Assuming all traffic is round-trip, 2 annual ADT on a ferry equals one additional visiting vehicle carrying approximately 3.6 people (DOT&PF, 2003c), Juneau is projected to receive a total of about 12,000 new visitors in 2008 with Alternative 4A. From the 2003 Alaska Travelers Survey and the 1994 Household Survey (McDowell, 1994) conducted for this project, in-state visitors to Juneau would spend $80/visitor/trip and non-Alaskan visitors (e.g., Canadian residents and travelers from the Lower 48 states) would spend $160/visitor/trip. Based on these assumptions, visitor spending in Juneau would increase by about $1.6 million in 2008 as a result of Alternative 4A. This increased visitor spending in Juneau would generate about $900,000 in new payroll and an annual average of about 30 jobs.

Table 4-36
2008 Alternatives 4A and 4C
Visitor Spending and Related Impacts in Juneau

Description	East Lynn Canal Alternative	
	4A	4C
Highway Traffic (Annual ADT)	140	100
Vehicle Traffic Less Residents and Baseline Traffic	20	0
Total New Visitors[1] per Year	12,000	0
Total New Visitor Spending per Year	$1,600,000	0
New Local Payroll per Year	$900,000	0
New Local Employment	30	0

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Juneau.

Lynn Canal traffic on the AMHS system under Alternative 4A is predicted to increase at an annual rate of approximately 1.4 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to new traffic in 2038 would be about 50 percent higher than in 2008 (Table 4-37).

Table 4-37
2038 Alternatives 4A and 4C
Visitor Spending and Related Impacts in Juneau

Description	East Lynn Canal Alternative	
	4A	4C
Highway Traffic (Annual ADT)	220	150
Vehicle Traffic Less Residents and Baseline Traffic	30	0
Total New Visitors[1] per Year	18,000	0
Total New Visitor Spending per Year	$2.4 million	0
New Local Payroll per Year	$1.35 million	0
New Local Employment	45	0

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Juneau.

Each new job in the economy results in an increase in population of about 1.5 people[31]. Therefore, the 30 new jobs in Juneau in 2008 resulting from Alternative 4A would increase population by 45 residents, which represents an overall increase of about 0.15 percent in Juneau's current population. In 2038, Juneau's population would increase by 60 to 70 residents with Alternative 4A, an overall increase in Juneau's current population of about 0.2 percent.

Assuming 2.6 persons per household, a population increase of 45 residents would result in additional demand for fewer than 20 housing units in 2008. A maximum of 28 housing units would be needed for the increased population in 2038. The latest available data indicate that Juneau had approximately 320 vacant housing units in 2001. The project demand is well within the existing vacant housing capacity of Juneau. Because of the small increase in independent

[31] This number is based on an estimated participation rate of 65 percent, meaning that 65 percent of the Juneau population participates in the local labor force.

visitors and population associated with Alternative 4A, the value of private property in Juneau would not measurably increase.

Sales tax revenues (plus hotel, liquor, and tobacco taxes) for Juneau would increase at a rate proportional to the increase in spending. Total additional visitor spending of $1.6 million in 2008 would generate (assuming all of the spending is taxable) $80,000 in additional sales tax revenues (based on a five percent tax rate). Additional visitor spending of up to $2.4 million in 2038 would generate $120,000 in additional sales tax revenues.

Industry/Commercial Sectors – The principal economic benefits of Alternative 4A would be received by the local retail trade and service sectors that provide goods and services to visitors. Economic benefits to other industrial sectors would not be appreciable.

Utilities and Public Services – Alternative 4A would not measurably affect utilities and public services in Juneau relative to the No Action Alternative.

Quality of Life – Alternative 4A would double the number of summer ferry trips between Juneau and Haines and Skagway relative to the No Action Alternative. Based on the 1994 and 2003 household surveys conducted for the project, this improved access would be perceived as an improvement to quality of life by a majority of Juneau residents, providing increased recreational opportunities. Alternative 4C would only add one or two more ferry trips per week between Juneau and Haines and Skagway; therefore, this alternative would not result in any change in the perceived quality of life relative to the No Action Alternative.

4.5.5.3 Haines

Population, Economics, Housing, and Municipal Revenues – As is the case with Juneau, Alternative 4A would have a minor benefit to the Haines economy and Alternative 4C would provide no change in economic conditions in Haines relative to the No Action Alternative (Table 4-38). The total increase in non-Haines resident traffic to and from Haines associated with Alternative 4A is estimated to be 20 annual ADT in 2008.

Table 4-38
2008 Alternatives 4A and 4C
Visitor Spending and Related Impacts in Haines

Description	Alternative	
	4A	4C
Ferry Traffic (Annual ADT)	80	55
Vehicle Traffic Less Residents and Baseline Traffic	20	0
Total New Visitors per Year	12,000	0
Total New Visitor[1] Spending per Year	$700,000	0
New Local Payroll per Year	$300,000	0
New Local Employment	10	0

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Haines.

Assuming that all traffic is round-trip, two annual ADT on a ferry equals one additional visiting vehicle carrying approximately 3.6 people. Haines is projected to receive a total of about 12,000 new non-Haines resident visitors in 2008 with Alternative 4A. Assuming that visitors would spend an average of $50 to $60 per trip in Haines, visitor spending in the community would increase by about $700,000 in 2008 as a result of Alternative 4A. Because Alternative 4A

would not change the cost of travel between Juneau and Haines, it is not expected that the number of trips that Haines residents would take to Juneau for shopping would increase substantially. Therefore, there would be little increased spending in Juneau to off set increased spending in Haines by visitors to that community. This increase in visitor spending in Haines would generate about $300,000 in new payroll and an annual average of about 10 additional jobs.

Lynn Canal traffic on the AMHS system under this alternative is predicted to increase at an annual rate of approximately 1.4 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to new traffic in 2038 would be approximately 50 percent higher than in 2008 (Table 4-39).

Table 4-39
2038 Alternatives 4A and 4C
Visitor Spending and Related Impacts in Haines

Description	Alternative	
	4A	4C
Ferry Traffic (Annual ADT)	120	80
Vehicle Traffic Less Residents and Baseline Traffic	30	0
Total New Visitors per Year	18,000	0
Total New Visitor[1] Spending per Year	$1.5 million	0
New Local Payroll per Year	$450,000	0
New Local Employment	15	0

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Haines.

Each new job in the economy results in an increase in population of about 1.5 people[32]. Therefore, the 10 new jobs in Haines in 2008 resulting from Alternative 4A would increase population by 15 residents. This would represent an overall increase of about 0.6 percent of Haines current population (2,360). Alternative 4A would increase Haines population by a maximum of 25 in 2038, an increase of about one percent in the community's current population.

Assuming 2.6 persons per household, a population increase of 15 residents would result in additional demand for about six housing units in 2008. An increase of up to 24 residents in 2038 would result in additional housing demand for about nine units. The latest available data indicate that Haines has about 127 vacant housing units not including seasonal, recreational, or occasional use units. The project demand is well within the existing vacant housing capacity of Haines. The small increase in independent visitors and population associated with Alternative 4A would not measurably increase the value of private property in Haines.

Sales tax revenues would increase at a rate proportional to the increase in spending in Haines. Total additional visitor spending in Haines of $700,000 annually would generate $38,500 in additional sales tax revenues (based on a 5.5 percent tax rate).

[32] This number is based on an estimated participation rate of 65 percent meaning that 65 percent of the Haines population participates in the local labor force.

Industry/Commercial Sectors – The principal economic benefits of Alternative 4A would be received by the local retail trade and service sectors that provide goods and services to visitors. Economic benefits to other industrial sectors would not be appreciable.

Utilities and Public Services – Alternative 4A would not measurably affect utilities and public services in Haines Borough relative to the No Action Alternative.

Quality of Life – Alternative 4A would double the number of ferry trips between Juneau and Haines relative to the No Action Alternative. Based on the 1994 and 2003 household surveys conducted for the project, this improved access would be perceived as an improvement to quality of life by a majority of Haines residents. Better access to shopping and other services in Juneau, and more recreational opportunities are potential benefits cited by some Haines residents. Alternative 4C would only add one or two more ferry trips per week between Juneau and Haines; therefore, this alternative would not result in any change in the perceived quality of life relative to the No Action Alternative.

4.5.5.4 Skagway

Population, Economics, Housing, and Municipal Revenues – Alternative 4A would have a minor benefit to the Skagway economy, and Alternative 4C would provide no change in economic conditions in Skagway relative to the No Action Alternative (Table 4-40). The total increase in non-Skagway resident traffic to and from Skagway associated with Alternative 4A is estimated to be 5 annual ADT in 2008.

Table 4-40
2008 Alternatives 4A and 4C Visitor Spending and Related Impacts in Skagway

Description	Alternative	
	4A	4C
Ferry Traffic (Annual ADT)	60	45
Vehicle Traffic Less Residents and Baseline Traffic	5	0
Total New Visitors[1] per Year	3,000	0
Total New Visitor Spending per Year	$200,000	0
New Local Payroll per Year	$100,000	0
New Local Employment	5	0

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Skagway.

Assuming all traffic is round-trip, two annual ADT on a ferry equals one additional visiting vehicle carrying approximately 3.6 people, Skagway is projected to receive a total of about 3,000 new visitors in 2008 with Alternative 4A. Assuming that visitors would spend an average of $50 per trip in Skagway, visitor spending in the community would increase by about $200,000 in 2008 as a result of Alternative 4A. This increase in visitor spending in Skagway would generate about $100,000 in new payroll and five additional annual average jobs.

Lynn Canal traffic on the AMHS system under this alternative is predicted to increase at an annual rate of approximately 1.4 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to new traffic in 2038 would be approximately 50 percent higher than in 2008 (Table 4-41).

Table 4-41
2038 Alternatives 4A and 4C Visitor Spending and Related Impacts in Skagway

Description	Alternative	
	4A	4C
Ferry Traffic (Annual ADT)	100	65
Vehicle Traffic Less Residents and Baseline Traffic	10	0
Total New Visitors[1] per Year	4,500	0
Total New Visitor Spending per Year	$300,000	0
New Local Payroll per Year	$150,000	0
New Local Employment	10	0

Notes: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Skagway.

Each new job in the Skagway economy results in an increase in population of about 1.3 people[33]. Therefore, five new jobs in Skagway would result from Alternative 4A in 2008, and these jobs would be expected to result in a population increase of less than seven residents, an overall increase of less than one percent of Skagway's current population. In 2038, Alternative 4A would create about eight new jobs in Skagway. This would result in a population increase of up to about 10 residents, an increase of less than two percent of Skagway's current population.

Assuming 2.6 persons per household, a population increase of less than 10 residents would result in additional demand for fewer than four housing units in 2008. An increase of 10 residents in 2038 would result in additional demand for about five housing units. The latest available data indicate that Skagway has about 54 vacant housing units, not including seasonal, recreational, or occasional use units. The project demand is well within the existing vacant housing capacity of Skagway. Because of the small increase in independent visitors and population associated with Alternative 4A, it is not expected to measurably increase the value of private property in Skagway.

Sales tax revenues would increase at a rate proportional to the increase in spending in Skagway. Total additional visitor spending would generate about $8,000 in additional tax revenues.

Industry/Commercial Sectors – The principal economic benefits of Alternative 4A would be received by the local retail trade and service sectors that provide goods and services to visitors. Economic benefits to other industrial sectors would not be appreciable.

Utilities and Public Services – Alternative 4A would not measurably affect utilities and public services in Skagway relative to the No Action Alternative.

Quality of Life – Alternative 4A would double the number of ferry trips between Juneau and Skagway relative to the No Action Alternative. Based on the 1994 and 2003 household surveys conducted for the project, this improved access would be perceived as an improvement to quality of life by a majority of Skagway residents. Increased tourism and more recreational opportunities are potential benefits cited by some Skagway residents. Alternative 4C would only add one or two more ferry trips per week between Juneau and Skagway; therefore, this

[33] This number is based on an estimated participation rate of 77 percent meaning 77 percent of the Skagway population participates in the local labor force.

alternative would not result in much change in the perceived quality of life relative to the No Action Alternative.

See the *Socioeconomic Effects Technical Report* (Appendix H) for further information on the socioeconomic assessment of proposed project alternatives.

4.5.6 Subsistence

Because Alternatives 4A and 4C would not substantially change transportation facilities and visitor trips in Lynn Canal, they would not result in direct or indirect impacts to subsistence uses.

4.5.7 Transportation

The 2004 SATP calls for the construction of a highway from Juneau to Skagway with a shuttle from Katzehin to Haines. The plan would need to be amended if Alternative 4A or 4C is the selected alternative.

4.5.7.1 Capacity and Demand

Traffic demand for Alternatives 4A and 4C was projected for 2008 and 2038 using the transportation model summarized in Section 4.1.5. These projections were based on 2002 traffic in Lynn Canal, the unmet travel demand in the region, projected growth in the region, costs of travel, travel distance and speed, value of time, accident costs, and frequency of delay.

Projected traffic demand and capacity for the No Action Alternative and Alternatives 4A and 4C in 2008 are provided in Table 4-42. As indicated in the table, Alternatives 4A and 4C would provide a combined capacity (mainliner and shuttles) of 452 and 303 vehicles, respectively, which would meet the demand for this mode of transportation in all but the peak week.

Table 4-42
2008 Forecast Demand and Capacity for the
No Action Alternative and Alternatives 4A and 4C

Alternative	Annual ADT	Summer ADT	Winter ADT	Peak Week ADT	Summer Capacity (vehicles per day)[1]
No Action	90	170	40	330	96/71
4A	140	250	70	490	229/223
4C	100	180	50	360	154/149

Note: [1]The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Juneau and Skagway.

Table 4-43 provides projections of traffic demand in 2038 for the No Action Alternative and Alternatives 4A and 4C. These projections assume an increase in travel demand of 1.5 and 1.2 percent annually for Alternatives 4A and 4C, respectively. As traffic demand grows with time, the ability of Alternatives 4A and 4C to accommodate that demand would decrease. The summer average daily traffic would still be accommodated. However, the difference between peak week demand and the fixed capacity of the ferry service would increase.

The projected travel demand between Haines and Skagway with Alternatives 4A and 4C is the same as the No Action Alternative. The Haines/Skagway summer ADT is projected to be 67 vehicles in 2008 and 98 vehicles in 2038 for both the No Action Alternative and Alternatives 4A and 4C. The projected summer daily capacity is 204 vehicles, which is more than enough to accommodate the demand between Haines and Skagway.

Table 4-43
2038 Forecast Demand and Capacity for the No Action Alternative and Alternatives 4A and 4C

Alternative	Annual ADT	Summer ADT	Winter ADT	Peak Week ADT	Summer Capacity (vehicles per day)[1]
No Action	130	230	60	460	96/71
4A	220	390	100	780	229/223
4C	150	260	70	520	154/149

Note: [1]The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Juneau and Skagway.

4.5.7.2 Travel Flexibility and Opportunity

Alternative 4A would result in an increase in flexibility and opportunity for travel in Lynn Canal. This alternative would approximately double the number of round-trips between Juneau and Haines or Skagway from one per day to two per day in the summer. Travelers would still be dependent on ferry schedules and subject to reservations for the timing of their travel.

Alternative 4C would leave travel flexibility and opportunity in Lynn Canal largely unchanged relative to the No Action Alternative. Under Alternative 4C, nine round-trips per week would be possible between Juneau and Haines or Skagway in the summer. Under the No Action Alternative, there would be eight round-trips per week between Juneau and Haines and seven round-trips per week between Juneau and Skagway in the summer. Travelers would still be dependent on ferry schedules and subject to reservations for the timing of their travel, and it would be difficult if not impossible to travel from Juneau to Haines or Skagway and return the same day.

Alternatives 4A and 4C would provide the same number of ferry trips between Haines and Skagway as the No Action Alternative.

4.5.7.3 Travel Time

Table 4-44 provides a comparison of travel times for the No Action Alternative and Alternatives 4A and 4C. As indicated in the table, Alternative 4A would have about the same travel times as the No Action Alternative. Travel times on a shuttle ferry in Alternative 4C would take more than two hours longer than the fast vehicle ferry in the No Action Alternative.

Alternatives 4A and 4C would not affect the travel time between Haines and Skagway. It would remain 1.3 hours, the same as the No Action Alternative.

Table 4-44
Travel Times for the No Action Alternative and Alternatives 4A and 4C

Route	Summer (hours)[1]
No Action Alternative	
Auke Bay - Haines	3.5/7.1
Auke Bay - Skagway	3.8/9.1
Haines - Skagway	1.3
Alternative 4A	
Auke Bay - Haines	3.8/7.1
Auke Bay - Skagway	4.1/9.1
Haines - Skagway	1.3
Alternative 4C	
Auke Bay - Haines	6.0/7.1
Auke Bay - Skagway	6.3/9.1
Haines - Skagway	1.3

Note: [1]The first number is the time for the trip on a shuttle ferry, and the second number is the time for the trip on a mainline ferry.

4.5.7.4 State and User Costs

The 30-year life cycle costs for the No Action Alternative and Alternatives 4A and 4C discounted to present (January 2004) dollars are provided in Table 4-45. These costs include state and federal capital costs and state maintenance and operating expenses. Capital costs include design, vessel and terminal construction, vessel refurbishment, and vessel replacement.

Table 4-45
Thirty-Year Life Cycle Costs for the No Action Alternative and Alternatives 4A and 4C ($millions)

Alternative	Capital Cost	Operating Cost	Total Life Cycle Cost
No Action	$87	$179	$267
4A	$232	$263	$495
4C	$129	$198	$326

Table 4-46 provides an estimate of the state's portion of these costs. As indicated in the table, Alternatives 4A and 4C would have higher capital and operating costs for the state than the No Action Alternative. Although state revenues from fares would be higher for Alternatives 4A and 4C than for the No Action Alternative, they would not offset the increased cost of these alternatives to the state. Therefore, the state would pay more for Alternatives 4A and 4C than for the No Action Alternative. The cost per vehicle to the state would be slightly lower with Alternatives 4A and 4C than the No Action Alternative because of the higher volume of traffic transported with these alternatives than the No Action Alternative.

Table 4-46
Present Value of Capital and Operating Costs to State of Alaska for the No Action Alternative and Alternatives 4A and 4C

Alternative	State Funds1					
	Capital Costs ($million)	Operating Costs ($million)	Total State Cost ($million)	Revenue ($million)	Net State Cost ($million)	State Cost/Vehicle (dollars)
No Action	$8	$179	$187	$126	$61	$51
4A	$21	$263	$284	$186	$98	$50
4C	$11	$198	$209	$131	$78	$57

Note: [1]Current value of 2004 to 2038 costs as of January 1, 2004, at private-sector rate of return.

The total cost[34] and out-of-pocket cost of travel between Juneau and Skagway or Haines for a family of four in a 19-foot vehicle is listed in Table 4-47 for the No Action Alternative and Alternatives 4A and 4C. The total cost and out-of-pocket cost for travel from Juneau to Haines or Skagway under Alternative 4A would be the same as the No Action Alternative. FVF and mainliner fares would be the same under Alternative 4A and the No Action Alternative. Alternative 4C would cost 10 percent less than travel on a FVF under the No Action Alternative or Alternative 4A.

Table 4-47
Juneau to Haines and Skagway Total and Out-of-Pocket User Cost for Family of Four in 19-foot Vehicle for the No Action Alternative and Alternatives 4A and 4C[1]

Alternative	Haines User Cost	Skagway User Cost
No Action[2]	$180	$237
4A[3]	$198	$261
4C[4]	$180	$237

Notes: [1]Because there is no highway travel for these alternatives, the total cost is the ferry fare which is the same as out-of-pocket cost.
[2]Cost is for a mainline ferry. FVF would be 10 percent higher.
[3]Cost is for FVF shuttle ferry. Mainline ferry would be 10 percent less.
[4]Cost is for shuttle or mainline ferry.

The cost of taking the shuttle ferry between Haines and Skagway would remain the same as the No Action Alternative with Alternatives 4A and 4C. That fare is estimated to be about $40 for a family of four.

Table 4-48 shows user benefits and net present values for Alternative 4A and 4C. User benefits can include reduced out-of-pocket costs, travel time, vehicle maintenance and ownership costs, and accident costs. Alternative 4A would provide $69 million in user benefits over 35 years primarily due to reduced travel frequency delay[35]. Alternative 4C would offer little user benefit.

[34]Total user costs are out-of-pocket cost, vehicle maintenance and ownership costs, and accident costs.

[35] Frequency delay is a measure of schedule convenience based on how often the opportunity to travel is available. For more information on frequency delay see the *Traffic Forecast Report* (Appendix C).

Table 4-48
User Benefits and Net Present Value of Alternatives 4A and 4C Versus the No Action Alternative[1]

Alternative	User Benefits ($million)[1]	Net Incremental Project Costs ($million)[2]		Net Present Value ($million)
4A	$69	$125		-$56
4C	$4	$61		-$57

Notes: [1]For the period 2004 to 2038 discounted to current (January 2004) dollars.
[2]Overall project costs minus revenues.

One of the best economic measures of an alternative is its net present value. Net present value is the total user benefits minus the net costs of an alternative over and above the net cost of the No Action Alternative for a given period of time. The 2004 to 2038 net present values of Alternatives 4A and 4C are negative numbers at about -$56 and -$57 million, respectively. In other words, the costs of these alternatives are greater than the value of their user benefits.

4.5.7.5 Other Transportation Impacts

It is likely that some travel would be diverted from air taxi operations currently serving the Lynn Canal to ferries under Alternative 4A due to the increased convenience of more trips. The *Traffic Forecast Report* (Appendix C) estimated that Alternative 4A would divert 23 percent of air traffic and Alternative 4C would divert 17 percent of air traffic.

AMHS service in Lynn Canal under the No Action Alternative is estimated to require a state subsidy of about $3.3 million in 2008. Because of the increase in ferry service in Lynn Canal with Alternatives 4A and 4C, both are estimated to require a larger state subsidy than the No Action Alternative (Table 4-49). These alternatives would place an additional funding burden on AMHS which could have negative impacts on other AMHS service.

Table 4-49
Annual AMHS Operating Costs and Estimated AMHS State Subsidy in 2008 for the No Action Alternative and Alternatives 4A and 4C

Alternative	AMHS Operating Cost ($million)	Estimated AMHS State Subsidy ($million)
No Action	$10.2	$3.3
4A	$16.7	$5.7
4C	$11.7	$4.2

No other transportation impacts would be likely under these alternatives.

4.5.8 Geology

Because Alternatives 4A and 4C would only involve reconfiguration of existing ferry terminal dock facilities, they would have no direct or indirect effects on geological resources.

4.5.9 Hydrology and Water Quality

4.5.9.1 Hydrology

Because Alternatives 4A and 4C would only involve relatively minor reconfiguration of existing ferry terminal dock facilities, they would not impact circulation within Lynn Canal. No other changes would be made to transportation facilities; therefore, there would be no impacts to surface water resources, including floodplains.

4.5.9.2 Water Quality

Ferry operations under Alternatives 4A and 4C would have little effect on area water quality. AMHS mainline ferry wastewater discharges in Lynn Canal would remain similar to discharges under the No Action Alternative. The ferries that would be used for Alternative 4A and 4C would have sanitary waste holding tanks,[36] or would discharge treated wastewater meeting applicable standards. The ferry terminal sewage treatment facilities at Auke Bay, Haines, and Skagway would continue to operate under these alternatives. There are no documented impacts associated with these systems; therefore, negligible impacts to water quality from the terminal treatment facilities are anticipated. Accidental discharges, spills, and leaks are possible during ferry operations. Historically, these have been minor, with only minimal and temporary impacts to water quality. This low level of impact would likely continue under Alternatives 4A and 4C.

4.5.10 Air Quality

Emissions from marine vessels and motor vehicles are directly proportional to the amount of fuel they burn. As indicated in Table 4-65, ferry and motor vehicle operations under Alternative 4A would consume about 2.5 times as much fuel as under the No Action Alternative, due primarily to the high fuel consumption rates of the fast vehicle ferries. Therefore, emissions of CO, NO_x, and particulates would be about 2.5 times higher under Alternative 4A than under the No Action Alternative. This would not result in violations of federal and state air quality standards because pollutant concentrations in the region are so low and the volume of emissions from Alternative 4A is relatively low compared with other more urbanized areas.

Because Alternative 4C uses conventional monohull ferries, fuel consumption would be essentially the same as under the No Action Alternative. Therefore, emissions under Alternative 4C would be similar to emissions under the No Action Alternative.

4.5.11 Hazardous Materials

The ISA did not identify any sites within the boundaries of Alternatives 4A and 4C that have the potential for hazardous materials involvement.

4.5.12 Wetlands

Because Alternatives 4A and 4C would only involve reconfiguration of existing ferry terminal dock facilities, they would have no direct or indirect effects on wetlands.

4.5.13 Marine and Freshwater Habitat and Species (Including Essential Fish Habitat)

Reconstruction of the Auke Bay terminal would require the removal of pilings, replacement of pilings, and placement of some fill in the bay. Fill and pilings would result in the loss of less

[36] Holding tanks would be pumped out and the waste treated onshore for disposal.

than one acre of intertidal and subtidal habitat. This loss would not result in a measurable reduction in any benthic or fish populations in the project region or Auke Bay.

Ferry operations under Alternatives 4A and 4C would be somewhat greater than under the No Action Alternative. This increase would not be large enough to have a measurably different effect on marine and freshwater habitat or fish and other marine species than the No Action Alternative. FHWA has determined that Alternatives 4A and 4C would not have a substantial adverse effect on essential fish habitat.

4.5.14 Terrestrial Habitat

Because Alternatives 4A and 4C would only involve reconfiguration of existing ferry terminal dock facilities, they would have no direct or indirect effects on terrestrial habitat.

4.5.15 Wildlife

4.5.15.1 Marine Mammals

Harbor seals, minke whales, killer whales, harbor porpoises, Dall's porpoises, and sea otters are considered in this section. Humpback whales and Steller sea lions are discussed in Section 4.5.18.

Seals are habituated to current ferry traffic. Because Alternatives 4A and 4C would use existing terminals, and would only increase traffic on existing routes, they would not impact harbor seal use of Lynn Canal.

Minke whales tend to be attracted to motor vessels and would likely not be displaced by increased vessel traffic associated with Alternatives 4A and 4C. Because of this attraction, increased ferry traffic would increase the risk of collision, particularly with the fast vehicle ferries used in Alternative 4A; however, collision accidents with minke whales are very rare (Angliss and Lodge, 2003). Therefore, Alternatives 4A and 4C are unlikely to impact the population of this species in Lynn Canal.

Fast-moving and maneuverable species such as the killer whale, harbor porpoise, and Dall's porpoise can readily avoid motor vessels, even the fast vehicle ferries proposed for Alternative 4A, and would not be impacted by the ferry traffic associated with Alternatives 4A and 4C.

Sea otters occur in low numbers in Lynn Canal. Like harbor seals, sea otters are sensitive to noise and would likely avoid ferry traffic associated with Alternatives 4A and 4C. These alternatives are unlikely to impact the sea otter population in Lynn Canal.

4.5.15.2 Marine Birds

This group includes species that nest on land but forage in marine waters at least part of the year. Species considered in this group include great blue herons, marbled murrelets, Kittlitz's murrelets, harlequin ducks, and trumpeter swans.

Blue herons and trumpeter swans do not feed and rest in open marine waters of Lynn Canal and therefore would not be affected by Alternatives 4A and 4C. Marbled murrelets, Kittlitz's murrelets, and harlequin ducks do use open marine waters for foraging. They most frequently use nearshore, protected areas for feeding and resting; therefore, they would not be present along the ferry routes for Alternatives 4A and 4C in the main channels of Lynn Canal. These birds may be flushed by ferries approaching terminals. Although this sort of disturbance would

be more frequent with Alternatives 4A and 4C than with the No Action Alternative, it would not be frequent enough to have a population-level effect on these species.

4.5.15.3 Terrestrial Mammals

Because Alternatives 4A and 4C would only involve reconfiguration of existing ferry terminal dock facilities, they would have no direct or indirect effects on terrestrial mammals.

4.5.15.4 Terrestrial Birds

Because Alternatives 4A and 4C would only involve reconfiguration of existing ferry terminal dock facilities, they would have no direct or indirect effects on terrestrial birds.

4.5.15.5 Amphibians

Because Alternatives 4A and 4C would only involve reconfiguration of existing ferry terminal dock facilities, they would have no direct or indirect effects on amphibians.

4.5.16 Bald Eagles

Because Alternatives 4A and 4C would only involve reconfiguration of existing ferry terminal dock facilities, they would have no direct or indirect effects on terrestrial or freshwater habitats used by bald eagles.

4.5.17 Threatened and Endangered Species

Consultation on Steller sea lions and humpback whales with NMFS under Section 7 of the Endangered Species Act will be concluded after the comment period for the Supplemental Draft EIS. Following consideration of comments received on the SDEIS, a final preferred alternative will be identified for the proposed project.

4.5.17.1 Steller Sea Lion

Alternatives 4A and 4C would not affect Steller sea lions at any traditional haulouts and would not measurably change the potential for Steller sea lion/AMHS ferry interactions. For these reasons, the FHWA has made the preliminary determination that Alternatives 4A and 4C are not likely to adversely affect Steller sea lions.

4.5.17.2 Humpback Whales

Ferry traffic in Lynn Canal would increase as a result of Alternatives 4A and 4C. The increased ferry traffic would increase the risk of collisions with humpback whales. The use of fast ferries for Alternative 4A would further increase the risk of collisions because research has shown that vessel-whale collisions increase proportionately when the speed of vessels increases above 14 knots (Laist et al., 2001). Collisions have been rare in the past and would likely continue to be rare despite this increased risk. FHWA has made the preliminary determination that Alternatives 4A and 4C are not likely to adversely affect humpback whales.

For further information on threatened and endangered species, refer to the *Wildlife Technical Report* (Appendix Q) and the *Steller Sea Lion Technical Report* (Appendix S).

4.5.18 Permits and Approvals

Permits and approvals required for Alternatives 4A and 4C are limited to modifications to the Auke Bay Ferry Terminal. The following permits and approvals would be required:

- USACE Section 404 permit for fill below the high tide line
- USACE Section 10 permit for dredge, fill, and structures placed below mean high water
- ADEC Section 401 Water Quality Certification in support of Section 404 permits
- ADNR Coastal Consistency Determination
- ADNR Interagency Land Management Assignment for use of additional tidelands

4.6 Alternatives 4B and 4D – FVF and Conventional Monohull Shuttle Service from Berners Bay

This section evaluates the direct and indirect effects of Alternatives 4B and 4D. Under both of these alternatives, a 5.2-mile highway would be constructed from Echo Cove to Sawmill Cove in Berners Bay. A ferry terminal would be constructed at Sawmill Cove. Ferry service would then be provided to Haines and Skagway from Sawmill Cove during the summer months. During the winter, ferry service would be provided to Haines and Skagway from Auke Bay. With Alternative 4B, two new FVFs would be used for this service. Under Alternative 4D, two conventional monohull vessels would be used for the ferry service. Mainline AMHS service would continue with two roundtrips per week year round.

4.6.1 Land Use

4.6.1.1 Land Ownership and Management

The required highway right-of-way from Echo Cove to Sawmill Cove and the new ferry terminal at Sawmill Cove would occupy up to 72 acres of federal land in the Tongass National Forest under the management of the USFS and 55 acres of land owned by Goldbelt. The Tongass National Forest land would remain in federal ownership with a highway easement conveyed to the state. Goldbelt would be compensated for lands acquired for a new highway right-of-way at fair market value in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

4.6.1.2 Consistency with Land Use Plans

As described in Section 3.1.1.1, the TLMP for the Tongass National Forest identifies a transportation corridor along the alignment for Alternatives 4B and 4D to Sawmill Cove (USFS, 1997); therefore, these alternatives are consistent with the TLMP. USFS land along the east shore of Berners Bay that would be crossed by the highway for these alternatives is currently managed under the designations Semi-Remote Recreation and Scenic Viewshed. If Alternative 4B or 4D is selected as the final preferred alternative for the proposed project and a highway is constructed to Sawmill Cove, the USFS would change the designation of the land on which the highway corridor is located to Transportation and Utility Systems.

The regional transportation policy set forth in the CBJ Comprehensive Plan is to support the improvement and expansion of air, marine, and highway transportation systems to maintain and expand Juneau's role as the capital city and a regional transportation center (CBJ, 1996). The 1996 update to the CBJ Comprehensive Plan maintains plans for the consideration of all alternatives, including highways, high-speed ferries, and light rail or railroad, to improve

transportation links throughout Southeast Alaska and Canada. The CBJ Comprehensive Plan recognizes the need to consider highway access to the Berners Bay area (CBJ, 1999). Therefore, Alternatives 4B and 4D are consistent with the CBJ Comprehensive Plan.

Haines and Skagway local plans and policies promote the type of marine transportation improvements that would occur under Alternatives 4B and 4D (City of Skagway, 1999; Haines Borough, 1999). Therefore, these alternatives are consistent with the plans and policies of Haines and Skagway.

4.6.1.3 Land and Resource Uses

The highway from Echo Cove to Sawmill Cove would improve opportunities for recreational activities such as hiking, camping, sightseeing, rafting, canoeing, kayaking, fishing, and hunting. These opportunities would provide benefits for residents and visitors, and spread out recreation activities that are currently concentrated along the existing highway system in Juneau. Berners Bay is already a popular location for remote and semi-remote recreation. A highway to the southern portion of that bay would make it more accessible for people looking for a rustic but not pristine outdoor experience. A highway could also provide opportunities for outfitters to make more recreational trips available to the public in the region. Opening up the recreation opportunities of the coastline along the east side of Lynn Canal to Berners Bay would be perceived as a negative impact by those who enjoy the existing remote nature of the region, including some outfitters who currently provide wilderness trips there.

Sawmill Creek would be crossed by the highway proposed for Alternatives 4B and 4D. This stream supports resident and anadromous sport fish. The region also supports populations of mountain goats and bears, which are popular big game species for resident and out-of-state hunters. Hunting and fishing pressure has increased substantially along every highway in Alaska that has opened a formerly remote area to local communities and outside visitors. Increases in hunting and fishing would be expected along the extension of the highway from Echo Cove to Sawmill Cove. As in other readily accessible regions of the state, the ADF&G would monitor the resources along Lynn Canal and adjust fish and game regulations, as necessary, to protect those resources from overutilization.

Under Alternatives 4B and 4D, Goldbelt would benefit from improved access to its Echo Cove lands. Better access would facilitate development opportunities, including transportation-related activities, recreation, and tourism and residential development.

4.6.1.4 Parks and Recreation Facilities

No land from a municipal, state, or federal park or recreation area would be required by Alternatives 4B and 4D. See Chapter 6 for further discussion of potential impacts to public recreation facilities.

4.6.2 Coastal Zone Management

Proposed facilities for Alternatives 4B and 4D are located in the coastal zone. The highway from Echo Cove to Sawmill Cove and the proposed Sawmill Cove Ferry Terminal are within the CBJ coastal management plan. Therefore, Alternatives 4B and 4D would need to comply with the enforceable policies of the ACMP and the CBJ coastal management plan.

The topics addressed by the enforceable policies of the ACMP and the coastal management plans that are relevant to Alternatives 4B and 4D are coastal development; geophysical hazards; recreation; transportation and utilities; subsistence; biological habitats; air, land, and

water quality; and prehistoric and historic resources. These policies provide goals and performance criteria for activities within the coastal zone, including transportation projects.

Alternatives 4B and 4D have been sited in consideration of the enforceable policies of the ACMP and the coastal management plans. These enforceable policies would also be considered in the development of design parameters for the alternative selected for the proposed project. In accordance with the Coastal Zone Management Act, DOT&PF will obtain a determination from ADNR of consistency of the selected alternative with the state coastal management program and applicable coastal management plans prior to obtaining the necessary state and federal permits for the project.

4.6.3 Visual Resources

4.6.3.1 Views from the Bay

In Berners Bay, the most susceptible views to potential impacts from Alternatives 4B and 4D are views from boats in the bay. Figure 4-27 provides a visual simulation of the highway in background views from the southern end of Berners Bay. From this location, the highway is approximately 2.4 miles from the viewer and is located in an area not requiring substantial cuts and fills. Therefore, the highway is not likely to dominate the existing natural setting. At closer distances, the ferry terminal at Sawmill Cove and the highway would be more noticeable. It is likely that visitors to Berners Bay and Point Bridget in the Point Bridget State Park would notice the highway; however, from this distance it would not be a dominant feature in the viewshed.

Figure 4-28 is a visual simulation of the highway in the foreground at the Sawmill Cove Ferry Terminal proposed for Alternatives 4B and 4D. The highway would be noticeable intermittently along the eastern edge of Berners Bay. However, the proposed ferry terminal would likely be highly visible from this distance (approximately ½ mile) and through the middleground viewing threshold. The changes to form, line, color, and texture introduced by the ferry terminal would dominate the existing viewshed.

Alternatives 4B and 4D would result in more frequent views of ferries on Lynn Canal from the land. However, the frequency would not be increased to the extent that noticeably different visual impressions of the region would be created relative to the impressions that currently exist.

4.6.3.2 Views from the Highway

Views from a highway along the east shore of Berners Bay looking east would be limited to the foreground by dense old-growth forest in most places. At the Sawmill Cove terminal, views to the west would include Point Bridgett, Point St. Mary, and the opening of Berners Bay across to the west side of Lynn Canal.

4.6.3.3 Consistency with Visual Quality Objectives (VQOs)

The VQO for the Transportation and Utility Systems LUD is Modification with only the foreground of views considered. Alternatives 4B and 4D would be consistent with this VQO. Where ever possible, the alignment has been located to maintain a buffer between the highway and the shore to reduce the visibility of the highway. In most locations, these alternatives would exceed the VQO of Modification. In order to demonstrate the overall visual effect of the alternatives, DOT&PF also evaluated the consistency of Alternatives 4B and 4D with the VQOs of the adjacent LUDs.

USFS land from Echo Cove to Sawmill Cove has a VQO of Partial Retention. The highway for Alternatives 4B and 4D would not be visible from the coastline until Sawmill Cove. At this point,

the access road to the terminal and the new ferry terminal would be visible from Berners Bay; therefore, the alternatives would not conform to the VQO of adjacent land in this area.

4.6.4 Historical and Archeological Resources

There are no eligible historic properties in the APE of Alternatives 4B and 4D. Therefore, FHWA has determined that Alternatives 4B and 4D would not affect historic properties.

These alternatives would indirectly increase recreational use of land adjacent to the new highway. Increased recreational use could result in increased disturbance of historic and prehistoric cultural sites by hikers, hunters, and other recreational users.

4.6.5 Socioeconomic Resources

4.6.5.1 Juneau

Population, Economics, Housing, and Municipal Revenues – Alternatives 4B and 4D include continuing mainline AMHS service to Haines and Skagway. Because of this, these two alternatives would have little effect on independent visitor traffic to Juneau. The total increase in non-Juneau resident traffic to and from Juneau associated with these alternatives in 2008 is estimated to vary between 35 annual ADT for Alternative 4B and 10 annual ADT for Alternative 4D.

Juneau is projected to receive a total of about 23,000 new non-Juneau resident visitors in 2008 under Alternative 4B and 7,000 visitors under Alternative 4D. Based on the 2003 Alaska Travelers Survey and the 1994 Household Survey (McDowell, 1994), in-state visitors to Juneau would spend $80/visitor/trip and non-Alaskan visitors (e.g., Canadian residents and travelers from the Lower 48 states) would spend $160/visitor/trip. Based on these assumptions, visitor spending in Juneau would increase by about $3 million in 2008 as a result of Alternative 4B and $1 million under Alternative 4D. This increase in visitor spending would generate about $1.7 million in new payroll and an annual average of about 60 additional jobs in Juneau under Alternative 4B and $500,000 in new payroll and 20 new jobs under Alternative 4D (Table 4-50).

Table 4-50
2008 Alternatives 4B and 4D Visitor Spending and Related Impacts in Juneau

Description	Alternative	
	4B	4D
Ferry Traffic (Annual ADT)	165	130
Vehicle Traffic Less Residents and Baseline Traffic	35	10
Total New Visitors[1] per Year	23,000	7,000
Total New Visitor Spending per Year	$3,000,000	$1,000,000
New Local Payroll per Year	$1,700,000	$500,000
New Local Employment	60	20

Notes: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Juneau.

Lynn Canal traffic on the AMHS system under this alternative is predicted to increase at an annual rate of approximately 1.4 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll

related to Alternatives 4B and 4D in 2038 would be approximately 50 percent higher than in 2008 (Table 4-51).

Table 4-51
2038 Alternatives 4B and 4D Visitor Spending and Related Impacts in Juneau

Description	Alternative	
	4B	4D
Ferry Traffic (Annual ADT)	265	200
Vehicle Traffic Less Residents and Baseline Traffic	55	15
Total New Visitors[1] per Year	34,000	10,500
Total New Visitor Spending per Year	$4.5 million	$1.5 million
New Local Payroll per Year	$2.5 million	$750,000
New Local Employment	90	30

Note: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Juneau.

Generally, each new job in the Juneau economy results in an increase in population of about 1.5 people[37]. Therefore, the new jobs in Juneau resulting from Alternatives 4B and 4D would be expected to result in a population increase of 90 and 30 residents, respectively, in 2008. This would represent a maximum increase of about 0.3 percent of Juneau's current population. In 2038, the population increase associated with Alternative 4B would be a maximum of 140 residents and the increase associated with Alternative 4D would be a maximum of 45 residents. This would represent a maximum increase of about 0.5 percent of Juneau's current population.

Assuming 2.6 persons per household, a population increase of 30 and 90 residents would result in additional demand for about 12 and 35 housing units in 2008. Housing demand in 2038 would increase to a maximum of about 55 units for Alternative 4B and 15 units for Alternative 4D. The latest available data indicate that Juneau had approximately 320 vacant housing units in 2001. The project demand is well within the existing vacant housing capacity of Juneau. Because of the small increase in independent visitors and population associated with Alternatives 4B and 4D, neither of these alternatives would measurably increase the value of private property in Juneau.

Sales tax revenues (plus hotel, liquor, and tobacco taxes) for Juneau would increase at a rate proportional to the increase in spending. Total additional visitor spending of $1 million to $3 million in 2008 would generate (assuming all of the spending is taxable) $50,000 to $150,000 in additional sales tax revenues (based on a five percent tax rate). Total additional visitor spending of $1.5 million to $4.5 million in 2038 would generate $75,000 to $225,000 in additional sales tax revenues for Alternatives 4D and 4B, respectively.

Industry/Commercial Sectors – The principal economic benefits of Alternatives 4B and 4D would be received by the local retail trade and service sectors that provide goods and services to visitors. Economic benefits to other industrial sectors would not be appreciable.

Utilities and Public Services – Alternatives 4B and 4D would not noticeably affect utilities and public services in the City and Borough of Juneau relative to the No Action Alternative.

[37] This number is based on an estimated participation rate of 65 percent meaning 65 percent of the Juneau population participates in the local labor force.

Quality of Life – Alternative 4B would more than triple the number of summer ferry trips between Juneau and Haines and double the number of summer ferry trips between Juneau and Skagway relative to the No Action Alternative. Alternative 4D would double the number of summer ferry trips between Juneau and Haines and Skagway. In addition, Alternatives 4B and 4D would reduce out-of-pocket user costs by approximately 30 and 40 percent, respectively, relative to the No Action Alternative. Based on the 1994 and 2003 household surveys conducted for the project, this improved access would be perceived as an improvement to quality of life by a majority of Juneau residents, providing increased recreational opportunities.

4.6.5.2 Haines

Population, Economics, Housing, and Municipal Revenues – As is the case with Juneau, Alternatives 4B and 4D would have a minor benefit to the Haines economy. The total increase in non-Haines resident traffic to and from Haines associated with Alternatives 4B and 4D is estimated to be 30 and 10 annual ADT, respectively, in 2008.

Haines is projected to receive a total of about 18,000 new non-Haines resident visitors in 2008 with Alternative 4B and 9,000 new visitors with Alternative 4D. Assuming that visitors would spend an average of $50 to $60 per trip in Haines, visitor spending in the community would increase by about $1 million in 2008 as a result of Alternative 4B and $500,000 as a result of Alternative 4D. Because Alternatives 4B and 4D would not change the cost of travel between Juneau and Haines, it is not expected that the number of trips that Haines residents would take to Juneau for shopping would increase substantially. Therefore, there would be little increased spending in Juneau to off set increased spending in Haines by visitors to that community. This increase in visitor spending would generate about $400,000 in new payroll and an annual average of about 20 additional jobs in Haines under Alternative 4B and $200,000 in new payroll and 10 new jobs under Alternative 4D (Table 4-52).

Table 4-52
2008 Alternatives 4B and 4D Visitor Spending and Related Impacts in Haines

Description	Alternative	
	4B	4D
Ferry Traffic (Annual ADT)	90	70
Vehicle Traffic Less Residents and Baseline Traffic	30	10
Total New Visitors[1] per Year	18,000	9,000
Total New Visitor Spending per Year	$1,000,000	$500,000
New Local Payroll per Year	$400,000	$200,000
New Local Employment	20	10

Notes: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Haines.

Lynn Canal traffic on the AMHS system under this alternative is predicted to increase at an annual rate of approximately 1.4 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to Alternatives 4B and 4D in 2038 would be approximately 50 percent higher than in 2008 (Table 4-53).

Table 4-53
2038 Alternatives 4B and 4D Visitor Spending and Related Impacts in Haines

Description	Alternative	
	4B	4D
Ferry Traffic (Annual ADT)	145	110
Vehicle Traffic Less Residents and Baseline Traffic	45	15
Total New Visitors[1] per Year	27,000	13,500
Total New Visitor Spending per Year	$1.5 million	$750,000
New Local Payroll per Year	$600,000	$300,000
New Local Employment	30	15

Notes: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Haines.

Each new job in the economy results in an increase in population of about 1.5 people[38]. Therefore, the 10 to 20 new jobs in Haines resulting from Alternatives 4B and 4D would be expected to result in a population increase of 15 to 30 residents in 2008. This would represent a maximum increase of about 1.3 percent of Haines' current population (2,360). In 2038, Alternatives 4B and 4D would result in a maximum population increase of 25 to 50 residents. This would represent a maximum increase of about two percent of Haines current population

Assuming 2.6 persons per household, a population increase of 15 to 30 residents would result in additional demand for about 6 to 12 housing units in 2008. In 2038, housing demand associated with Alternatives 4B and 4D would be a maximum of about 18 and 9 units, respectively. The latest available data indicate that Haines has about 127 vacant housing units not including seasonal, recreational, and occasional use units. The project demand is well within the existing vacant housing capacity of Haines. Because of the small increase in independent visitors and population associated with Alternatives 4B and 4D, they are not expected to measurably increase the value of private property in Haines.

Sales tax revenues would increase at a rate proportional to the increase in spending in Haines. Total additional visitor spending in Haines of $500,000 to $1 million in 2008 would generate $27,500 to $55,000 in additional sales tax revenues (based on a 5.5 percent tax rate). In 2038, additional visitor spending of up to $750,000 to $1.5 million would generate about $41,000 to $83,000 in additional sales tax revenues for Alternatives 4D and 4B, respectively.

Industry/Commercial Sectors – The principal economic benefits of Alternatives 4B and 4D would be received by the local retail trade and service sectors that provide goods and services to visitors. Economic benefits to other industrial sectors would not be appreciable.

Utilities and Public Services – Alternatives 4B and 4D would not measurably affect utilities and public services in the Haines Borough relative to the No Action Alternative.

Quality of Life – Alternative 4B would more than triple the number of summer ferry trips between Juneau and Haines relative to the No Action Alternative. Alternative 4D would double the number of summer ferry trips between these two communities. In addition, Alternatives 4B and 4D would reduce out-of-pocket user costs by approximately 30 and 40 percent, respectively, relative to the No Action Alternative. Based on the 1994 and 2003 household

[38] This number is based on an estimated participation rate of 65 percent meaning 65 percent of the Haines population participates in the local labor force.

surveys conducted for the project, this improved access would be perceived as an improvement to quality of life by a majority of Haines residents. Better access to shopping and other services in Juneau, and more recreational opportunities are potential benefits cited by some Haines residents.

4.6.5.3 Skagway

Population, Economics, Housing, and Municipal Revenues – Alternatives 4B and 4D would have a minor benefit to the Skagway economy. The total increase in non-Skagway resident traffic to and from Skagway under Alternative 4B is estimated to be 10 annual ADT in 2008. Alternative 4D would result in no change in non-resident traffic relative to the No Action Alternative.

Skagway is projected to receive a total of about 7,000 new non-Skagway resident visitors in 2008 with Alternative 4B. Assuming that visitors would spend an average of $50 per trip in Skagway, visitor spending in the community would increase by about $400,000 in 2008 as a result of Alternative 4B. This increase in visitor spending under Alternative 4B would generate about $200,000 in new payroll and an annual average of about 10 additional jobs in Skagway (Table 4-54).

Table 4-54
2008 Alternatives 4B and 4D Visitor Spending and Related Impacts in Skagway

Description	Alternative	
	4B	4D
Ferry Traffic (Annual ADT)	70	60
Vehicle Traffic Less Residents and Baseline Traffic	10	-
Total New Visitors[1] per Year	7,000	-
Total New Visitor Spending per Year	$400,000	-
New Local Payroll per Year	$200,000	-
New Local Employment	10	-

Notes: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Skagway.

Lynn Canal traffic on the AMHS system under this alternative is predicted to increase at an annual rate of approximately 1.4 percent for the 30-year forecast period considered in this Supplemental Draft EIS. At that rate of growth, annual spending, employment, and payroll related to Alternatives 4B in 2038 would be approximately 50 percent higher than in 2008 (Table 4-55).

Each new job in the Skagway economy results in an increase in population of about 1.3 people[39]. Therefore, the 10 new jobs in Skagway resulting from Alternative 4B would be expected to result in a population increase of about 13 residents in 2008. This would represent a maximum increase of about 1.8 percent of Skagway's current population. In 2038, Alternative 4B would add a maximum of about 20 residents to Skagway, an increase of about 2.5 percent to the community's current population.

[39] This number is based on an estimated participation rate of 77 percent meaning 77 percent of the Skagway population participates in the local labor force.

Table 4-55
2038 Alternatives 4B and 4D Visitor Spending and Related Impacts in Skagway

Description	Alternative	
	4B	4D
Ferry Traffic (Annual ADT)	120	90
Vehicle Traffic Less Residents and Baseline Traffic	15	-
Total New Visitors[1] per Year	10,500	-
Total New Visitor Spending per Year	$600,000	-
New Local Payroll per Year	$300,000	-
New Local Employment	15	-

Notes: Annual ADT = annual average daily traffic.
[1]New visitors are all visitors who are not residents of Skagway.

Assuming 2.6 persons per household, a population increase of 13 residents would result in additional demand for about five housing units in 2008. In 2038, Alternative 4B would result in additional demand for about 8 housing units. The latest available data indicate that Skagway has about 54 vacant housing units, not including seasonal, recreational, and occasional use units. The project demand is well within the existing vacant housing capacity of Skagway. Because of the small increase in independent visitors and population associated with Alternative 4B, it would not increase the value of private property in Skagway.

Sales tax revenues would increase at a rate proportional to the increase in spending in Skagway. Total additional visitor spending would generate about $16,000 in additional tax revenues in 2008 and a maximum of $24,000 in 2038.

Industry/Commercial Sectors – The principal economic benefits of Alternative 4B would be received by the local retail trade and service sectors that provide goods and services to visitors. Economic benefits to other industrial sectors would not be appreciable.

Utilities and Public Services – Alternatives 4B and 4D would not affect utilities and public services in Skagway relative to the No Action Alternative.

Quality of Life – Alternatives 4B and 4D would more than double the number of ferry trips between Juneau and Skagway relative to the No Action Alternative. In addition, Alternatives 4B and 4D would reduce out-of-pocket user costs by approximately 30 and 40 percent, respectively, relative to the No Action Alternative. Based on the 1994 and 2003 household surveys conducted for the project, this improved access would be perceived as an improvement to quality of life by a majority of Skagway residents. Increased tourism and more recreational opportunities are potential benefits cited by some Skagway residents.

4.6.6 Subsistence

Because Alternatives 4B and 4D would not substantially change transportation facilities and visitor trips in Lynn Canal, they would not result in direct or indirect impacts to subsistence uses.

4.6.7 Transportation

The 2004 Southeast Alaska Transportation Plan calls for the construction of a highway from Juneau to Skagway with a shuttle ferry from Katzehin to Haines. The plan would need to be amended if Alternative 4B or 4D is selected as the final preferred alternative.

4.6.7.1 Capacity and Demand

Traffic demand for Alternatives 4B and 4D was projected for 2008 and 2038 using the transportation model summarized in Section 4.1.5. These projections were based on 2002 traffic in the Lynn Canal corridor, the unmet travel demand in the region, projected growth in the region, costs of travel, travel distance and speed, value of time, accident costs, and frequency of delay.

Projected traffic volumes for Alternatives 4B and 4D in 2008 are provided in Table 4-56 along with travel demand for the No Action Alternative. These projections are based on an increase in annual travel demand of 0.5 percent. As indicated in the table, Alternatives 4B and 4D would increase capacity by roughly three times the No Action Alternative capacity. This capacity would be sufficient to meet travel demand for this transportation mode except in the peak summer week.

Table 4-56
2008 Forecast Demand and Capacity for the No Action Alternative and Alternatives 4B and 4D

Alternative	Annual ADT	Summer ADT	Winter ADT	Peak Week ADT	Summer Capacity (vehicles per day[1]
No Action	90	170	40	330	96/71
4B	170	290	80	580	284/227
4D	130	230	60	460	208/203

Note: [1]The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Juneau and Skagway.

Table 4-57 provides projections of traffic demand in 2038 for the No Action Alternative and Alternatives 4B and 4D. These projections assume an annual increase in travel demand of 1.6 and 1.4 percent for Alternatives 4B and 4D, respectively. As traffic demand grows with time, the ability of Alternatives 4B and 4D to accommodate that demand would decrease. The summer average daily traffic demand would still be accommodated, but the gap between peak week demand and the fixed capacity of the shuttle system would increase.

Table 4-57
2038 Forecast Demand and Capacity for the No Action Alternative and Alternatives 4B and 4D

Alternative	Annual ADT	Summer ADT	Winter ADT	Peak Week ADT	Summer Capacity (vehicles per day)[1]
No Action	130	230	60	460	96/71
4B	270	470	120	940	284/227
4D	200	350	90	690	208/203

Note: 1The first number is vehicle capacity between Juneau and Haines, and the second number is vehicle capacity between Juneau and Skagway.

The projected travel demand between Haines and Skagway with Alternatives 4B and 4D is the same as the No Action Alternative. The summer ADT is projected to be 67 vehicles in 2008 and 98 vehicles in 2038 for both the No Action Alternative and Alternatives 4A and 4C. The projected summer capacity of 204 vehicles per day would accommodate the projected demand for travel between Haines and Skagway with Alternatives 4B and 4D.

4.6.7.2 Travel Flexibility and Opportunity

Alternatives 4B and 4D would result in an increase in flexibility and opportunity for travel in Lynn Canal. Alternative 4B would more than triple the number of round-trips between Juneau and Haines to 30 trips per week in summer. It would essentially double the number of round-trips between Juneau and Skagway to 16 trips per week in summer. Alternative 4D would also double the number of round-trips between Juneau and Haines or Skagway to 16 trips per week in summer. Travelers would still be dependent on ferry schedules and subject to reservations for the timing of their travel.

Alternatives 4B and 4D would have the same opportunity for travel between Haines and Skagway as the No Action Alternative, three trips per day.

4.6.7.3 Travel Time

Table 4-58 provides a comparison of travel times between the No Action Alternative and Alternatives 4B and 4D. As indicated in the table, Alternative 4B would have the same travel times between Juneau and Haines or Skagway as the No Action Alternative taking the fast ferry[40]. Travel time between Juneau, Haines, and Skagway under Alternative 4D would be about an hour longer than the fast ferry under the No Action Alternative.

Table 4-58
Travel Times for the No Action Alternative and Alternatives 4B and 4D

Route	Summer (hours)[1]
No Action	
Auke Bay - Haines	3.5/7.1
Auke Bay - Skagway	3.8/9.1
Haines - Skagway	1.3
Alternative 4B	
Auke Bay - Haines	3.5/7.1
Auke Bay - Skagway	3.8/9.1
Haines - Skagway	1.3
Alternative 4D	
Auke Bay - Haines	5.0/7.1
Auke Bay - Skagway	5.3/9.1
Haines - Skagway	1.3

Note: [1]The first number is the time for the trip on a shuttle ferry, and the second number is the time for the trip on a mainline ferry.

Travel time between Haines and Skagway would be the same with Alternatives 4B and 4D as the No Action Alternative, approximately 1.3 hours.

4.6.7.4 State and User Costs

The 30-year life cycle costs for the No Action Alternative and Alternatives 4B and 4D discounted to present (January 2004) dollars are provided in Table 4-59. These costs include state and federal capital costs and state maintenance and operating expenses. Capital costs include design, right-of-way acquisition, highway, vessel, and terminal construction, vessel refurbishment, and vessel replacement.

[40] The travel time is approximately the same because the slight savings in time traveling by road from Auke Bay to Sawmill Cove is offset by the longer turn around time for the larger ferry required to meet the increased demand with Alternative 4B.

Table 4-59
Thirty-Year Life Cycle Costs for the No Action Alternative and Alternatives 4B and 4D ($millions)

Alternative	Capital Cost	Operating Cost	Total Life Cycle Cost
No Action	$87	$179	$267
4B	$233	$249	$482
4D	$120	$193	$313

Table 4-60 provides an estimate of the state's portion of these costs. As indicated in the table, Alternatives 4B and 4D would have higher capital and operating costs for the state than the No Action Alternative. For Alternative 4B, state revenues from fares would be higher than for the No Action Alternative, but would not offset the increased cost of this alternative to the state. Therefore, the state would pay more for Alternative 4B than for the No Action Alternative, while individual user costs would be less (Table 4-61). The net state cost for Alternative 4D would be about the same as the net state cost of the No Action Alternative because the increased state revenues for this alternative would essentially offset increased state costs relative to the No Action Alternative. Individual user costs for Alternative 4D would be less than for the No Action Alternative. Alternatives 4B and 4D would cost the state less per vehicle than the No Action Alternative because of the larger number of vehicles transported.

Table 4-60
Present Value of Capital and Operating Costs to State of Alaska for the No Action Alternative and Alternatives 4B and 4D

Alternative	State Funds[1]					
	Capital Costs ($million)	Operating Costs ($million)	Total State Cost ($million)	Revenue ($million)	Net State Cost ($million)	State Cost/Vehicle (dollars)
No Action	$8	$179	$187	$126	$61	$51
4B	$21	$249	$269	$175	$94	$39
4D	$11	$193	$204	$134	$70	$39

Note: [1]Current value of 2004 to 2038 costs as of January 1, 2004, at private-sector rate of return.

The total[41] and out-of-pocket cost of summer travel between Juneau and Skagway or Haines for a family of four in a 19-foot vehicle is listed in Table 4-61 for the No Action Alternative and Alternatives 4B and 4D. Those alternatives would reduce the cost relative to the No Action Alternative.

The cost of taking the shuttle ferry between Haines and Skagway would remain the same as the No Action Alternative with Alternatives 4B and 4D. That fare is estimated to be about $40 for a family of four.

[41]Total user costs are out-of-pocket cost, vehicle maintenance and ownership costs, and accident costs.

Table 4-61
Juneau to Haines and Skagway Total and Out-of-Pocket User Cost for Family of Four in 19-Foot Vehicle for the No Action Alternative and Alternatives 4B and 4D, Summer Fares

Alternative	Haines User Cost[1]	Skagway User Cost[1]
No Action [2]	$180	$237
4B[3]	$124/$113	$174/$163
4D[3]	$114/$103	$160/$149

Notes: [1]First number is total user cost and second number is out-of-pocket cost. Total cost is based on fares plus $0.44 per mile for vehicular travel (AASHTO, 2003). Out-of-pocket cost based on fares and gasoline consumption.
[2]Cost is for mainline ferry. FVF would be 10 percent more.
[3]Cost is for Berners Bay shuttle. Mainline from Auke Bay would be the same as No Action.

User benefits encompass reductions in out-of-pocket costs, travel time, vehicle maintenance and ownership costs, and accident costs. Table 4-62 gives the 35-year value of user benefits as well as net present values of Alternatives 4B and 4D. User benefits are primarily due to the reduced cost to travel a shorter distance by ferry in summer.

Table 4-62
User Benefits and Net Present Values for Alternatives 4B and 4D Versus the No Action Alternative[1]

Alternative	User Benefits ($million)	Incremental Project Costs ($million)[2]	Net Present Value ($million)
4B	$107	$130	-$23
4D	$53	$50	$3

Notes: [1]For the period 2004 to 2038 discounted to current (January 2004) dollars.
[2]Overall project costs minus revenues.

One of the best economic measures of an alternative is its net present value. Net present value is the total user benefits minus the net costs of an alternative over and above the net cost of the No Action Alternative for a given period of time. The 2004 to 2038 net present value of Alternative 4B is negative at about -$23 million. In other words, the costs of this alternative are greater than the value of its user benefits. For Alternative 4D, the net present value over the period is about $3 million.

4.6.7.5 Other Transportation Impacts

It is likely that some travel would be diverted from the air taxi operations currently serving the Lynn Canal to ferries with Alternatives 4B and 4D due to increased travel opportunity. The *Traffic Forecast Report* (Appendix C) estimated that Alternative 4B would divert 23 percent of air traffic and Alternative 4D would divert 17 percent of air traffic.

The highway proposed for Alternatives 4B and 4D would include 4-foot paved shoulders suitable for bicyclist and pedestrian use. Predicted traffic volumes would be compatible with bicycle or pedestrian use of the shoulders. Shuttle ferries for these alternatives would accommodate bicyclists and walk-on passengers. In summer, walk-on passengers would need to take a private vehicle or private carrier to Sawmill Cove or travel on the twice-weekly mainline ferry from Auke Bay.

AMHS service in Lynn Canal under the No Action Alternative is estimated to require a state subsidy of about $3.3 million in 2008. The estimated subsidy for AMHS service under

Alternatives 4B and 4D in 2008 is $6.8 and $4.9 million, respectively (Table 4-63). These alternatives would place an additional funding burden on AMHS, which could have negative impacts on other AMHS service.

Table 4-63
Annual AMHS Operating Costs and Estimated AMHS State Subsidy in 2008 for the No Action Alternative and Alternatives 4B and 4D

Alternative	AMHS Operating Cost ($million)	Estimated AMHS State Subsidy ($million)
No Action	$10.2	$3.3
4B	$15.5	$6.8
4D	$11.3	$4.9

No other transportation impacts would be likely under these alternatives.

4.6.8 Geology

Alternatives 4B and 4D would not impact any unique geologic resources in the project area. These alternatives would be subject to earthquake-induced ground tremor. As indicated in Section 3.2.1.2, the Queen Charlotte/Fairweather fault system located within 75 miles of the project area has the capability of producing earthquakes with magnitudes greater than 7.0 on the Richter scale. Based on USGS hazard maps published in 1999, this fault system has a 10 percent probability of producing an earthquake in the next 50 years that would cause ground accelerations in excess of 1.1 to 1.15 g[42] in the project region. These types of ground accelerations would be taken into account in the design of roadway pavement, highway structures, and ferry terminal structures. It is probable that a maximum ground acceleration in the study area would cause damage to project facilities, as is the case with many other Alaska transportation facilities in seismic areas.

4.6.9 Hydrology and Water Quality

4.6.9.1 Floodplains

The highway proposed for Alternatives 4B and 4D would cross Sawmill Creek. This creek would be crossed with a single-span bridge. The bridge structure and its supports would be located outside the predicted 100-year flood elevation of the creek, as determined by additional hydraulic studies to be conducted during the final engineering design of the selected alternative.

There are no floodplain development plans for the area from Echo Cove to Sawmill Cove. Sawmill Creek is located in the Tongass National Forest and is designated Semi-Remote Recreation. The principal management goal of this designation is to retain the natural character of the area. Therefore, no incompatible floodplain development would be likely in the project area.

Alternatives 4B and 4D would provide a highway where there are currently no roads. The highway would serve as a new evacuation route for emergencies for land adjoining the road.

[42] Seismic ground acceleration is measured in units of gravity or *g*. The acceleration of *g* is 32 feet/second/second.

4.6.9.2 Hydrology

The proposed highway segment for Alternatives 4B and 4D would act as a partial barrier to the flow of shallow groundwater and surface water. Shallow groundwater blocked by the highway would eventually flow to the surface. Roadside drainage ditches would collect surface water on the upgradient side of the highway and channel it to the downstream side through culverts. Culverts would be placed to minimize roadside flow and maintain downslope hydrology. Culverts would be designed for the 50-year rainfall event, and end sections or rock dissipaters would be used to disperse high-volume/high-velocity flows to protect soils and vegetation below culvert outfalls from erosion.

The Sawmill Cove Ferry Terminal would require the placement of fill in Berners Bay. This small encroachment would not measurably change circulation and currents in the bay. The proposed terminal is sited so as not to obstruct discharge from Sawmill Creek. Breakwaters are currently not planned for the terminal.

4.6.9.3 Water Quality

Highway construction, maintenance, and operations can affect water quality through earth-moving activities, equipment oil and fuel spills/leaks, debris generation, winter sanding, and vehicular traffic. These activities could introduce metals, fuel, oil, and other potential contaminants to water courses whose drainages encompass the proposed highway between Echo Cove and Sawmill Cove, principally through runoff from the highway.

Results from stormwater research by the FHWA indicate stormwater runoff from low to medium traffic volumes (under 30,000 vehicles per day) on rural highways exerts minimal to no impact on the aquatic components of most receiving waters (USDOT & FHWA, 1987). Studies conducted in Anchorage, Alaska, under the Municipality of Anchorage Watershed Management Program similarly concluded that street runoff has minimal impacts to the water quality of receiving waters from most potential pollutants (MOA, 2000b). Results showed dissolved concentrations of calcium, chromium, magnesium, and zinc to be below their AWQS. Only dissolved concentrations of copper and lead were noted to be above their AWQS; however, modest dilution would likely reduce these concentrations to below their AWQS. Identified concentrations would not adversely impact streams with flow rates greater than 0.5 cubic foot per second (MOA, 2000e). Polynuclear aromatic hydrocarbons were at concentrations below the EPA water quality criteria.

Because of the rural setting of the highway between Echo Cove and Sawmill Cove and the predicted low annual ADT, fewer impacts to water quality in the project area are expected than were found in the Anchorage studies. The studied runoff was collected from Anchorage roadways that ranged from residential (<2,000 ADT) to major arterial (>20,000 ADT). The studied melt water was from snow collected from a mix of these types of roads. In comparison, a highway from Echo Cove to Sawmill Cove would have a maximum peak week ADT in 2008 of about 460 to 580 vehicles, and the peak week ADT in 2038 is projected to range from 690 to 940 vehicles. During most times but that week, the ADT would be fewer than 500 vehicles.

Highway runoff and melt water from the highway between Echo Cove and Sawmill Cove would have lesser quantities of potential contaminants than what was observed in the Municipality of Anchorage Watershed Management Program due to a lower traffic volume and less area development. The ferry terminal would only be used in summer. Maintenance in the winter would be at the same level as other secondary roads in the Juneau road system. Snow would be cleared from the highway and deposited along its length instead of being disposed of in one location. DOT&PF does not usually use de-icing chemicals on rural roads. Sanding would be

performed, as conditions required. Typically, up to 5 percent sodium chloride per total weight of sand is added to keep sand friable in winter. Potential pollutants would not be concentrated in one area. Runoff from the proposed highway and bridges would not be expected to exceed AWQS or adversely impact the water quality of receiving waters for the long term. Potential contamination from oil or hazardous substance spills would be low due to the rural setting of the highway and the low predicted highway traffic volume.

The following BMPs would be implemented to minimize long-term water quality impacts. See Section 4.8.6 for BMPs to minimize water quality impacts during construction.

- Only clean fill material would be used for the roadway and ferry terminal embankments
- Rock would be used to stabilize toes of slopes at ponds and stream crossings
- Grass seed would be placed on any road slope not constructed of shot rock. To protect the integrity of the natural plant communities, plant species indigenous to the area would be used for vegetating road slopes, except that non-native annual grasses may be used to provide initial soil cover
- Roadside swales would be designed to keep surface water within the natural drainage basins

Culverts would be installed through fill slopes in appropriate locations to maintain natural flow patterns for surface water.

Ferry operations under Alternatives 4B and 4D would have little effect on area water quality. AMHS mainline ferry wastewater discharges in Lynn Canal would remain the same as under the No Action Alternative. Wastewater would be stored in tanks[43] or treated to applicable standards before discharge. A sewage treatment facility with a permitted outfall would be installed at the Sawmill Cove Ferry Terminal. Discharges from the sewage treatment facilities would operate within permit guidelines. Aeration and ultraviolet light disinfection, similar to the system used at the Auke Bay Ferry Terminal, would likely be used. Negligible adverse impacts to water quality from the terminal treatment facility are anticipated. Accidental discharges, spills, and leaks are possible during ferry operations. Historically, these effects have been minor, with only minimal and temporary impacts to water quality. This low level of impact would likely continue under Alternatives 4B and 4D.

Highway and bridge runoff would contribute minimal turbidity and pollutant loads to local drainages flowing to Berners Bay. Contaminant concentrations in runoff from the proposed highway and/or bridges would not be expected to exceed AWQS or adversely impact the water quality of receiving waters for the long term.

4.6.10 Air Quality

Emissions from marine vessels and motor vehicles are directly proportional to the amount of fuel they burn. As indicated in Table 4-65, ferry and motor vehicle operations under Alternative 4B would consume about two times as much fuel as under the No Action Alternative, due primarily to the high fuel consumption rates of fast vehicle ferries. Therefore, emissions of CO, NO_x, and particulates would be about two times higher under Alternative 4B than under the No Action Alternative. This would not result in violations of federal and state air quality standards because pollutant concentrations in the region are so low and the volume of emissions from Alternative 4B is relatively low compared with other more urbanized areas.

[43] Holding tanks would be pumped out and the waste treated onshore for disposal.

Because Alternative 4D uses conventional monohull ferries, fuel consumption would be essentially the same as that of the No Action Alternative. Therefore, emissions under Alternative 4D would be similar to emissions under the No Action Alternative.

4.6.11 Hazardous Materials

The ISA did not identify any sites within the boundaries of Alternatives 4B and 4D that have the potential for hazardous materials involvement.

4.6.12 Wetlands

A total of 11.0 acres of wetlands and 1.9 acres of other waters of the U.S. would be filled between Echo Cove and Sawmill Cove under Alternatives 4B and 4D. All of the wetland fill would result from construction of the proposed highway. The preliminary alignment for highway segments of Alternatives 4B and 4D has been adjusted several times to avoid wetlands and reduce the impacts to wetlands that could not be avoided. During design DOT&PF would investigate additional measures to reduce impacts, including further small alignment changes, steepened slopes, and reduced embankment heights.

As indicated in Table 4-64, 94 percent of these wetlands would be forested wetlands. The effects of filling these forested wetlands include reduced groundwater recharge and groundwater discharge/lateral flow functions, modification of the surface hydrologic control, and a reduction in wildlife habitat function with the loss of forest habitat.

Table 4-64
Wetlands and Other Waters of the U.S. Filled by Alternatives 4B and 4D (Acres)

Wetlands and Other Waters of the U.S.	Alternatives 4B and 4D (acres)
Wetlands	
Palustrine Emergent	0.01
Palustrine Forested	10.3
Palustrine Scrub-Shrub	0.7
Subtotal	**11.0**
Marine Areas	
Rocky Shore Beaches	1.9
Subtotal	**1.9**
Total Acres	**12.9**

Note: This total does not include fill associated with culvert placement in non-anadromous streams. This additional acreage would be determined during design and permitting.

The proposed highway would act as a partial barrier to the flow of shallow groundwater and surface water. Flow of surface water or shallow groundwater blocked by the highway embankment would eventually flow to the surface and be diverted by ditches to culverts under the highway embankment. Alteration of hydrology because of the highway embankment could result in corresponding changes to the vegetation and over time could affect wetland functions within and outside of the highway right-of-way. The extent of this effect would depend on localized hydrologic patterns; however, effects would be minimized with porous fill material and cross-drainage structures.

The use of salt-treated sand to improve road conditions during the winter could potentially affect roadside vegetation; however, high rainfall in this region would minimize most impacts from road salt (Stormwater, 2001). Due to the small quantity of salt used to keep the sand friable for winter maintenance there would be negligible impacts on adjacent vegetation.

The indirect effects of the proposed highway for Alternatives 4B and 4D on wetlands include the potential introduction of contaminants from accidental spills of fuels and lubricants, the introduction of non-native plant species inadvertently transported to the area on vehicles and their occupants, and damage to wetlands from increased human recreational activity in the area. These wetland impacts could cause the further loss of wildlife habitat functions, the reduction of ecological diversity, and the reduction of sediment/toxicant retention functions. Implementation of BMPs in maintaining the highway, including not using salt to the extent possible, limiting the use of sand near wetlands, and posting educational signs for wetland users, would minimize the risk of these effects occurring.

DOT&PF has avoided wetlands to the extent practicable during development of the preliminary alignment for Alternatives 4B and 4D. The roadway would be constructed using the minimum-width fill footprint necessary for a stable road base in wetland areas. During final engineering design of the selected alternative, DOT&PF would continue to coordinate with resource agencies to further minimize encroachment on wetlands. Compensatory mitigation would be provided for wetland losses associated with the selected alternative.

4.6.13 Marine and Freshwater Habitat and Fish (Including Essential Fish Habitat)

Under Alternatives 4B and 4D, approximately 3.2 acres of intertidal/subtidal habitat would be filled or dredged for the Sawmill Cove Ferry Terminal. Based on a subtidal survey conducted in 2003, the seabed at the proposed terminal site is almost exclusively muds, sand, and gravels, though there may be some bedrock outcrops on the seabed in one location and occasional cobbles. Gravel content is highest in the intertidal zone and drops off rapidly in the subtidal zone, where sands and muds predominate. Vegetation cover is closely linked to the gravel component; therefore, cover drops off rapidly in the offshore. Video surveys of the site conducted in 2003 and 2004 indicated dense rockweed at the headlands on the north and south sides of the cove to about the zero foot tidal elevation. In the lower intertidal zone, rockweed is interspersed with two kinds of large-blade kelp. While this kelp is sparse, it is persistent and evenly distributed throughout the site. Crabs use the subtidal and intertidal zones in Sawmill Cove Cove and a variety of fish species have been observed at the site including yellowfin sole, rock sole, gunnels, snake prickleback, sculpin, and Pacific herring.

The impact to 3.2 acres of intertidal and subtidal habitat, the replacement of natural substrates due to terminal construction, and the dredging of approximately 16,000 cubic yards for a mooring basin would alter habitat usage in the disturbed area. Filling would result in the loss of habitat while dredging and ongoing use would substantially reduce habitat value in the dredged areas. The Sawmill Cove Ferry Terminal would cover approximately 300 feet (0.06 mile) of shoreline at mean lower low water. This is less than 2 percent of the alongshore herring spawning length (approximately 3 miles) observed in Berners Bay in 2003. This habitat loss would not measurably affect other fish populations in the Berners Bay area.

Turbidity at the ferry terminal could be increased over ambient conditions for short periods by ferries maneuvering into and out of the terminal. Short-term turbidity and propeller or water jet scour could affect some Pacific herring eggs and larvae in the immediate vicinity of the Sawmill Cove Ferry Terminal.

There is the potential for accidental fuel spills from ferries at terminals and while traveling Lynn Canal routes. To date, no in-water fuel spills have been associated with AMHS operations in Lynn Canal. The effects of a spill would depend on its size and location.

The fast vehicle shuttles or conventional monohull shuttles that would be used for Alternative 4B and 4D, respectively, would have sanitary waste holding tanks[44],or would discharge treated wastewater meeting applicable standards. Sanitary waste generated at the ferry terminals would undergo treatment. Wastewater would undergo treatment and disinfection with ultraviolet light. The treated wastewater would be discharged under an NPDES and/or Water Quality permit and would meet EPA- and Alaska-established waste discharge limitations. For this reason, the effluent should not impact fish habitat or affect fish populations in Lynn Canal, including Berners Bay.

Stormwater and melt water runoff from the bridge over Sawmill Creek would not alter water quality sufficiently to impact anadromous and marine fish habitat. As discussed in Section 4.6.9, studies of highway runoff in Alaska indicate that the volume of traffic on the proposed highway for Alternatives 4B and 4D is not large enough for runoff to cause the exceedance of any AWQS in receiving waters.

The highway from Echo Cove to Sawmill Cove would cross Sawmill Creek, an anadromous fish stream. This bridge would not encroach on the stream channel. Therefore, it would not impact essential fish habitat.

Other, smaller non-anadromous streams crossed by the project alternatives would be channeled through culverts. Culverts in waters with the potential to have resident fish would be designed in accordance with the standards provided in the Memorandum of Agreement between ADF&G and DOT&PF for the "Design, Permitting, and Construction of Culverts for Fish Passage" (August 3, 2001).

In summary, the construction of Alternatives 4B and 4D would result in the direct loss of 3.2 acres of essential fish habitat as a result of filling and dredging for the Sawmill Cove Ferry Terminal. This is historically documented spawning habitat for Lynn Canal Pacific herring stock. Ferry maneuvers at Sawmill Cove could increase turbidity in the vicinity of the terminal sufficiently to impact Pacific herring eggs and larvae at the terminal site. Alternatives 4B and 4D would bridge Sawmill Creek, which supports anadromous fish populations. The bridge would not encroach on the streambed. None of these impacts would be large enough to measurably affect fish and invertebrate populations in Lynn Canal.

The incremental effect of the Sawmill Cove Ferry Terminal on Pacific herring stock is relatively small; therefore, this loss by itself is not expected to adversely affect the stock's ability to recover to previous population levels. For other commercial fish species, the direct loss of 3.2 acres of habitat from ferry terminal construction would not adversely affect any fish and invertebrate populations in Lynn Canal. FHWA has determined that Alternatives 4B and 4D would not have a substantial adverse effect on essential fish habitat.

If the selected alternative includes the Sawmill Cove terminal, DOT&PF would continue to investigate ways to further reduce intertidal and subtidal impacts associated with the terminal. Compensatory mitigation would be provided for the loss of intertidal and subtidal habitat.

4.6.14 Terrestrial Habitat

Alternatives 4B and 4D would result in the loss of vegetation within the cut-and-fill boundaries of the highway to Sawmill Cove and a narrow band of right-of-way clearing adjacent to the highway. The acres of vegetation types that would be removed are estimated to be:

[44] Holding tanks would be pumped out and the waste treated onshore for disposal.

- Fifty-three acres of old-growth forest
- Two acres of open meadow/muskeg

The loss from each vegetation type represents less than 0.5 percent of that type in the study area and is small compared to the approximate forest cover of 117,000 acres in the Lynn Canal region (NPS, 2003). The loss of this vegetation would not adversely affect any rare or unique community types or any known rare or sensitive plant species. Clearing of the highway right-of-way would increase the potential for blowdown of trees adjacent to the right-of-way or slides in unstable areas.

The proposed highway could have indirect effects on terrestrial vegetation. By improving the access to the area, human activity would increase along the highway corridor. This activity could lead to some degradation or disturbance of terrestrial habitat adjacent to the highway through camping and hiking, illegal dumping, and unauthorized collection of firewood. Invasive plant species could be introduced from visitors, vehicles, and pets.

4.6.15 Wildlife

4.6.15.1 Marine Mammals

Harbor seals, minke whales, killer whales, harbor porpoises, Dall's porpoises, and sea otters are considered in this section. Humpback whales and Steller sea lions are discussed in Section 4.6.17.

Harbor seals use the Sawmill Cove area for feeding when prey fish concentrate there, but their main haulouts in Berners Bay are on sandbars near the major rivers; therefore, they are not likely to be affected by operation of the ferry terminal or the highway. The increased frequency of ferry service in Lynn Canal is not expected to result in any appreciable changes in effects on harbor seals relative to the No Action Alternative.

Minke whales tend to be attracted to motor vessels and would likely not be displaced by increased vessel traffic associated with Alternatives 4B and 4D. Because of this attraction, increased ferry traffic would increase the risk of collision, particularly with the fast vehicle ferries used in Alternative 4B; however, collision accidents with minke whales are very rare (Angliss and Lodge, 2003). Therefore, Alternatives 4B and 4D are unlikely to impact the population of this species in Lynn Canal.

Fast-moving and maneuverable species such as the killer whale, harbor porpoise, and Dall's porpoise can readily avoid motor vessels, even the fast vehicle ferries proposed for Alternative 4B, and would not be impacted by the ferry traffic associated with Alternatives 4B and 4D.

Sea otters occur in low numbers in Lynn Canal. Like harbor seals, sea otters are sensitive to noise and would likely avoid ferry traffic associated with Alternatives 4B and 4D. These alternatives are unlikely to impact the sea otter population in Lynn Canal.

4.6.15.2 Marine Birds

This group includes species that nest on land but forage in marine waters at least part of the year. Species considered include the great blue heron, marbled murrelet, Kittlitz's murrelet, harlequin duck, and trumpeter swan.

The proposed highway would result in the loss of some nesting habitat for great blue herons and marbled murrelets; however, the amount of habitat loss relative to the amount available in

the study area is small. Nesting habitat for harlequin ducks and trumpeter swans is concentrated farther north in Berners Bay than Sawmill Cove, and Kittlitz's murrelets nest on high-elevation talus slopes, which are not present along the highway alignment for Alternatives 4B and 4D.

Trumpeter swans typically nest in marshy areas near small lakes and use estuarine areas to feed. They are principally found further north in Berners Bay, near the Lace, Antler, and Berners River drainages. Therefore, Alternatives 4B and 4D are not expected to affect this species.

Blue herons and trumpeter swans do not feed and rest in open marine waters of Lynn Canal and therefore would not be affected by Alternatives 4B and 4D. Marbled murrelets, Kittlitz's murrelets, and harlequin ducks do use open marine waters for foraging. They most frequently use nearshore, protected areas for feeding and resting; therefore, they would not be present along the ferry routes for Alternatives 4B and 4D in the main channels of Lynn Canal. These birds may be flushed by ferries approaching terminals. Although this sort of disturbance would be more frequent with Alternatives 4B and 4D than with the No Action Alternative, it would not be frequent enough to have a population-level effect on these species.

4.6.15.3 Terrestrial Mammals

Species considered in this group include the black bear, brown bear, marten, river otter, wolf, Sitka black-tailed deer, moose, and mountain goat. The assessment of project effects on these animals considered habitat loss and fragmentation, traffic disturbance, mortality caused by collisions with vehicles, and the indirect impacts of increased human activity in the study area.

The loss of wetland and terrestrial habitat described in Sections 4.6.12 and 4.6.14 would have a minor effect on terrestrial mammals because this loss would amount to less than one percent of these habitats available in the study area. Additional loss of habitat because of windblown trees adjacent to the right-of-way for the highway to Sawmill Cove or changes in local hydrologic patterns along this highway may add to the total habitat loss but not by enough to measurably affect wildlife populations in the study area.

The beach fringe between Echo Cove and Sawmill Cove provides high-value habitat for many terrestrial mammals, including bears, martens, river otters, and wolves. The highway alignment for Alternatives 4B and 4D would divide the home range of some bears that winter at higher elevations and move down to the coast during summer to forage. For species averse to human presence, the highway may limit their ability to use all of their range, thus fragmenting their habitat. Because black bears are highly adaptable and often learn to coexist near human development, habitat fragmentation is not expected to result in a substantial effect on black bear populations in the study area. The highway would likely result in mortality of some black bears from vehicle collisions.

Brown bears tend to avoid highway traffic more than black bears. Thus, they would be more likely than black bears to abandon certain parts of their range rather than cross the highway, and less likely to be involved in vehicle collisions. Because the highway for Alternatives 4B and 4D would separate higher elevation habitats from beach fringe and those latter areas often contain important resources for brown bears, the effective loss of habitat could reduce the reproductive success or survival of some bears (Schoen et al., 1993). To reduce this habitation fragmentation, the bridge over Sawmill Creek would be designed to provide an underpass for wildlife movement.

Wolves travel widely in pursuit of prey and strongly avoid areas of human activity (USFS, 2000; Person, 2001). The proposed highway would provide more access for people to beaches in the Sawmill Cove vicinity, potentially inhibiting the use of this area by wolves.

The proposed highway for Alternatives 4B and 4D would not fragment the ranges of martens and river otters, as these species have small home ranges and readily cross roads. Sitka black-tailed deer use a variety of habitat types, so it is unlikely that the small-scale habitat loss and potential fragmentation at the northern end of its range in the project study area would affect their populations. Mountain goat habitat is primarily at higher elevations than the proposed highway alignment, and even when they venture down to low elevations to escape deep snow, they never venture far from steep escape terrain. Therefore, the home range of mountain goats would not be substantially affected by the highway for Alternatives 4B and 4D.

Collisions with vehicles would result in an increase in mortality among many terrestrial mammal species in the project area. Species most likely to be affected are those attracted to roads to feed on roadside grasses, forbs, and brush and to escape deep snow, such as deer, and those that do not appear to have a substantial aversion to crossing roads, such as river otters, martens, and black bears. Fewer vehicle collisions are likely to occur with species that tend to avoid roads, such as wolves and brown bears. Mountain goats would not be substantially affected, as they would generally not be found adjacent to the highway alignment. There would be some losses, but the mortality from collisions with vehicles would not likely have population-level effects on most wildlife species in the study area.

The moose population around Berners Bay consists of only about 100 to 150 animals and is subject to a highly popular but very limited permit-only hunt (Barten, 2001). Moose rarely travel as far south as Sawmill Cove. The number of moose killed by vehicles traveling from Echo Cove to Sawmill Cove would be very low, and it is possible that no collisions would occur.

The highway for Alternatives 4B and 4D would make a small area more accessible to hunters and trappers. Hunting and trapping pressure on species such as the black and brown bear, moose, deer, mountain goat, marten, and river otter would increase along this highway segment. The effects of this increased pressure would be controlled by ADF&G through season duration, take limits, lottery drawings, etc. Therefore, this small amount of increased pressure would not result in population-level effects.

4.6.15.4 Terrestrial Birds

Species considered in this group include the Queen Charlotte goshawk, peregrine falcon, olive-sided flycatcher, gray-cheeked thrush, blackpoll warbler, and Townsend's warbler. Goshawks are the only resident species in this group. Peregrine falcons could be present during migration in spring and fall. The other species are neo-tropical migrants that could be present either during migration or during the nesting season. Except for the peregrine falcon, all of these species favor primarily old-growth forest habitat. Conservation concerns for these species are the result of landscape-scale loss of habitat due to commercial logging (BPIF, 1999). The amount of habitat that would be lost by the proposed highway for Alternatives 4B and 4D would be negligible in comparison. Therefore, these alternatives would not result in population-level impacts to these species.

The 5.2-mile highway segment for Alternatives 4B and 4D would cause some direct loss of habitat through clearing. The opening in the forest canopy created by the highway could cause some birds to avoid the highway area, leading to an effective loss of additional nesting habitat. Openings in the forest canopy also create "edge effects," which are used by some avian

predators such as ravens, jays, and crows. This would add to the decreased value of nesting habitat for neo-tropical migrants near the highway.

4.6.15.5 Amphibians

Frogs and toads live in both marshy and forested wetlands. The amount of wetlands lost as a result of the proposed highway for Alternatives 4B and 4D would be small compared to the amount of total wetlands near the proposed highway alignment. Amphibians have small home ranges and do not appear to travel far from their natal pools (NatureServe, 2003). Therefore, the potential impacts of highway maintenance and operation would be limited to those animals that live near the proposed 5.2-mile highway segment. The principal impacts of a highway to amphibians would be through mortality from vehicles and pollution of wetlands from highway stormwater runoff and accidental spills. These impacts would not affect amphibian populations on an area-wide basis.

4.6.16 Bald Eagles

The highway between Echo Cove and Sawmill Cove would pass seven trees with bald eagle nests, none of which are within 330 feet of the alignment. The ferry terminal and associated facilities at Sawmill Cove would be at least 1,000 feet away from the nearest nest, located to the northeast of the facility. Because of the distance of Alternative 4B and 4D facilities from trees with bald eagle nests, maintenance and operation of these facilities would not have any effect on bald eagles.

4.6.17 Threatened and Endangered Species

Consultation on Steller sea lions and humpback whales with NMFS under Section 7 of the Endangered Species Act will be concluded after the comment period for the Supplemental Draft EIS. Following consideration of comments received on the SDEIS, a final preferred alternative will be identified for the proposed project. Section 7 consultation will be completed on that alternative.

4.6.17.1 Steller Sea Lion

Alternatives 4B and 4D would not affect Steller sea lions at any traditional haulouts and would not change the nature of potential sea lion/AMHS ferry interactions, which are considered minimal. Alternatives 4B and 4D do not include any new boat launch facilities and are therefore unlikely to increase recreational or commercial use of motorized vessels in the area. For these reasons, the FHWA has made a preliminary determination that Alternatives 4B and 4D are not likely to adversely affect Steller sea lions.

4.6.17.2 Humpback Whales

Ferry traffic in Lynn Canal would increase as a result of Alternatives 4B and 4D. The increased ferry traffic would increase the risk of collisions with humpback whales. The use of fast ferries for Alternative 4B would further increase the risk of collisions because research has shown that vessel-whale collisions increase proportionately when the speed of vessels increases above 14 knots (Laist et al., 2001). However, collisions have been rare in the past and would likely continue to be rare.

Pile driving for construction of the ferry terminal at Sawmill Cove could disturb humpback whales in the area. Monitors would be used during pile driving to ensure that this activity does not occur when humpback whales are within 660 feet of the construction area.

Based on the above, the FHWA has made a preliminary determination that Alternatives 4B and 4D are not likely to adversely affect humpback whales.

4.6.18 Permits and Approvals

Alternatives 4B and 4D would require the following permits and approvals:

- USFS special use permit for project facilities in the Tongass National Forest
- USACE Section 404 permit for fill in wetlands and other waters of the U.S.
- USACE Section 10 permit for dredge, fill, and structures placed below mean high water
- ADEC Section 401 Water Quality Certification in support of Section 404 permits
- ADNR Title 41 Fish Habitat Permit for work below ordinary high water in streams with anadromous or resident fish
- ADNR Coastal Consistency Determination
- ADNR Interagency Land Management Assignment for use of tidelands at the Sawmill Cove Ferry Terminal
- Authorization from EPA and/or ADEC for treated wastewater discharge from the Sawmill Cove Ferry Terminal

4.7 Other Environmental Issues

4.7.1 Wild and Scenic Rivers

There are no designated Wild and Scenic Rivers in the study area. Two rivers in the study area have been recommended for designation: the Gilkey and the Katzehin rivers, both located on the east side of Lynn Canal. The Gilkey joins the Antler River upstream of where the Antler is crossed by the proposed alignment for Alternatives 2, 2B, and 2C. Therefore, the proposed project would not affect the status of the Gilkey River. The Katzehin River is crossed by the proposed alignment for Alternatives 2 through 2C near its mouth. The lower 2 miles of the river have been excluded from recommendation as Wild and Scenic because that reach was reserved for a possible transportation corridor crossing. Therefore, no alternative would affect the proposed Wild and Scenic status of the Katzehin River.

4.7.2 Environmental Justice

Effective transportation decision-making depends on understanding and properly addressing the unique needs of different socioeconomic groups. A 1994 Presidential Executive Order addresses this:

> Each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations (Executive Order 12898).

FHWA defines “minority population” and “low-income population” as “any readily identifiable group of low-income (or minority) persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed FHWA program, policy, or activity” (FHWA, 1998).

Highway segments of Alternatives 2 through 2C, 3, 4B, and 4C pass through undeveloped land that is largely owned by the federal or state governments. Therefore, no highway segments of any alternative would pass through minority and/or low-income neighborhoods.

All alternatives except Alternatives 4A and 4C would add some additional traffic to Glacier Highway in the CBJ between Jordan Creek and Vanderbilt Hill. Census Tract 4 in this area has two Block Groups (1 and 3) with a higher percentage of minorities than the average for the CBJ (Table 3-1). Several of the Block Groups crossed by the Glacier Highway (Block Group 5, Census Tract 2, Block Groups 2 and 3, Census Tract 3, Block Groups 1 through 3, Census Tract 4, Block Groups 2 and 3, Census Tract 5, and Block Group 3, Census Tract 6) have median household incomes below the Juneau average; however, the median income level in these areas is not below the poverty level for any household size of eight persons or less. The increased traffic on Glacier Highway resulting from the project alternatives would not substantially affect the level of service of the highway or substantially increase noise at adjacent residences (see Sections 4.3.7 and 4.7.7 for a discussion of transportation and noise impacts, respectively, for Alternatives 2 through 2C).

The community of Klukwan is a minority community when compared to state and national data. The median household income is also below the state and national averages; however, the median income level in this area is not below the poverty level for the average household size (2.2 to 2.4) for this community.

None of the proposed alternatives would affect any property in the immediate vicinity of Klukwan; therefore, there would be no disproportionate adverse effect. Under proposed project alternatives, more visitor traffic would travel the highway adjacent to Klukwan. However, this community would not be impacted any more than Juneau, Haines, or Skagway. Increased traffic near Klukwan could result in increased tourism and economic development, which are beneficial effects.

Implementation of a build alternative, particularly a West Lynn Canal or East Lynn Canal Highway, would create local employment and business opportunities for local residents, including Alaska Natives, which is a beneficial effect of the proposed project. As indicated in the discussion of land use effects of project alternatives, some of the property required for the Alternative 3 right-of-way is owned by Native Alaskans. These owners, as well as all other private property owners, would be compensated for their land at fair market value in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

Within the study area, an upgraded transportation system, either a highway or an improved ferry system, would improve access to regional medical care, which would be a beneficial effect. Upgrading the transportation system may increase economic development activities and provide economic opportunities for minority and low-income residents, which are beneficial effects.

Toll roads can have a disproportionate effect on low-income travelers, who may not be able to afford this additional travel cost. This is an emerging concept in environmental justice, but it does not have universal acceptance or defined analysis measures.

The current surface transportation system in Lynn Canal is essentially an expensive toll road. The high cost of travel in Lynn Canal has an impact on low-income travelers, in some cases precluding their ability to travel outside their home town. Alternatives 2 through 2C, 3, 4B, and 4D would reduce the cost of travel in this area benefiting all travelers. Alternatives 2 and 2C are the only alternatives that would reduce travel cost in this area to a level typical of the rest of the United States, particularly for travel between Juneau and Skagway.

Based on the traditional measures of environmental justice, FHWA has determined that none of the build alternatives would have a disproportional affect on low-income or minority communities.

4.7.3 Farmlands

There are no prime or unique farmlands in the State of Alaska and the study area does not appear on the U.S. Department of Agriculture Natural Resources Conservation Service list of farmlands of state or local importance. None of the proposed project alternatives would impact farmland.

4.7.4 Relocation Impacts

No residences, businesses, farms, churches, or nonprofit organization facilities would be relocated by any proposed project alternative.

4.7.5 Coastal Barriers

Federal legislation requires that any federal action that could potentially affect Coastal Barrier Resources Systems must be consistent with the Federal Coastal Barriers Resource Act of 1982 and the Coastal Barrier Improvement Act of 1990. Coastal Barrier Resources Systems consist of undeveloped coastal barriers on the Atlantic and Gulf Coasts. No coastal barriers have been identified on the West Coast of the United States. Therefore, none of the proposed project alternatives would have any effect on coastal barriers.

4.7.6 Energy

The estimated annual fuel use for transportation of each of the proposed project alternatives was computed for the years 2008 and 2038. Fuel consumption was calculated for AMHS ferries, standard passenger vehicles, standard vans, standard ½- to ¾-ton pickups, recreational vehicles, and commercial tractor-trailer freight haulers. Ferry consumption rates were based on the optimum vessel identified for each marine segment. (Substitution of the *M/V Aurora* on the Haines/Skagway or Haines/Katzehin segment would have a minor effect on the analysis.)

Table 4-65 presents the estimated annual operational energy usage for all project alternatives. In 2008, Alternatives 2 through 2C would have lower fuel consumption while providing greater transportation capacity than the No Action Alternative. All other project alternatives would have greater fuel consumption than the No Action Alternative, but would also provide greater transportation capacity than the No Action Alternative. In 2038, Alternatives 2 through 2C would have similar fuel usage as the No Action Alternative. All other project alternatives would have greater fuel consumption than the No Action Alternative.

Fuel usage per vehicle would be substantially lower for Alternatives 2 through 2C and 3 than for the No Action Alternative in 2008 and 2038 (Table 4-65). For the number of people transported, motor vehicles provide a more energy-efficient mode of transportation than ferries.

Alternatives 4A through 4D increase the capacity of the transportation system in Lynn Canal relative to the No Action Alternative, primarily by increasing the number of ferry trips. The fast vehicle ferries proposed for Alternatives 4A and 4B consume more fuel than conventional monohull vessels; therefore, they have a higher per vehicle fuel usage than the No Action Alternative. Fuel usage per vehicle for Alternative 4D is lower than under the No Action Alternative because of the shorter travel distance from Sawmill Cove to Haines and Skagway than from Auke Bay.

Table 4-65
Estimated Annual Operational Energy Usage[1]

Alternative	Fuel (thousands of gallons)						Per Vehicle Fuel Usage (gallons)	
	Year 2008			Year 2038			2008	2038
	Ferry[2]	Vehicle[3]	Total	Ferry[2]	Vehicle[3]	Total		
No Action	2,607	0	2,607	2,607	0	2,607	79	55
2	775	1,013	1,788	775	1,835	2,610	10	8
2A	1,222	665	1,887	1,222	1,165	2,387	13	10
2B	1,284	700	1,984	1,284	1,226	2,510	14	10
2C	1,054	1,114	2,168	1,054	1,969	3,023	15	11
3	2,036	617	2,653	2,036	1,045	3,081	23	16
4A	6,601	0	6,601	6,601	0	6,601	129	82
4B	5,545	81	5,626	5,545	132	5,677	91	58
4C	3,072	0	3,072	3,072	0	3,072	84	56
4D	2,848	63	2,911	2,848	97	2,945	61	40

Notes: [1]All calculations are based on travel from Auke Bay to Haines and Skagway Ferry Terminals.
[2]DOT&PF, 2004g and Appendix B
[3]Passenger and recreational vehicles and commercial trucks. Based on 19.7 mpg USEPA fleet average and projected ADT.

4.7.7 Noise

4.7.7.1 No Action Alternative

Noise levels in the project area would continue to be dominated by natural sounds under the No Action Alternative with intermittent man-made noise sources including marine vessels, pleasure craft, airplanes, and helicopters. As indicated in Section 3.2.6, short-term noise measurements were taken at the edge of Berners Bay near the USFS cabin in 1994 and 2003 and at the cabin in 2003. These measurements documented hourly sound levels between 47 and 52 dBA. Noise levels were also measured on the Chilkat Peninsula, south of Haines in 2003. Those measurements documented sound levels of 35 dBA. This wide difference in sound levels is the result of meteorological conditions at the time that measurements were taken and natural water features near noise monitoring sites. These noise levels are expected to continue into the future under the No Action Alternative.

4.7.7.2 Direct Impacts of Build Alternatives

Undeveloped Areas – Noise modeling indicates that a peak-hour noise level of 65 dBA from traffic on the highway segments of the project alternatives outside of developed areas would be contained within 35 feet of the centerline of the road. Based on simple noise attenuation theory, roadway noise generally decreases by 3 to 6 dBA with every doubling of distance from the source. Where traffic is continuous and the sound travels across hard surfaces such as paving and buildings, the decrease is typically 3 dBA. Where traffic is continuous and the sound travels over soil and vegetation, the decrease is on the order of 4.5 dBA. Where traffic is light, and the noise from each vehicle can be distinguished, the decrease is about 6 dBA. Peak hour traffic volumes are projected to reach almost 200 vehicles in 2038 on Alternative 2, which would have the highest traffic volumes of all the alternatives considered on the east side of Lynn Canal. Peak hour traffic volumes are projected to reach approximately 100 vehicles on the West Lynn Canal Highway in 2038. The traffic on Alternatives 2 and 3 would average approximately one vehicle every 20 to 35 seconds, respectively. At these volumes, the sound of individual vehicles would be distinct; therefore, an attenuation of about 5 to 6 dBA with every doubling of distance could be expected from traffic noise on Alternatives 2 through 2C, 3, 4B, and 4D. This

relationship would mean that vehicle noise associated with these alternatives is likely to decrease to existing levels typical of the undeveloped areas of Lynn Canal within about 100 to 300 yards of the roadway, depending largely on weather conditions (e.g., traffic noise would be masked at shorter distances during rain and wind storms).

Summer peak-hour traffic noise at the USFS cabin on Berners Bay was estimated for Alternative 2 using basic noise attenuation theory. Peak-hour traffic noise at the cabin was estimated to be approximately 48 dBA in 2038. Noise levels at this cabin under the No Action Alternative would range from about 35 to 52 dBA depending on meteorological conditions. Therefore, traffic noise from Alternatives 2, 2B, and 2C could be perceptible at the cabin. However, this noise would be well below 65 dBA.

Juneau – As indicated in Section 3.2.6, project alternatives would not have a direct impact on sensitive receptors in Juneau except at the Echo Cove campground. The campground is approximately 600 feet from the alignment of Alternatives 2 through 2C, 3, 4B, and 4D. Of these alternatives, Alternative 2 would have the largest volume of traffic and would therefore create the greatest traffic noise. The peak-hour traffic noise is estimated to be approximately 45 dBA at the campground. Existing noise at the campground was measured at 43 dBA. This could be expected to vary depending on meteorological conditions and campground activity. The noise from a highway on the alignment for project alternatives would not increase the peak-hour noise by more than about 1 to 2 dBA. This increase would not be perceptible to the average human ear.

Haines – Project alternatives would not have a direct impact on sensitive receptors in Haines. Noise modeling was used to predict the noise level from Alternative 2 at the Chilkat Peninsula. The acoustical conditions associated with Chilkoot Inlet, which lies between the peninsula and the proposed highway alignment, were included in the noise model. The predicted noise level due to the highway under 2038 peak summer traffic conditions would be approximately 30 dBA at the closest location in Chilkat State Park. Existing noise levels measured on the peninsula were approximately 35 dBA. Therefore, traffic noise from Alternatives 2 through 2C would cause an increase of only 1 dBA to the overall noise environment. This increase would not be perceptible to the average human ear.

Skagway – Alternatives 2B, 3, and 4A through 4D would have no direct noise impacts to Skagway as these alternatives would involve no new construction there. Traffic associated with Alternatives 2, 2A, and 2C would enter and leave Skagway on a new highway. Alternative 2C would generate the maximum traffic volume entering and departing Skagway of any of these alternatives because in addition to the Skagway/Juneau traffic, all traffic between Juneau and Haines would have to pass through Skagway under this alternative. Peak-hour noise in 2038 from summer traffic on the proposed new highway descending into Skagway under Alternatives 2, 2A, and 2C was modeled at sensitive receptors on State Street north of 21st Avenue and 23rd Avenue from State to Alaska Street. Modeled peak-hour noise from the highway for these alternatives at these receptors ranged from 49 to 55 dBA. Traffic noise from the highway under Alternatives 2, 2A, and 2C would not be perceptible because of masking from local traffic noise as well as noise from trains and aircraft.

With Alternatives 2, 2A, and 2C, State Street would no longer connect to 23rd Avenue. Main Street at 23rd Avenue would become the main point for traffic entering and leaving Skagway. From State Street, traffic leaving Skagway would turn on 22nd Avenue and proceed to Main Street. Traffic from the Klondike Highway or East Lynn Canal Highway would access State Street from Main Street and 21st Avenue. Therefore, traffic on State Street would decrease substantially north of 21st Avenue and particularly north of 22nd Avenue. Conversely, more traffic would be on Main Street, 21st Avenue, and 22nd Avenue than under current conditions or

the No Action Alternative. New construction for Alternatives 2, 2A, and 2C would terminate on Main Street north of the alley between 22nd Avenue and 23rd Avenue. Impacts at the intersection of 23rd Avenue and Main Street and on Main north of 22nd Avenue are partially the result of traffic on this new construction; therefore, direct impacts were evaluated as far south as the intersection of Main Street and 22nd Avenue.

Peak-hour noise from summer traffic on the proposed new highway for Alternatives 2, 2A, and 2C was modeled in combination with other projected peak-hour summer traffic at sensitive receptors on Main Street north of 22nd Avenue and on 23rd Avenue. Traffic noise at these receptors was also modeled based on 2002 traffic data for Skagway to represent current conditions, and for the No Action Alternative in 2038. For analyses purposes, the worst-case scenario for the No Action and Build Alternatives was modeled. Based on past trends in population growth, it was estimated that traffic would increase at the rate of one percent a year into the future. This would increase traffic volumes in Skagway by approximately 35 percent by 2038. For the Build Alternatives, all traffic from the Klondike Highway and East Lynn Canal Highway was assumed to enter and leave Skagway. For both the No Action and Build Alternatives, all traffic was assumed to use State Street.

Table 4-66 provides the results of this noise modeling. As indicated in the table, current interior peak-hour traffic noise is estimated to be 50 dBA at the daycare center on the corner of 23rd Avenue and Main Street. No sensitive receptors in this area currently have an exterior traffic noise of 65 dBA. Under the No Action Alternative, peak-hour traffic noise is estimated to increase relative to existing conditions by 1 to 2 dBA by 2038. With Alternatives 2, 2A, and 2C, interior peak-hour traffic noise in 2038 is projected to increase by 3 to 15 dBA relative to existing traffic conditions at the five sensitive receptors on Main Street north of 22nd Avenue, and all these receptors would have interior peak-hour traffic noise greater than 50 dBA. Exterior peak-hour noise is projected to increase by 3 to 16 dBA in 2038 relative to existing traffic conditions at these sensitive receptors on Main Street north of 22nd Avenue, and three of them would have exterior peak-hour noise of at least 65 dBA with these alternatives. These five receptors are the only sensitive receptors that would have direct traffic noise impacts from any of the build alternatives. Therefore, noise abatement was evaluated for these receptors.

Table 4-66
Modeling Results for Noise-Sensitive Receptors Along Road Segments in Skagway by Project Alternatives[1]

Location	Modeled Peak- Hour Traffic Noise Level (dBA L_{eq})																	
	Existing (2002)		No Action Alternative (2038)				Alternative 2 (2038)				Alternative 2A (2038)				Alternative 2C (2038)			
	In	Ex	In	In Δ	Ex	Ex Δ	In	In Δ	Ex	Ex Δ	In	In Δ	Ex	Ex Δ	In	In Δ	Ex	Ex Δ
Residence southeast corner 23rd and Main	47	60	48	1	62	2	52	5	63	3	52	5	62	2	53	6	63	3
Daycare southwest corner 23rd and Main	50	60	51	1	62	2	54	4	63	3	53	3	63	3	54	4	64	4
Residence on Main between 22nd and 23rd	41	51	42	1	52	1	54	13	66	15	53	12	65	14	54	13	66	15
Residence northwest corner Main and 22nd	39	50	41	2	51	1	53	14	66	16	53	14	66	16	53	14	66	16
Residence northeast corner Main and 22nd	40	50	41	1	51	1	55	15	65	15	55	15	65	15	55	15	65	15

Notes: [1]In = interior, Ex = exterior, InΔ = Difference between alternative and existing interior, ExΔ = Difference between alternative and existing exterior

4.7.7.3 Noise Abatement Evaluation

In accordance with 23 CFR 772.13(c), the following noise abatement measures must be considered for direct noise impacts:

- Traffic management measures (e.g., traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations)
- Alteration of horizontal and vertical alignments
- Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers
- Construction of noise barriers (including landscaping for aesthetic purposes) whether within or outside the highway right-of-way
- Acquisition of real property or interests therein (predominately unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise
- Noise insulation of public use or nonprofit institutional structures

The two relevant criteria considered in identifying and evaluating noise abatement measures to be incorporated into a project are feasibility and reasonableness. Feasibility deals primarily with engineering considerations on whether or not a substantial noise reduction can be achieved given the conditions of the specific project location. A proposed sound barrier that will not achieve a minimum of five decibels of attenuation under the specific conditions of the project site is generally not considered to be feasible. In addition, feasibility also takes into account the safety and maintenance of noise abatement facilities.

Reasonableness is a more subjective criterion that takes into account an array of factors. According to DOT&PF Noise Abatement Policy (March 1996), a determination of reasonableness for noise abatement shall be based on the following:

- Amount of noise reduction provided
- Number of people protected
- Cost of abatement
- Views of impacted residents
- Future absolute traffic noise levels
- Difference between future traffic noise levels and existing noise levels
- Difference between future traffic noise levels for the build and no-build alternatives
- Amount of development that occurred before and after the initial construction of the highway
- Extent to which zoning or land use is changing
- Effectiveness of land use controls implemented by local officials to prevent incompatible development

In order to be considered reasonable pursuant to DOT&PF policy, noise abatement measures must have a cost of $25,000 or less per benefited receptor unless a severe[45] noise impact is demonstrated. Reasonableness criteria also include a requirement that unmitigated future build noise levels would be at least five dBA greater than existing noise levels.

If Alternative 2, 2A, or 2C were the selected alternative for the project, the only routes into and out of Skagway would be via Main Street or Alaska Street. Therefore, traffic management measures to abate noise on Main Street such as traffic control devices and signing for prohibition of certain vehicle types or time-use restrictions for certain vehicle types would not be feasible because they would only move this traffic onto another residential street. In addition, it is projected that most of the traffic associated with an East Lynn Canal highway would be personal vehicles such as automobiles, light duty trucks, and recreation vehicles. Only a small percentage of the traffic is expected to be large trucks.

The speed limit for Main Street and 21st and 22nd avenues is anticipated to be 25 mph. Traffic noise was modeled using that speed. A traffic noise reduction of 3 dBA requires halving the speed. Reducing the speed limit to 20 mph would reduce traffic noise by less than one dBA. Speed limits below 20 mph are not realistic.

[45] A severe noise impact is defined as a predicted (design year) sound level that would create an increase of at least 15 dBA over existing sound levels or that the predicted "build" sound levels would exceed the predicted "no action" sound levels by at least 5 dBA.

The northeastern portion of Skagway that would be impacted by project traffic noise is developed. Therefore, it would not be possible to abate traffic noise through restrictions to development in this area.

Minor horizontal and vertical adjustments that could be made to the proposed highway alignment in the area of Skagway potentially impacted by traffic noise would not reduce noise on Main Street north of 22nd Avenue. Major changes to the alignment would result in relocation of residences, introduction of traffic noise impacts to other areas of Skagway, or additional project costs greater than $25,000 per benefited receptor. Therefore, alignment alteration is not a feasible means of noise abatement in Skagway.

Alternatives 2, 2A, and 2C would impact residences and a for-profit daycare center. Therefore, noise insulation of public use or nonprofit institutional structures is not a feasible noise abatement measure.

Noise barriers were considered for sensitive receptors along Main Street north of 22nd Avenue as well as along 23rd Avenue east of Main Street where modeled peak-hour traffic noise with Alternatives 2, 2A, and 2C would be at or above the NAC. The following sound barriers were determined to reduce traffic noise below these criteria at the daycare center on the corner of 23rd Avenue and Main, the residence on Main between 22nd and 23rd, and the three residences on Main Street north of 22nd and south of the mid-block alley:

- Six-foot high barrier approximately 400 feet long on the east side of Main Street from the alley at mid-block to 23rd Avenue wrapping around the south side of 23rd Avenue in front of the residence on the corner of 23rd Avenue and Main Street.
- Six- (Alternative 2A) to eight-foot (Alternatives 2 and 2C) high barrier approximately 700 feet long in front of the daycare center on 23rd Avenue wrapping around the west side of Main Street to the alley at mid-block.
- Eight- (Alternatives 2 and 2A) to ten-foot (Alternative 2C) high barrier approximately 300 feet long on the west side of Main Street from the alley at mid-block south to 22nd Avenue.
- Ten-foot high barrier approximately 400 feet long on the east side of Main Street from the alley at mid-block south to 22nd Avenue wrapping around the north side of 22nd Avenue to the first driveway.

A sound barrier on the east side of Main Street from 23rd Avenue to the mid-block alley would reduce estimated interior traffic noise levels at the residence on this corner from 53 dBA to 49 dBA; however, this barrier would not achieve a five decibel reduction in noise. Therefore, it was not considered feasible. As indicated above, sound barriers must have a cost of $25,000 or less per benefited receptor based on DOT&PF guidelines. Based on typical sound barrier cost of $45 per square foot, this barrier would cost $108,000. Therefore, this sound barrier is not feasible or reasonable.

The other three potential sound barriers evaluated for the project would reduce traffic noise by at least five decibels. As indicated above, sound barriers must have a cost of $25,000 or less per benefited receptor, although where the sound impact is considered severe this amount can be exceeded. A barrier on 23rd Avenue and Main Street would cost from approximately $190,000 (6 feet high) to $250,000 (8 feet high) and would only benefit the daycare center. The barrier on the west side of Main Street between the alley and 22nd Avenue would only benefit two residences that would have a severe noise impact (traffic noise projected to be 66 dBA, up to 14 dBA above no action) at an estimated cost of $108,000 (8 feet high) to $135,000 (10 feet

high). A barrier on the east side of Main Street between the alley and 22nd Avenue would only benefit two residences that would have a severe noise impact (traffic noise projected to be 66 dBA, up to 14 dBA above no action) at an estimated cost of $180,000. Therefore, on the basis of cost, the sound barriers at these three locations are not reasonable.

Traffic noise is not the only noise source in the area of these five receptors. Based on long-term noise measures taken on State Street and 22nd Avenue, non-traffic noise (trains and aircraft) is the predominant noise source and is currently at levels equal to predicted 30-year peak-hour traffic noise. The noise barriers considered in this analysis would not appreciably reduce noise from these sources. Based on this and the feasibility and reasonableness determinations presented above, no noise barriers are proposed.

4.7.7.4 Indirect Impacts

No Action Alternative – Based on past trends in population growth, it was estimated that traffic in the Juneau, Haines, and Skagway areas would increase at the rate of one percent a year into the future. This would increase traffic volumes in these areas by approximately 35 percent by 2038. This increase in traffic would also increase noise adjacent to existing roads in these communities.

Juneau – Existing traffic noise along Egan Drive and Glacier Highway in Juneau was estimated by computer modeling using traffic volumes measured in 2002. Based on this modeling, exterior peak-hour summer traffic noise along these highways is estimated to be at or above 65 dBA at 25 housing units in Juneau (14 single-family residences, 10 condominiums, and the Auke Bay RV Park) (Table 4-67). Based on a field survey of the Juneau area, there are a number of noise sensitive receptors near Egan Drive and Glacier Highway where the exterior areas closest to the highway do not appear to receive frequent human use and therefore it is most appropriate to evaluated potential interior noise impacts. For these other receptors, modeling indicates that interior peak-hour traffic noise is at or above 50 dBA at 103 housing units (single-family residences, residence rooms in the Pioneer's Home, condominiums, apartments, DeHart's upper floor, and the Squire's Rest Building).

Table 4-67
Housing Units Along Egan Drive and Glacier Highway in the Juneau Area Impacted by Summer Traffic Noise[1]

Location	Number of Housing Units									
	Modeled Existing Condition (2002)		No Action Alternative (2038)		Alternatives 2–2C (2038)		Alternative 3 (2038)		Alternatives 4A–4D (2038)	
	In	Ex	In	Ex	In	Ex	In	Ex	In	Ex
Egan Drive from Twin Lakes Drive to Old Glacier Highway	21	1	29	3	29	3	29	3	29	3
Glacier Highway from Old Glacier Highway to Engineers Cutoff Road	23	12	26	14	26	14	26	14	26	14
Glacier Highway from Engineers Cutoff Road to Fritz Cove Road	16	10	17	12	17	12	17	12	17	12
Glacier Highway from Fritz Cove Road to Auke Bay Road	15	0	17	1	17	1	17	1	17	1
Glacier Highway from Auke Bay Road to Auke Nu Drive	23	2	26	4	26 - 28[2]	4	26	4	26	4
Glacier Highway from Auke Nu Drive to Terminus	5	0	6	2	13 - 14[2]	4	11	3	7 - 11[3]	2 – 3[4]
Total	103	25	121	36	128-131	38	126	37	122-126	36 - 37

Notes: [1]In = interior at or above 50 dBA $L_{eq(h)}$, Ex = exterior at or above 65 dBA $L_{eq(h)}$
[2]28 for Alternative 2 and 26 for Alternatives 2B, 2A, and 2C.
[2]13 for Alternatives 2A and 2B and 14 for Alternatives 2 and 2C.
[3]11 for Alternatives 4A, 4B, and 4D and 7 for Alternative 4C.
[4]3 for Alternatives 4A, 4B, and 4D and 2 for Alternative 4C.

The increase in summer traffic associated with the No Action Alternative is projected to increase noise levels in Juneau relative to existing conditions by up to 2 dBA by the year 2038 for all modeled roadway segments. Although this noise increase would not be noticeable since the average human ear does not typically recognize noise increases below 3 dBA, it would increase the number of housing units in Juneau receiving exterior peak-hour traffic noise at or above 65 dBA by 11 (all single-family residences). It would also increase the number of housing units in Juneau receiving interior peak-hour traffic noise at or above 50 dBA by 19 (17 single-family residences and 2 apartments). The Juneau Christian School would have an interior peak-hour noise of 51 dBA under the No Action Alternative. Table 4-67 lists sensitive receptors in the Juneau area that are currently at or above the Noise Abatement Criteria (NAC) and sensitive receptors that would be affected by traffic noise with the No Action Alternative in 2038.

Haines – Increased summer traffic in Haines under the No Action Alternative would increase traffic noise in downtown Haines by 2 dBA in 2038. Existing exterior peak-hour noise levels in Haines range from 34 to 57 dBA. As mentioned above, an increase of 2 dBA would not noticeably increase the perceived noise adjacent to roads in Haines. Therefore, project alternatives would not result in noise impacts in Haines.

Skagway – Peak-hour noise at a residence (LT-3 at 420 22nd Avenue) nearest State Street and the Skagway railroad yard was measured in 2003 at just below 65 dBA. At a residence at 12th Avenue and Broadway a block away from the Yukon and White Pass Route Railroad line, peak-hour noise was measured in 2003 at 60 dBA. Based on short-term noise measurements, peak-hour noise in downtown Skagway further away from the railroad line and other non-traffic noise sources was estimated to be less than 60 dBA.

Peak-hour traffic noise levels in Skagway were modeled using 2002 summer traffic levels to represent current conditions. Most traffic coming into or out of Skagway on the Klondike Highway travels on 23rd Avenue and State Street north of 21st Avenue before dispersing onto other roads in Skagway. Exterior peak-hour traffic noise at receptors along State Street between 21st and 23rd avenues and 23rd Avenue between State and Main streets was modeled to range from 57 to 62 dBA. Modeled traffic noise levels were lower than measured noise levels in Skagway. This modeling indicates that vehicle traffic is not the dominant source of noise in most of the community. Other noise sources such as rail traffic and aircraft are primarily responsible for the high measured peak hour noise levels in Skagway (60 to 65 dBA). The northeast section of town is close to the railroad tracks which have up to 120 train movements per day in the summer with many passenger trains during the measured peak hour. Airplane and helicopter noise also contributes to the high noise level with up to 130 takeoffs and landings per day in the summer. With existing traffic noise levels of 57 to 62 dBA, these other noise sources likely contribute approximately 62 to 64 dBA in order for the total peak hour noise level to be 65 dBA.

Noise measurements and modeling indicate that no sensitive receptors in Skagway currently receive exterior peak-hour traffic noise of 65 dBA or greater. However, it is estimated that interior peak-hour traffic noise at the residence where State Street becomes 23rd Avenue, the residence on the southwest corner of State Street and 22nd Avenue, and the daycare center on the southwest corner of 23rd Avenue and Main Street currently exceeds 50 dBA.

Increased summer traffic in Skagway under the No Action Alternative would also increase traffic noise in the community by 1 to 2 dBA in 2038. An increase of 2 dBA would not noticeably increase the perceived noise adjacent to roads in Skagway. Because traffic is not the dominant source of noise in the community, the small increase projected for the No Action Alternative would not increase peak-hour noise at the exteriors of any sensitive receptors to 65 dBA; however, it is estimated that this increase in noise would result in an interior peak-hour traffic noise of 50 dBA or greater at the residences on State Street and 22nd Avenue (north- and southwest corners), the residence on State and 23rd Avenue, the daycare center on the corner of 23rd Avenue and Main Street, and the apartments on the northwest corner of State Street and 21st Avenue.

Build Alternatives – Project build alternatives would increase traffic on roads in Juneau, Haines, and Skagway relative to the No Action Alternative. This would have the indirect effect of increasing traffic noise at receptors adjacent to these roads. Although analysis of the need for noise abatement is not required by FHWA regulations for these indirect impacts, NAC noise levels are useful in their evaluation.

Juneau – In most cases, exterior and interior noise exposure at sensitive receptors along Glacier Highway and Egan Drive with Alternatives 2 through 2C, 3, and 4A through 4D would be the same as estimated for the No Action Alternative (Table 4-67). As Table 4-67 shows, two additional sensitive receptors would receive exterior peak-hour traffic noise at or above 65 dBA with Alternatives 2 through 2C relative to the No Action Alternative. Interior peak-hour noise levels would be at or above 50 dBA at 10 additional sensitive receptors with Alternative 2 and 7 additional receptors with Alternatives 2A, 2B, and 2C (Table 4-67) relative to the No Action

Alternative. With Alternative 3, one more receptor would receive exterior peak-hour traffic noise at or above 65 dBA and five more receptors would receive interior peak-hour noise levels at or above 50 dBA when compared to the No Action Alternative (Table 4-67). With Alternatives 4A, 4B, and 4D, one more receptor would receive exterior peak-hour traffic noise at or above 65 dBA and five more receptors would receive interior peak-hour noise levels at or above 50 dBA (Table 4-66) relative to the No Action Alternative. For Alternative 4C, the only difference from the No Action Alternative would be that one more receptor would receive interior peak-hour noise levels at or above 50 dBA (Table 4-67).

Alternative 2 would increase peak hour noise at the Adlersheim Wilderness Lodge near Yankee Cove by 10 dBA. Current (2002) peak hour noise at the lodge is estimated to be 51 dBA. Peak hour noise in 2038 with Alternative 2 would be 61 dBA. Peak hour noise in 2038 at the lodge is estimated to range from 59 to 60 dBA with Alternatives 2A through 2C, 58 dBA with Alternative 3, and 55 to 56 dBA with Alternatives 4A through 4D.

Haines – Project alternatives would result in increased traffic on Mud Bay Road or on Lutak Road and in downtown Haines on Front and Main streets. Modeling indicates that this increased summer traffic in 2038 would increase noise levels in Haines by 2 to 7 dBA for Alternatives 2 through 2C, and 3, and 1 to 4 dBA for Alternatives 4A through 4D relative to existing conditions. These noise increases would result in peak exterior traffic noise levels in Haines of 65 dBA within 35 feet of the highway centerline in 2038. No sensitive receptors would be impacted by this noise.

Skagway – Traffic associated with Alternatives 2B, 3, and 4A through 4D would enter and leave Skagway via ferry the same as traffic currently traveling between Juneau and Skagway. Alternative 2B would result in the largest increase in summer traffic in Skagway among these alternatives with an estimated peak-hour increase over the No Action Alternative of about 55 vehicles in 2038. This would increase peak-hour traffic noise at sensitive receptors along State Street in Skagway by about 1 to 2 dBA over the No Action Alternative and 3 to 4 dBA relative to existing conditions. No sensitive receptors would receive traffic noise at a level equal to or greater than 65 dBA with this alternative. Alternatives 3 and 4A through 4D would result in traffic volumes somewhat lower than Alternative 2B and would therefore increase peak-hour traffic noise by 1 dBA or less. A 1-dBA increase in noise would not be perceptible to the average human ear.

Revision of the traffic pattern into and out of Skagway with Alternatives 2, 2A, and 2C would result in indirect noise impacts to receptors in the northeast part of the community. The new traffic pattern would result in a reduction in noise at most receptors on State Street north of 21st Avenue since fewer vehicles would use this segment of the street than under existing conditions or the No Action Alternative. Exterior peak-hour traffic noise would increase by 10 to 11 dBA at residences near mid-block on 21st and 22nd avenues between State and Main streets (Table 4-68). Residences closer to State Street on 21st and 22nd avenues would have less of a traffic noise impact. Residences closer to Main Street on 21st and 22nd avenues would have a greater traffic noise impact. As explained in Section 4.7.7.3, long-term noise measures in this part of Skagway indicated that non-traffic noise is the predominant noise source, and is currently at levels above the predicted 30-year peak-hour traffic noise.

Table 4-68
Modeled Indirect Noise Impacts on Selected Noise-Sensitive Receptors, Skagway[1]

Location	Modeled Exterior Peak-Noise-Hour Traffic Noise Level (dBA L_{eq})									
	Modeled Existing Noise Level (2002)		No Action Alternative (2038)		Alternative 2 (2038)		Alternative 2A (2038)		Alternative 2C (2038)	
	In	Ex	In	Ex	In	Ex	In	Ex	In	Ex
Residence on State and 22nd	48	61	50	62	46	56	46	55	47	56
Residence on State and 23rd	51	62	53	64	46	56	46	56	47	57
Residence on southwest corner State and 22nd	50		52		52		51		52	
Apartment northwest corner State and 21st	48		50		49		48		49	
Residence on 22nd mid-block between State and Main		52		53		62		62		63

Notes: [1]In = interior, Ex = exterior

Alternatives 2, 2A, and 2C would result in increased summer traffic in downtown Skagway (e.g., Broadway between 1st and 6th avenues) in 2038. Modeling indicates that this increased traffic would increase peak-hour noise over the No Action Alternative in downtown Skagway by 1 to 3 dBA. These noise increases in downtown Skagway would result in peak exterior traffic noise levels of less than 65 dBA, based on current measured noise levels of less than 60 dBA.

4.8 Construction Impacts

4.8.1 Land Use

Construction of many of the proposed project alternatives may require establishment of at least one temporary construction camp and a number of temporary materials staging areas. For Alternatives 2 through 2C, it is likely that a construction camp would be set up at Comet Landing, outside of the required right-of-way for the project. For Alternative 2B, a camp is likely at the Katzehin Ferry Terminal site. The camp could be located on the right-of-way acquired for the project. For Alternative 3, a camp is likely at William Henry Bay at the proposed ferry terminal site. As with the Katzehin site, this camp could be on the right-of-way for the project. For Alternatives 4B and 4D, construction staging areas would be likely at the Sawmill Cove Ferry Terminal site. The number and location of these sites would depend on the contractor's work plans/schedule and sequencing of work areas in concert with approval by DOT&PF. In the event that temporary construction camps and/or staging areas are needed outside of the permanent right-of-way for proposed project facilities, it would be necessary to obtain a use permit from the USFS for sites located on Tongass National Forest land, and a lease for sites on private or local government land. These requirements would apply for any material source sites or sites required for setting up rock crushers or other material processing equipment.

4.8.2 Visual Resources

Viewers from boats or ferries on Lynn Canal would see construction activities where they are not screened by vegetation and fugitive dust created during right-of-way clearing, grading, and blasting. These activities would contrast with the natural landscape and may dominate some viewsheds for a short period.

4.8.3 Historical and Archeological Resources

Known historical and archeological resources in the vicinity of the project would be identified in the construction plans to ensure that the contractor is aware of the need to avoid impacts to these resources. Cultural resources within the project limits would be flagged in the field to ensure that equipment operators do not inadvertently damage these resources. In the event a previously unknown cultural resource is discovered during construction, work in the vicinity of the site would cease until DOT&PF has evaluated the site, FHWA has determined its eligibility for the National Register of Historic Places, and, if the site is determined to be eligible, DOT&PF, FHWA, and the State Historic Preservation Officer have agreed to a plan to avoid or mitigate adverse impacts.

4.8.4 Socioeconomic Resources

4.8.4.1 Alternatives 2 through 2C

Table 4-69 lists the estimated construction costs for all project alternatives and the corresponding annual labor employment required to construct each alternative. Labor employment was derived from the estimated construction cost. In major construction projects of this nature, labor constitutes from one-third to one-half of the total project cost. The total labor cost was calculated assuming it would be 45 percent of construction costs. Total labor cost was broken down into annual labor cost; construction was assumed to take approximately four years. Based on 2001 DOL&WD data, the total annual salary for highway, street, and bridge construction workers in Alaska was about $71,000. Total labor cost includes this annual salary plus 20 percent for benefits and other labor-related overhead, or approximately $85,000 per annual-equivalent job. The estimate of annual labor employment was determined by dividing this annual-equivalent job cost into the total estimated annual labor cost.

In 2002, there were 13 firms designated as heavy construction employers in the Juneau/Haines/Skagway area with average annual employment of 298 workers. As indicated in Table 4-69, Alternatives 2, 2A, and 2C would more than double this employment and Alternative 2B would increase it by 86 percent. It is unlikely that the Juneau/Haines/Skagway region would have enough qualified workers for this construction project; therefore, workers would be needed from other areas to construct any of these alternatives.

As the region's commercial and population center, Juneau would receive the largest construction-related impacts under Alternatives 2 through 2C. Haines would not experience appreciable socioeconomic impacts from Alternatives 2 through 2C because it is not located on the alignment for these alternatives. However, Haines-area construction contractors and labor could participate in the project. Skagway could be most affected by a construction-related, temporary population influx because it is the smallest community in the project region and because it is located on the alignment for Alternatives 2, 2A, and 2C.

Table 4-69
Project Construction Phase Employment Impacts

Alternative	Construction Cost ($Million)	Estimated Annual Employment (people)
2	281	370
2A	248	320
2B	198	255
2C	265	350
3	210	275
4A	13	25
4B	21	40
4C	13	25
4D	21	40

Note: Construction costs include only highway and ferry terminal costs; vessel construction is not included. Estimates are based on a four-year construction period.

The highway construction effort for Alternatives 2 through 2C would be initially staged out of Juneau and/or Skagway. Camp-supported facilities near the Katzehin River would likely be used for Alternative 2B and could potentially be a part of Alternatives 2, 2A, or 2C, depending on the contractor's work plan and schedule.

The location of the major workforce concentration is important in terms of where construction-related socioeconomic impacts would occur. Regardless of location, the types of impacts that could occur include:

- Increased sales with construction equipment, rental, and repair companies
- Increased sales with food wholesalers and other businesses providing goods and services to the construction camp(s)
- Increased sales with fuel distributors
- Increased sales to businesses providing goods and services to construction workers and dependents
- Increased sales tax revenues
- Increased demand for rental and other housing
- Increased enrollment in local schools
- Increased demands on other public services such as law enforcement, fire and emergency services and health care services

Table 4-70 provides an estimate of total annual employment and payroll associated with Alternatives 2 through 2C. The estimates provided in Table 4-70 are high-case estimates because indirect impacts (those associated with business spending on goods and services in support of the construction project) and induced impacts (those associated with construction workers spending their payroll) develop over time and are generally lower for short-term projects such as construction of any of the alternatives.

Table 4-70
East Lynn Canal Highway Alternatives Construction Phase
Direct and Total Employment and Payroll Effects

Alternative	Estimated Annual Direct Employment (people)	Estimated Annual Direct Payroll ($Million)	Estimated Annual Total Employment (people)	Estimated Annual Total Payroll ($Million)
2	370	25	520	30
2A	320	22	450	26
2B	255	17	360	21
2C	350	24	490	29

Note: Estimates are based on a four-year construction period.

Table 4-71 provides an estimate of construction-related population increases, total new housing demand, and additional school-age population projections for Alternatives 2 through 2C. These estimates are based on the following assumptions:

- Half of the total construction-related labor force would seek some form of housing in Juneau, including construction workers relocating to Juneau.
- For construction workers relocating to Juneau, 75 percent would bring dependents, family size would average 3.1, and 20 percent of the dependent population would be school age.
- Workers seeking housing in Juneau who do not have dependents would seek shared housing with other construction workers (two people per housing unit).

Table 4-71
East Lynn Canal Highway Alternatives Construction Phase
Maximum Potential Population-Related Effects

Alternative	Total Construction Related Population Increase (people)	Total New Housing Demand (No. of Units)	Additional School Age Population (children)
2	670	240	130
2A	580	200	115
2B	460	160	90
2C	630	220	125

Note: Estimates are based on a four-year construction period.

Juneau had approximately 320 vacant housing units in 2001. Although the construction-related housing demand associated with Alternatives 2 through 2C is less than existing vacancies, some additional housing development would probably occur in anticipation of increased demand.

The effect on the school district of additional school-age residents would depend on the age and geographic distribution of the construction-related population. Total public school enrollment in Juneau has declined by about 250 students over the past five years; therefore, the infrastructure is in place to serve this additional enrollment. Additional enrollment would also result in increased state funding, which is based in part on enrollment.

4.8.4.2 Alternative 3

Construction of Alternative 3 is estimated to cost approximately $210 million. This alternative would create approximately 275 construction jobs, which is similar to the construction workforce estimated for Alternative 2B. Other economic impacts for Alternative 3 in terms of annual total employment and payroll, construction-related population increase, new housing demand, and additional school-age population would be similar to Alternative 2B.

Construction-phase impacts related to the West Lynn Canal Highway differ from an East Lynn Canal Highway in that Haines could potentially be substantially affected. Alternative 3 would likely be staged out of Haines and a camp at the William Henry Bay Ferry Terminal area. Potential socioeconomic effects in Haines from Alternative 3 could be the same as those listed for Alternative 2B.

Assuming that about 75 percent of the construction jobs for Alternative 3 would be filled by non-residents, and about half of those non-residents would bring dependents with them to Haines, a population increase of approximately 500 to 550 residents could be expected, including those residing in a local construction camp. That would represent a temporary 20 percent increase in the population of Haines.

This population increase would increase public school enrollment by approximately 50 new students in all grades. Physical facilities in the Haines school district are adequate to meet this demand; however, depending on the distribution of students among grades, it may be necessary to hire one or more teachers.

4.8.4.3 Alternatives 4A through 4D

The only in-state construction expenditures associated with Alternatives 4A and 4C would be minor reconfiguration of the Auke Bay Ferry Terminal, requiring about 25 workers. This construction would have no appreciable effect on the Juneau economy. Construction for Alternatives 4B and 4D would include the Sawmill Cove Ferry Terminal and the highway between Echo Cove and Sawmill Cove. These alternatives would require about 40 construction workers, which is equal to 13 percent of the existing heavy construction workforce in the region. The economic effects to Juneau, Haines, and Skagway from this increase in construction jobs over a four-year period would be negligible.

4.8.5 Transportation

DOT&PF may set up interim ferry service during construction of Alternatives 2 through 2C or 3. For Alternatives 2A or 3, interim ferry service to Haines and Skagway could be instituted from Sawmill Cove after construction of the ferry terminal and the highway from Echo Cove. For Alternatives 2, 2B or 2C, interim ferry service could be initiated to Haines and Skagway from Slate Cove after highway construction reaches the Jualin mine road if Coeur Alaska constructs a floating vehicle dock in Slate Cove (Alternative B in USFS Supplemental EIS for the Kensington Gold Project). In both cases this service could be provided by a combination of the *M/V Aurora* and the *M/V Fairweather*. The *M/V Aurora* could add a run to Slate Cove in the middle of the day between runs to and from Haines and Skagway. The *M/V Fairweather* would remain based in Juneau until any highway alternative was completed, but could depart Auke Bay to Haines or Skagway, then sail south to Slate Cove, head north to Haines or Skagway, and then return to Auke Bay. This would reduce the overall running time and cost of operation.

4.8.6 Hydrology and Water Quality

During construction of the highway segments of the project alternatives, small non-anadromous fish streams with perennial flow would need to be diverted during placement of culverts. Diversions would not be required for anadromous fish streams and rivers to be spanned by bridges.

Diversion of streams would be done during low-flow periods to avoid downstream water quality impacts using standard procedures to minimize water quality impacts. Depending on flows, water may be pumped around the site where the culvert is being placed, or the stream may be diverted to a temporary lined channel. When the culvert is in place and the stream is re-established in its natural channel, there would be a short-term, one-time increase in turbidity. Based on past experience, this short-term increase in turbidity would not change stream profiles or result in a long-term degradation of fish habitat.

Bridges crossing streams would be built from shore. No temporary roads would be established in streambeds. This would minimize turbidity caused by bridge construction.

Bridges crossing major rivers would require placement of piers in the river bed. This construction activity would be timed to periods of low flow to minimize turbidity; however, there would be a short-term increase in turbidity during this activity. Based on past experience, this short-term increase in turbidity would not change river profiles or result in a long-term degradation of fish habitat.

Construction of the proposed ferry terminals at Katzehin (under Alternatives 2, 2A, and 2B) and Sawmill Cove (under Alternatives 2A, 3, 4B, and 4D) would require dredging to approximately 25 feet below mean lower low water. The proposed William Henry Bay Ferry Terminal for Alternative 3 would not require dredging. The new terminals proposed for the project alternatives would require placement of in-water fill. Alternatives 2 through 2C would also require in-water fill in intertidal/subtidal areas for highway construction. Dredging and in-water fill placement would result in short-term (hours or days) localized increases in turbidity. Based on past studies of dredging impacts conducted by the USACE, fish would avoid the dredge or fill sediment plume. Benthic invertebrates that cannot rapidly move away from the sediment as it settles out of the water column would be buried and killed. Kelp and aquatic vegetation in close proximity to dredging would be covered with sufficient sediment to hamper photosynthesis and some of this vegetation may die. Areas impacted by sediment deposition would be expected to recolonize within one to two seasons. The fill used for the project would be shot-rock generated during highway construction; therefore, no pollutants would be introduced into marine waters from this fill material.

Highway and ferry terminal construction would involve earth-moving activities. Exposed soils susceptible to erosion can be discharged to natural water bodies, resulting in short-term increased turbidity.

Fuel and lubricant spills and leaks could occur during construction. These potential pollutants could flow directly to area water bodies or be transported to them by stormwater runoff.

Debris and waste are generated during construction. If not properly managed, they can contribute to water pollution through stormwater runoff.

During design of the selected alternative, an erosion and sediment control plan would be developed to provide a general plan to minimize erosion and sedimentation during construction. Project contractors would use this plan to develop Stormwater Pollution Prevention Plans

(SWPPPs) for their work. Each SWPPP would detail the resources that a contractor has on-hand and the procedures and BMPs that the contractor would use to prevent construction activities from jeopardizing area hydrology or water quality. BMPs would include:

- Erosion and sediment control measures would be employed as early in construction as possible.
- Staking would be done at the planned outside limits of disturbance prior to construction to ensure that impacts are limited to that area.
- Grass seed would be placed on any road slope not constructed of shot rock. To protect the integrity of the natural plant communities, plant species indigenous to the area would be used for vegetating road slopes, except that non-native annual grasses may be used to provide initial soil cover.
- Silt fences would be used adjacent to waterways just beyond the estimated toe of fill.
- Ditch checks would be used to reduce erosion during construction.
- Sedimentation basins would be used, as necessary, during construction.

4.8.7 Air Quality

Construction can be a source of dust emissions that have temporary impacts on local air quality (i.e., exceedances of the NAAQS for PM_{10}). Construction particulate emissions would result from drilling and blasting and use of heavy equipment involved in land clearing, ground excavation, cut-and-fill operations, and the construction of project facilities. Dust emissions would vary from day to day depending on the level of activity, the specific operations, and the prevailing weather. Dust emissions would be minimized by application of BMPs, such as watering exposed soil surfaces in active work areas, if necessary. Most of the study area is distant from populated areas, so dust would primarily be a concern for workers and habitat areas adjacent to the project.

In addition to particulate emissions from earth moving, there would be pollutant emissions (carbon monoxide, nitrogen oxides, $PM_{10,}$ and reactive organic compounds) from construction equipment engines. These emissions are not expected to result in exceedances of NAAQS for any pollutant because of the low background levels of pollutants in the study area and the relatively small amount of construction equipment.

4.8.8 Noise

The evaluation of construction noise was based on typical noise levels from public works projects, such as road construction, developed by the EPA. Using that information, the overall noise level generated on a construction site for proposed project alternatives was estimated to be 88 dBA at 50 feet, except where blasting is to be done which would produce higher short-term noise levels. Noise levels generated by construction equipment decrease at a rate of approximately six decibels per doubling of distance away from the source (Diehl, 1973). For all build alternatives, typical noise from project construction would drop to background levels at about 3,300 feet from the construction site. In many places, the noise would attenuate over much shorter distances because of terrain.

Because of the different phases of construction (e.g., clearing, grading, cut and fill, etc.), no single location would experience a long-term period of construction noise. Instead, construction activities and associated noise would move along the right-of-way as construction proceeds.

DOT&PF would include specific noise abatement requirements in the construction contracts for the proposed project. Those requirements would include proper maintenance of noise control equipment like mufflers.

4.8.9 Wetlands

Highway construction for all project alternatives except Alternatives 4A and 4C require work in wetland areas. Excavation, grading, and cut-and-fill activities could alter local hydrologic patterns, which could affect these wetlands. The erosion and segment control plan developed by DOT&PF for implementation by construction contractors would contain specific BMPs to avoid construction impacts to wetlands including:

- The roadway would be constructed using the minimum-width fill footprint necessary to provide a stable road base.
- Separate identification of slope limits to insure workers are aware of wetlands and the need to avoid impacts beyond the slope and clearing limits.
- Construction camps, staging sites, borrow pits, and waste areas will be located in upland areas and stabilized during and after use to avoid water quality impacts to wetlands and water bodies.

The Stormwater Pollution Prevention Plan (see Section 4.8.5) would include provisions to avoid contaminating these wetlands. Wetland fill limits would be separately identified to raise the awareness of workers on the need to avoid impacts beyond the toe of the slope.

No borrow sites, waste sites, staging areas, or construction camps would be located in wetlands. No storage areas or truck turnaround areas are anticipated to be in wetlands other than within the actual footprint of the highway. The locations for these activities would be further evaluated during design.

4.8.10 Terrestrial Habitat

Construction of the selected alternative would require a combination of temporary facilities, such as borrow sources, waste sites, staging areas, and possible construction camps. The specific locations and sizes of these temporary facilities would be determined by the construction contractors. These sites would be small relative to the area of clearing required for project facilities themselves. Large quantities of borrow material would not be required for highway construction, as most embankment material would come from necessary rock cuts. Most waste soil would either be buried below the embankment or used as topsoil in non-wetland areas. As discussed in the impact assessment for all project alternatives, the permanent loss of terrestrial habitat associated with the Juneau Access Improvements Project would be a small percentage of the total area of similar habitats available in the Lynn Canal region. Clearing of remote temporary construction facilities would not substantially affect terrestrial habitats, and those areas outside the footprint of the project would be revegetated to natural plant communities following construction.

Construction activities have the potential to introduce invasive plant species to the Lynn Canal region. There are three pathways for this potential impact. Construction equipment brought to the project site from other areas could contain seeds or plant parts that could then be spread to the construction site. Seed mixtures used to vegetate exposed soils could contain invasive species. Soil containing invasive species excavated from one area could be moved to another area, thus spreading the invasive species. For more information on invasive species, including a list of existing species in southeast Alaska, refer to Section 4.2.1.1 of the *Wildlife Technical*

Report (Appendix Q). See Supplemental Draft EIS Section 5.3 for information on mitigating these potential impacts.

4.8.11 Marine and Freshwater Habitat and Species (Including Essential Fish Habitat)

Construction of ferry terminals would result in a short-term increase in turbidity near the construction sites. This turbidity could result in the loss of some Pacific herring eggs in the vicinity of the Sawmill Cove Ferry Terminal site under Alternatives 2A, 3, 4B, and 4D and sculpin eggs at the William Henry Bay terminal site under Alternative 3. Timing of in-water construction to avoid the spawning and egg maturation period would avoid this impact. At other proposed terminal sites, this increased turbidity could result in the loss of some benthic organisms. These impacts would not have population-level effects on any benthic species, fish, or crab species in Lynn Canal.

Highway construction for Alternatives 2, 2A, and 2C would require sidecasting of up to 6.4 million cubic yards of rock from road cuts into Taiya Inlet and Lynn Canal. Alternative 2B would require two million cubic yards of rock sidecasting because the Taiya Inlet highway segment would be eliminated. Sidecasting would create a sediment plume that could smother benthic organisms for an area outside the principal fill zone for the material. Fish would typically avoid these plumes. These temporary impacts are not expected to have population-level effects on any benthic species, fish, or crab species in Lynn Canal.

Construction of multi-span bridges across the Antler (Alternatives 2, 2B, and 2C), Lace (Alternatives 2, 2B, and 2C), Katzehin (Alternatives 2 through 2C), Sullivan (Alternative 3), Endicott (Alternative 3), and Chilkat (Alternative 3) rivers would require placement of support structures in the river channels. Based on recent experience with bridge construction in San Francisco Bay, it is possible that the energy generated by pile driving could cause some fish kills within about 100 feet of that activity (FAA, 2003). Construction in the river channels would also result in short-term turbidity that could affect migrating fish and smother fish eggs. Although bridge construction in these rivers may lead to some mortality of resident or anadromous fish, the full width of each river would not be impacted at once and construction would be timed to avoid periods when anadromous fish are active in the area. Therefore, it is not expected that bridge construction would result in long-term population-level effects on resident or anadromous fish.

4.8.12 Wildlife

4.8.12.1 Marine Mammals

Harbor seals may be disturbed by loud noises caused by highway and ferry terminal construction activities near the shore. It is likely that harbor seals would perceive active construction areas in or immediately next to the water from a distance and avoid the area if noise levels are bothersome. Harbor seals haul out on sandbars in Berners Bay and at the Katzehin River delta. They have also been observed to haul out on the west side of Taiya Inlet at the base of Halutu Ridge. On the west side of Lynn Canal, harbor seals haul out in protected waters near the Sullivan River, Davidson Glacier delta, and Pyramid Island. Construction noise caused by any of the alternatives may cause harbor seals to temporarily abandon some haulout sites. However, they are likely to return to those sites after the noise has ceased. In addition, there are numerous haulout sites that seals use throughout Lynn Canal. This temporary disturbance would not result in population-level effects on this species.

4.8.12.2 Marine Birds

Project construction could result in flushing some marine birds, such as marbled murrelets and harlequin ducks, resting or feeding in nearshore waters. These short-term displacements would cost birds a small amount of energy and time but would not affect reproductive success or survival.

Disturbance of nesting birds could decrease their chances of reproductive success for the season or could cause them to abandon their nests. The waterfowl and herons in the study area begin breeding activities in late April or early May and some do not fledge their young until the middle of August. Clearing for Alternatives 2 through 2C, 3, 4B, and 4D during the spring and summer seasons would be limited to reduce the potential for disturbing nesting birds. Marbled murrelets nest in old-growth forest, the most common habitat type crossed by the proposed highway alignments on the east and west sides of Lynn Canal. Therefore, marbled murrelets may be the species most affected by highway construction.

Disturbance of nesting birds would not have population-level effects on waterfowl and herons in Lynn Canal. Highway construction would proceed in stages over the alternative alignments. Construction would not take place over the entire length of any alignment in one season with the possible exception of the relatively short extension of Glacier Highway from Echo Cove to Sawmill Cove for Alternatives 4B and 4D. Therefore, only a small area of nesting habitat relative to the amount available throughout the region would be disturbed during any one breeding season.

Trumpeter swans nest in the wetlands of the Antler, Lace, and Berners rivers, with a concentration of nests on the Lace River near its confluence with Berners Bay (USFS, 2001). Most of these nests are well upstream of the alignment for Alternatives 2, 2B, and 2C; however, at least one known nest site is approximately 3,200 feet from the alignment on the delta between the Antler and Lace rivers (USFS, 2001). As indicated in Section 4.8.7, this is far enough away from construction activities that noise from construction equipment would be at background levels typical for the area. Therefore, construction of project facilities should not have a substantial impact on nesting trumpeter swans.

4.8.12.3 Terrestrial Mammals

Some species of terrestrial mammals such as bears, wolves, river otters, and martens give birth in dens during the winter or spring. It is possible that highway construction could cause some direct mortality of adults and young in dens inadvertently destroyed during clearing operations in the early spring. However, only a few individuals are expected to be affected and therefore construction would not result in population-level effects on any species in the Lynn Canal region. To reduce the likelihood of impacting denning wolves, a den survey would be conducted (see Section 5.8).

Black and brown bears typically avoid human activity. However, they are attracted to human garbage and food supplies, which often brings them into conflict with humans and results in bears being shot in defense of life or property. This problem often occurs in remote construction camps (McLellan, 1989). Best management practices for food and waste disposal would be implemented for construction camps, staging areas, and day-to-day activities to minimize bear-human interactions.

4.8.12.4 Terrestrial Birds

Project construction effects on terrestrial birds are similar to those described for marine birds. Loud noises from construction activities are likely to disturb birds within one-quarter to one-half mile of the alignment. If the birds are feeding or resting, they would fly away from the disturbance and resume their normal behavior in another location. Disturbance of nesting birds would decrease their chances of reproductive success for the season and would be avoided to the extent practicable. It is not expected that project construction would have population-level effects on terrestrial birds in Lynn Canal. Highway construction would proceed in stages over the alternative alignments. Construction would not take place over the entire length of any alignment in one season with the possible exception of the relatively short extension of Glacier Highway from Echo Cove to Sawmill Cove for Alternatives 4B and 4D. Therefore, only a small area of nesting habitat relative to the amount available throughout the region would be disturbed during any one breeding season.

4.8.12.5 Amphibians

Project construction would result in the loss of individual frogs and toads in the wetlands crossed by the highways for Alternatives 2 through 2C, 3, 4B, and 4D. Few amphibians inhabiting areas to be cleared, graded, or filled would be able to avoid construction equipment. However, this loss of individuals is not expected to have population-level effects on any species in the Lynn Canal region, as the area disturbed is small relative to the total regional habitat available to amphibians.

4.8.12.6 Bald Eagles

As discussed in Section 4.1.15, the USFWS has established a 330-foot primary buffer zone around active bald eagle nests to protect them from typical construction noise, and a 0.5-mile secondary buffer for loud construction noises such as blasting. Based on past experience, bald eagles may not select an existing nest or abandon their nest when construction activities are at closer distances. Alternatives 2 through 2C have from 45 (Alternative 2B) to 57 (Alternatives 2 and 2C) known trees with bald eagle nests within 330 feet of the alignment and from 88 (Alternative 2B) to 100 (Alternatives 2 and 2C) known nest trees within 0.5 mile of the alignment. There are 25 bald eagle nest trees within 330 feet of the proposed alignment for Alternative 3, and 45 nest trees within 0.5 mile of the alignment. No bald eagle nest trees are known to be within 330 feet of the proposed highway alignment from Echo Cove to Sawmill Cove under Alternatives 4B and 4D, but seven nest trees occur within 0.5 mile of the alignment.

Construction along the alignments of Alternatives 2 through 2C and 3 would be staged; therefore, construction would not occur along the entire alignment in any one season. In addition, not all eagle nests are actively used each year. Construction would be timed to avoid nest tree areas during the nest occupation period, and to avoid active nests during the rearing season. In specific locations, monitors may be used to allow construction during these periods if agreed to by USFWS.

New bald eagle nests are built each year and some older nests may be destroyed each winter. The locations of all nest trees within the construction zone would be surveyed each year prior to construction. Site-specific mitigation would be the subject of ongoing consultations with the USFWS and would be agreed to on a case-by-case basis during design and construction. A blasting plan would be developed in consultation with USFWS for areas where blasting would be required within 0.5 mile of active eagle nests.

4.8.12.7 Threatened And Endangered Species

Construction of a highway for Alternatives 2 through 2C would place construction equipment in close proximity to the Gran Point Critical Habitat Area for Steller sea lions as well as the Met Point haulout. Average noise levels from typical construction equipment would be approximately 88 dBA at 50 feet. Background noise levels at remote shorelines in Berners Bay have been measured at 47 to 52 dBA. The alignment for Alternatives 2 through 2C is approximately 285 feet behind and 140 feet above Gran Point. Shielding from trees, rocks, and earth between the haulout and the noise source would decrease noise levels by an additional 5 dBA or more in addition to the normal noise decrease rate of approximately 6 dBA per doubling of distance without shielding. This would mean that typical construction noises would be, for example, 88 dBA at 50 feet, 77 dBA at 100 feet, 66 dBA at 200 feet, 55 dBA at 400 feet, and 44 dBA at 800 feet. The closest point of construction activity to the haulout would be 317 feet. Therefore, noise from construction activities in the vicinity of the Gran Point haulout would not produce noise levels above ambient except directly opposite the haulout. Noise levels would be similar at the Met Point haulout which is 400 feet from the nearest point of construction.

Based on surveys including daily monitoring of the Gran Point haulout, sea lions use the haulout through the fall, winter, and spring months. By mid-July, sea lions generally stop using the haulout and do not return until the end of August. To ensure no disturbance, construction work in the immediate vicinity of the haulouts (1,000 feet) would occur when the haulouts are vacant.

Blasting would also be required in this area for highway construction. An analysis of blasting effects was conducted for the 1997 Draft EIS. The two major components of blasting disturbance are the air blast and ground vibration. Ground vibration levels expected at the haulout were estimated to evaluate possible disturbance to Steller sea lions. Vibration is expressed in terms of inches per second (ips), which represents the velocity of the particles in the ground during a seismic wave caused by blasting. According to the U.S. Bureau of Mines, human tolerance levels for ground vibrations often depends on an individual's feelings about the blasting activity. If an individual is hostile or objects to blasting, the tolerance level can be lower than 0.1 ips. For those supporting the activity, the tolerance level can be as high as 0.50 ips. The level of 0.1 ips was used as the disturbance threshold for sea lions.

Calculations of ground velocity at the Gran Point haulout were developed using standard blasting formulas and delayed charge weights of 20, 50, and 100 pounds. For the haulout site, corresponding ground vibration was calculated to be 0.048 ips for 20-pound charges, 0.096 ips for 50-pound charges, and 0.16 ips for 100-pound charges. It is estimated that 20-pound delayed charges would be used during highway construction. These charges would produce ground vibration of less than half of the inferred disturbance threshold for sea lions.

Sea lions on the Gran Point and Met Point haulouts would be monitored when construction activities occur within 3,000 feet of these haulouts. This monitoring would be done to ensure that sea lions are not disturbed.

Humpback whales near shore may hear or feel construction activities that take place at ferry terminal sites or on highway alignments close to shore. The reaction of humpback whales to underwater noise would depend on how far away they were from the disturbance and what they were doing at the time. In some cases, whales change course and speed to avoid a noisy ship. In other cases, especially when they are feeding in an area of high prey availability, whales tolerate very loud noises. To minimize construction impacts to whales, monitors would be on-site in areas with a high probability of noise impacts, including pile driving at ferry terminals, to watch for the presence and/or disturbance of whales. The short-term disturbance due to construction noise would not impact the humpback whale population in Lynn Canal.

4.9 Cumulative Impacts

The geographic area for the cumulative effects assessment encompasses the following areas:

- Auke Bay Ferry Terminal and Echo Cove within the City and Borough of Juneau for all resources, and the Glacier Highway in Juneau for noise impacts
- Echo Cove, around Berners Bay, and north along the east side of Lynn Canal and Taiya Inlet to Skagway
- City of Skagway
- Haines Borough
- William Henry Bay to Mud Bay Road in Haines, on the west side of Lynn Canal

Baseline conditions and current actions within the study area were evaluated in 2003. The time frame for past actions ranged from the nineteenth century, when the earliest mining operations began, to 2003. The time frame for reasonably foreseeable future actions extends to 2038 and includes projects that are funded or have submitted permit applications to appropriate regulatory and resource agencies.

As discussed below, most of the foreseeable future projects that have been identified for the cumulative effects assessment are located in the vicinity of Juneau. None of the projects is near Haines, and only one project, the proposed Otter Creek Hydroelectric Project on Kasidaya Creek, is near Skagway.

4.9.1 Past, Present, and Foreseeable Future Projects

Past, present, and reasonably foreseeable future actions in the project area were identified using the Juneau Access Improvements Project comment database (to find foreseeable future actions referred to in 1997 Draft EIS comment letters from agencies and the public), 1997 public testimony, and 2003 scoping letters. In addition, future projects were identified through planning documents, personal communications with resource agency representatives, NEPA documentation, current events reported in the local and regional news, and best professional judgment.

4.9.1.1 Mining

On the east side of Lynn Canal, the project study area lies within a large mineral region known as the Juneau Mining District, which has produced large quantities of gold, silver, and lead since 1869. The larger-scale mining activities have occurred primarily outside the project corridor, to the southeast of the project, near Juneau. However, the proposed alignment for Alternatives 2 through 2C runs through areas of prospects, claims, and historic and current mines. Mining and prospecting within the project corridor have been primarily for copper, gold, silver, and zinc, with the primary area of historic mining activity along the Berners Bay area at the Jualin and Kensington Mines.

At present, no mining is occurring along the east side of Lynn Canal in the project area. Coeur Alaska, Inc., a mining company based in Idaho, acquired the Kensington and Jualin Mines in the 1990s and received all permits required to begin construction and operations following publication of the *1997 Kensington Gold Project Final Supplemental Environmental Impact Statement* and issuance of a USFS Record of Decision. Construction of the new mine has not started. In an effort to increase efficiency and reduce disturbance in the area Coeur submitted an amended Plan of Operations, which became the basis of the current *2004 Kensington Gold*

Project Draft Supplemental Environmental Impact Statement. For the purpose of this cumulative impact assessment, it is assumed that mine development will take place before 2010. The 2004 proposed mine has an expected life of 10 years following an 18-month construction period, though additional ore discovery could extend its operating life. It is assumed that the mine will be constructed and operate within the time frame of the Juneau Access Improvements Project.

Mining has been minimal along the west side of Lynn Canal with the exception of the Alaska Endicott Mine, near William Henry Bay, and the Dream Prospect, on the mainland across from Sullivan Island. The former Alaska Endicott Mine is approximately 1 mile southwest of the beginning of the proposed Alternative 3 alignment at William Henry Bay. It was mined from the early 1900s to 1924 for copper and incidental amounts of gold and silver. The Dream Prospect was extensively explored for zinc and copper with no significant mineral recovery. Several other mineral occurrences, prospects, and mines are in the project study area on the west side of Lynn Canal. No mining is currently taking place or planned on the west side of Lynn Canal in the project area.

4.9.1.2 Timber Harvests

In 1997, Goldbelt conducted a timber harvest in the Cascade Point/Echo Cove area, and that land is now being used as a rock quarry. There are no plans for timber harvests in the project area. It is possible that some timber harvest would occur on Mental Health and University Trust lands; however, it is not possible to quantitatively predict a reasonably foreseeable amount. Therefore, the only logging included as reasonably foreseeable in the detailed cumulative impact analysis is the logging within the right-of-way for construction of one of the alternatives for the Juneau Access Improvements Project.

4.9.1.3 Development

State Development – Major projects developed by the state within the project area have included construction of the State of Alaska Auke Bay, Haines, and Skagway Ferry Terminals, and the Echo Cove boat ramp. The Echo Cove boat ramp and access road were designed in 1996 and built by DOT&PF. The facility consists of a 16-foot-by-192-foot concrete ramp and a parking area. The CBJ maintains the facility.

Alaska Glacier Seafoods Company – Alaska Glacier Seafoods has obtained a permit to construct 12,000 square feet of office space and a processing plant next to the Auke Bay Ferry Terminal at 12-mile Glacier Highway. In addition, the company has a permit modification to construct a timber dock and a saltwater intake system for the processing facility.

Goldbelt – Goldbelt has prepared a management plan for its Echo Cove landholdings, and has indicated that industrial or commercial uses related to transportation and recreation would be more likely future uses than residential development. This long-range plan includes development on 10 percent of Goldbelt land at Echo Cove, including a 40-acre commercial development site at Cascade Point (road, dock development, and service station), an 80-acre cultural center in Echo Cove, a camping area adjacent to the CBJ boat ramp in Echo Cove, and a low-impact recreational and cultural development. Their access easement allows for the construction, maintenance, and operation of a three-mile-long gravel-surfaced road from the end of the existing Glacier Highway to the company's lands at Cascade Point. The Cascade Point Road project was the only Goldbelt project included in this analysis because it has a NEPA analysis that provides details of potential impacts and is permitted. The other projects are conceptual and are not dealt with in this analysis because they are not reasonably foreseeable.

The State of Alaska is funding the construction of the Cascade Point Road as part of the Industrial Roads Program. Also known as the Roads to Resources program, these state funds are used to foster industrial development. In this case the goal is to assist Goldbelt to develop its land at Cascade Point.

West of the Lace River, the highway for Alternatives 2, 2B, and 2C would intersect an existing unpaved road that runs from the dock at Slate Cove to the Jualin mine. This road is a public road that may be upgraded as part of Coeur Alaska's proposal to build a deepwater floating dock at Slate Cove with funds from the Alaska Industrial Development and Export Authority (AIDEA). Use of these funds would ensure state access to the dock. If Coeur Alaska develops the Slate Cove dock with AIDEA funds, DOT&PF could use the dock in two ways: to provide interim ferry shuttle service during construction of a highway north of Slate Cove, and to provide temporary winter ferry service during extended road closures for avalanche control.

Other – There are Alaska Mental Health Trust, Native allotments, and other private lands on both the east and the west sides of Lynn Canal (Figures 3-1 and 3-2). A highway would increase the likelihood of development of these lands, but nothing specific is reasonably foreseeable. Therefore, these lands are not discussed further in this cumulative analysis. DOT&PF controls access to any state highway. The location and configuration of driveways off of a state highway would conform to DOT&PF standards.

4.9.1.4 Recreation

Personal Recreation – Recreation in Lynn Canal includes pleasure boating, sailboating, kayaking, canoeing, camping, hiking, sport fishing, hunting, and shellfish harvesting. In 2001, the U.S. Coast Guard reported 4,472 boat registrations in Juneau, 436 in Haines, and 101 in Skagway. Developed tent and RV campgrounds are found near the communities of Juneau, Skagway, and Haines. Hiking primarily occurs on trails maintained by the state, local governments, or private non-profit organizations.

Commercial Recreation – Several companies provide scenic tours in the Lynn Canal area using small aircraft and helicopters for optimal viewing opportunities. Primary flight-seeing destinations include the Juneau Icefield, Chilkat Glacier system, Mendenhall Glacier, Glacier Bay National Park, and Wrangell-St. Elias National Park. Wilderness guiding is a growing industry in Southeast Alaska, and guided tours in Berners Bay, the Katzehin River Valley, the Endicott River Wilderness, and the Chilkat Bald Eagle Preserve are popular. Guides operate Glacier River float trips and marine animal viewing tour boats in the Davidson Glacier area. Sport fishing is one of the most popular recreational activities in Lynn Canal. In 2003, the ADF&G Charter Vessel Registration List reported 1,127 charter boats registered in Juneau, 81 in Haines, and 13 in Skagway (ADF&G, 2003a).

4.9.1.5 Private Industry

Non-AMHS Vessel Operations – The Chilkat Express Ferry includes two 150-passenger high-speed jet catamarans operated seasonally in northern Lynn Canal between Haines and Skagway. Fjord Express operates a 48-passenger vessel between Haines and Juneau. Large cruise ships (overnight capacity $\geq$ 250 passengers), small cruise ships (overnight capacity of $<$ 250 passengers), fishing boats, and other commercial boats also operate within Lynn Canal between Skagway, Haines, and Juneau.

Commercial Fishery – The Lynn Canal commercial fisheries (District 15) are segmented into three regulatory areas: 15A – Upper Lynn Canal; 15B – Berners Bay; and 15C – Lower Lynn Canal. The drift gillnet fishery targets sockeye, summer chum, coho, and fall chum salmon, with

some king and pink salmon taken incidentally. A limited power and hand troll fishery for king and coho salmon exists in Lynn Canal, as well as a limited crab and shrimp pot fishery in Haines and Juneau.

There were 286 commercial fishing permit holders active in Juneau in 2002, with a combined harvest of 18.4 million pounds for a gross value of $14.35 million. In Haines, 81 commercial fishing permit holders harvested 5.3 million pounds with a gross value of $2 million. Skagway had three active permit holders, but only two fished commercially in 2002 (values unavailable).

Pacific Seaflight Ferry – Pacific Seaflight is planning to begin operating wing-in-ground-effect ships between Juneau and Haines and Juneau and Hoonah. The vessels operate much like a hydrofoil but instead of using noisy fans to lift the vessel the air cushion is created by the forward motion of the ship. The ships are quiet and do not exchange fluids with the marine environment. The ferry service will be based in downtown Juneau.

4.9.1.6 Utilities

Alaska Power and Telephone Company has a Federal Energy Regulatory Commission permit for a 6-acre, 3-megawatt hydroelectric project, called the Otter Creek Hydroelectric Project on USFS land at Kasidaya Creek in Taiya Inlet, 3 miles south of Skagway. Major infrastructure for the project includes an impoundment structure; a 3,700-foot-long, 40-inch-diameter penstock; a metal powerhouse with an adjacent staging area and transformer pad; a 75-foot-long tailrace; three helicopter pads; and a jetty. Construction is scheduled to begin in 2005.

Both the Haines and Skagway sewage treatment facilities are primary treatment plants that operate under EPA 301(h) waivers from secondary treatment for ocean discharges. Primary treatment includes screening, settling, grit removal, and skimming. The Haines outfall extends 1,800 feet into Lynn Canal and discharges effluent at 70 feet below mean lower low water. Skagway's outfall extends 85 feet into Taiya Inlet and discharges effluent at 60 feet below mean lower low water.

The CBJ operates three wastewater treatment plants, all of which have NPDES permits (Juneau – Douglas, Mendenhall, and Auke Bay). The Auke Bay Wastewater Treatment Plant discharges effluent to Auke Bay at 30 feet below mean low water after secondary treatment. The other outfalls are not near the project area. The Auke Bay Ferry Terminal also discharges effluent to Auke Bay after treatment at 20 feet below mean lower low water.

4.9.1.7 Other

Subsistence and Personal Use – Subsistence harvests are conducted by residents of Klukwan, Haines, and Skagway. These residents fish for salmon and non-salmon finfish and hunt black bear, brown bear, moose, Sitka black-tailed deer, and mountain goat. The Native Alaskans residing in Haines and Skagway also harvest marine invertebrates, including crabs, shrimp, clams, and cockles. Harbor seals have also been harvested by Skagway residents in the past, and continue to be harvested by Native Alaskans residing in Haines.

Juneau is not recognized as a subsistence community under the Alaska National Interest Lands Conservation Act. Some residents of Juneau use Berners Bay and Lynn Canal for personal use harvests of fish and shellfish.

4.9.1.8 Actions Not Considered

The following actions were determined not to be reasonably foreseeable future actions or pertinent present actions and, therefore, were not evaluated in the cumulative effects analyses.

Timber Sales – There are no timber sales currently planned by any of the major landholders in the project area in the next 10 years.

Alaska Interstate Gas Company Natural Gas Service – Alaska Interstate Gas Company proposes to provide natural gas service for Juneau and 16 other communities in Southeast and Southcentral Alaska. The project is currently in the marketing and feasibility stage; project development timelines are uncertain.

Lace River Hydroelectric Project – Lace River Hydroelectric was granted a preliminary permit on December 11, 1995, for a hydroelectric project to be located on a tributary of the Lace River. On November 5, 1997, the company requested to terminate its permit, as there was no market for the power. The permit officially expired on November 30, 1998 (Federal Register [FR] v. 63, n. 58, 1998). It is unlikely that this project would be developed in the reasonably foreseeable future.

Cape Fox Land Entitlement Adjustment Act of 2003 – This bill would give approximately 2,700 acres of USFS lands in the Johnson and Slate Creek drainages to Cape Fox Corporation and 9,300 acres of land in the Johnson, Sherman, and Sweeny Creek drainages to Sealaska Corporation. In exchange, the USFS would get 3,000 acres of private lands near Ketchikan. If the land exchange is executed, it is expected that Cape Fox Corporation will use its new land to develop support services for the Kensington Gold Project (U.S. Senate Bill 1354). This land exchange was not used in the analysis because the exchange is not completed and there is no management plan in place; therefore, no details of potential impacts are reasonably foreseeable.

4.9.2 Cumulative Impact Analysis

Alternatives were analyzed to determine if they would have either direct or indirect effects on area resources. Numerous past, present, and reasonably foreseeable future impacts were identified that, in combination with direct or indirect impacts, would result in cumulative impacts. Resources that would not have direct or indirect impacts from project alternatives were not evaluated for cumulative impacts. Further, resources that could potentially have direct or indirect impacts from project alternatives, but were not impacted by any past, present, or reasonable foreseeable future actions, were not evaluated for cumulative impacts. Potential cumulative effects were identified for the following resource areas: land use, visual resources, historical and archeological resources, economics, social effects, water quality, air quality, noise, wetlands, marine fish habitat, terrestrial habitat, wildlife, bald eagles, and threatened and endangered species. The cumulative impact analysis is projected to the year 2038.

4.9.2.1 Land Use

Alternatives 2 through 2C and 3 – Alternatives 2 through 2C and 3 would make the east side or west side of the Lynn Canal substantially more accessible to recreational uses such as hunting, fishing, hiking, boating, and camping. The USFS envisions trails from DOT&PF pullouts but there are no specific plans to do so. Outdoor recreation is a principal leisure time activity for Juneau, Haines, and Skagway residents. The improved access provided by Alternatives 2 through 2C and 3, and the increase in visitors to the region expected with these highway alternatives, combined with the population increases that would be associated with the

development of the Kensington Gold Project and commercial development by Goldbelt, would increase the use of the recreational resources along the coastline of either the east side or the west side of Lynn Canal. It is also likely to increase commercial ventures related to outdoor activities such as recreational equipment retail stores and guide services.

The cumulative effect of improved recreational opportunities associated with any of these alternatives would likely be perceived as a negative impact by those who enjoy the existing primitive nature of the region, including some outfitters who currently provide wilderness trips there. However, those who would take advantage of the new outdoor recreation opportunities would perceive increased access as beneficial.

Alternatives 4A through 4D – Alternatives 4A through 4D would improve opportunities for recreation in the vicinity of Haines, Skagway, and in the case of Alternatives 4B and 4D the southern end of Berners Bay, but would not improve recreational access to large areas of Lynn Canal in the same way as Alternatives 2 through 2C and 3. The proposed Goldbelt developments from Echo Cove to Cascade Point would provide additional recreational opportunities. The cumulative effect of the improved recreational opportunities associated with Alternatives 4B and 4D would likely be more noticeable in the Berners Bay area due to the proposed Goldbelt tour operations and easier access for personal kayakers and kayak guides in Berners Bay. This effect would likely be perceived as a negative impact by those who enjoy the existing natural setting of the area. However, those who would take advantage of the new recreational opportunities would perceive increased access as beneficial.

4.9.2.2 Visual Resources

Alternatives 2 through 2C, 3, 4B, and 4D would increase the visual presence of man in primarily a natural landscape, most noticeably in views from ferries and boats. The Goldbelt Cascade Point marine facility, the Kensington Gold Project Slate Cove marine facility, and the Otter Creek Hydroelectric Plant on Kasidaya Creek would be visible from a few locations. Their addition to a few views of the coastline would be minor in relation to the number of views that would include a highway paralleling the coastline, particularly along the east side of Lynn Canal, where a highway would be visible at many locations because of topography and vegetative cover. The cumulative visual effect for any of these alternatives would be substantial, but the contribution from other foreseeable future projects would be small because little commercial development other than mining is planned for the region and the planned developments would only be visible from a few locations in Berners Bay or Taiya Inlet.

4.9.2.3 Historical and Archeological Resources

The increased population and visitors associated with either Alternatives 2 through 2C or 3, together with the improved access associated with these project alternatives and USFS joint developments, would result in increased personal and guided outdoor recreation in the Lynn Canal region. These activities would increase the potential for discovery of currently unknown historic and prehistoric cultural sites or the loss of cultural resources through souvenir hunting at known and unknown sites. The cumulative effect on cultural sites for any of these alternatives would be beneficial if new sites were located and reported undamaged, but the effect would be negative if known or unknown sites are looted by artifact hunters.

None of the proposed project alternatives would have a direct adverse effect on the historical mining districts in the region. The Kensington Gold Project would have direct effects on the elements of the Berners Bay Historic Mining District. The population growth and increased visitors associated with Alternatives 2 through 2C and 3 combined with improved access could result in cumulative effects to elements of the District through vandalism or artifact hunting.

4.9.2.4 Economics

Alternatives 2 through 2C – Alternatives 2 through 2C are projected to create about 200 to 290 new jobs in Juneau by 2038. The Kensington Gold Project (225 permanent jobs), the Alaska Glacier Seafoods Auke Bay facility (10 to 15 seasonal and two permanent jobs), and the Pacific Seaflight ferry (five to seven seasonal and 9 permanent jobs) are also projected to increase employment in Juneau. As a rule of thumb, each new job results in a population increase of about 1.5 people. Alternatives 2 through 2C are projected to add 300 to 430 people to the Juneau population by 2038. The only other reasonably foreseeable project that would have an appreciable effect on Juneau's population is the Kensington Gold Project, which is projected to increase the population of Juneau by approximately 1,164 people. If the Kensington Gold Project is still in production in 2038, the cumulative population increase in Juneau would represent up to about five percent of the community's existing population (Juneau's 2003 population estimate is 31,000 people).

Sales tax revenues for Juneau would increase due to a predicted increase in visitor spending. It is estimated that Alternatives 2 through 2C would generate approximately $520,000 to $775,000 additional sales tax dollars in 2038. CBJ would receive approximately $1.4 million dollars from the Kensington Gold Project property taxes.

The Otter Creek Hydroelectric Project at Kasidaya Creek would reduce electrical costs to Skagway and possibly Haines. Alternatives 2 through 2C would reduce transportation costs to these communities. This could provide a cumulative benefit by reducing the overall cost of living for residents of Haines and Skagway.

Alternative 3 – Alternative 3 is projected to provide an additional 78 new jobs in Juneau in 2038. As stated above, the Kensington Gold Project, Alaska Glacier Seafoods Auke Bay facility, and Pacific Seaflight are also projected to increase employment in Juneau. Alternative 3 is projected to result in an increase of about 100 people in Juneau in 2038. Together with the Kensington Gold Project projected population increase (1,164 people), an overall population increase of approximately four percent would be expected in Juneau.

Increased visitor spending associated with Alternative 3 would generate approximately $170,000 additional sales tax dollars in Juneau in 2038. CBJ would receive approximately $1.4 million dollars from the Kensington Gold Project property taxes.

The Otter Creek Hydroelectric Project at Kasidaya Creek would reduce electrical costs to Skagway and possibly Haines. Alternative 3 would reduce transportation costs to these communities. This could provide a cumulative benefit by reducing the overall cost of living for residents of Haines and Skagway.

Alternatives 4A, 4B, and 4D – Alternatives 4A, 4B, and 4D are estimated to add about 70 to 96 new jobs in Juneau by 2038. The Kensington Gold Project, Alaska Glacier Seafoods Auke Bay facility, and Pacific Seaflight are also projected to increase employment in Juneau. Alternatives 4A, 4B, and 4D are projected to result in an increase of about 70 to 150 people in Juneau by 2038. Together with the Kensington Gold Project projected population increase (1,164 people), a maximum overall population increase of approximately four percent would be expected in Juneau.

Increased visitor spending associated with these three alternatives would generate approximately $80,000 to $240,000 in additional sales tax dollars in Juneau by 2038. CBJ would receive approximately $1.4 million dollars from the Kensington Gold Project property taxes.

Economic Cumulative Effects – To varying degrees, the cumulative effect of the new jobs and corresponding increase in Juneau's population associated with the proposed project alternatives and foreseeable future projects would cause an increase in housing demand greater than the existing housing supply and a corresponding increase in property values in Juneau. This population growth is projected to place an increased demand on public utilities, the CBJ school system, and health care services. Due to a stagnant economy in Juneau over the last five years, most public utilities are not operating at full capacity and could accommodate increased demand, especially in light of the additional tax revenues that would be generated by sales taxes and the Kensington Gold Project.

4.9.2.5 Social Effects

The increased population and visitors associated with improved access, particularly with Alternatives 2 through 2C and 3, and the Kensington Gold Project would reduce the isolation of Juneau, Skagway, and Haines and provide economic stimulation (primarily to Juneau). Increased economic opportunities, easier travel among the Lynn Canal communities, and better connections to areas outside Lynn Canal would be viewed as an improvement to the quality of life by some. Others would feel that their quality of life is diminished by reducing their isolation and bringing more people into the region.

4.9.2.6 Water Quality

The proposed project alternatives and foreseeable future projects would introduce some pollutants to stormwater runoff, which would eventually flow to marine and freshwater bodies. Treated wastewater would also be discharged from these projects to marine waters. All treated effluent would meet NPDES wastewater discharge limits, and pollutant loads in stormwater runoff are expected to be below AWQS, as discussed in Section 4.3.9 and the Supplemental EIS for the Kensington Gold Project (USFS, 2004); therefore, there would be no substantial cumulative water quality impacts.

4.9.2.7 Air Quality

Alternatives 2 through 2C and 3 – These alternatives could result in some increases in air pollutants and particulates due to vehicular and marine traffic emissions.

Alternatives 4A through 4D – These alternatives could result in some increases in air pollutants and particulates due to marine emissions.

Air Quality Cumulative Effects – Area air quality has been affected by several past and present events, including marine vessel operations, urban area emissions (e.g., motor vehicle emissions, heating systems, and fugitive emissions), mining, and timber harvesting, but lingering effects are not observable. Alaska does not have a statewide air toxics emission inventory to assess the impact of these urban environments to the air quality of Lynn Canal. However, the air quality within the northern Lynn Canal area is considered very good due to the absence of air pollution sources. This conclusion is further supported by data compiled for the proposed Kensington Gold Project showing that background concentrations of air pollutants were substantially below NAAQS in the East Lynn Canal area (USFS, 1992). However, on rare occasions, elevated concentrations of PM_{10} may exist in the project area when smoke from fires is carried south from the Yukon under northerly winds.

Foreseeable future actions, including the Kensington Gold Project, Goldbelt developments, non-AMHS vessels, and urban emissions, would affect air quality within the project region. The primary emission sources from the Kensington Gold Project include combustion emissions from power plant generators (four 3.3-megawatt units), smaller generator units at various facilities

and haul road vehicles, and particulate emissions from the tailings facility, borrow pits, rock crushing and mine haul roads. These emissions were modeled as part of the Kensington Gold Project Supplemental EIS; the resulting pollutant concentrations were found to be below federal and state air quality standards and Prevention of Significant Deterioration requirements for the build alternatives.

Proposed Goldbelt land development construction would cause localized, short-term increases in air emissions in the area (e.g., particulates or CO). Potential development in the area would also increase air pollutant emissions from other sources, such as combustion from heating of buildings, aircraft and watercraft use, and wood burning.

The foreseeable future projects in the Lynn Canal region are located several miles apart and therefore would not have a cumulative impact for non-reactive pollutants, such as most particulates and CO. Where the highway associated with Alternatives 2 through 2C passes by the Kensington Gold Project or Goldbelt development, concentrations of particulates and CO would be increased by a few percent, but would still be well below air quality standards. The volume of reactive pollutants such as nitrogen oxides and reactive organic gases from the proposed project and foreseeable future projects would be too small in combination with background concentrations to result in the formation of substantial concentrations of ozone.

4.9.2.8 Noise

The principal noise source from project alternatives would be traffic noise on those alternatives that include a highway. Noise modeling is discussed in the Supplemental Draft EIS and presented in the *Noise Analysis Technical Report* (Appendix L).

Alternatives 2, 2A, 2B, or 2C – These alternatives would introduce a new noise source in an area that is principally undeveloped, adding traffic noise to existing intermittent man-made noises from helicopters, airplanes, jet boats, and other vessels in Lynn Canal and Berners Bay. Ambient noise measurements along the shoreline of Lynn Canal ranged from 35 to 52 dBA depending on weather conditions and proximity of streams. Taking the average of about 40 dBA and using simple noise attenuation theory (explained in Appendix L and the Supplemental Draft EIS discussions on noise), traffic noise is estimated to be at background levels at approximately 200 to 250 feet from centerline along the coastline. Alternative 2A would introduce the same noise source in Lynn Canal but not around the shoreline of Berners Bay.

The Kensington Gold Project Slate Cove access road and the Goldbelt Cascade Point Road and other potential Goldbelt developments would generate vehicular traffic noise. A cumulative effect of increased noise over ambient levels would occur from Echo Cove to Cascade Point Road turnoff and at Slate Cove, where the Kensington Gold Project access road would be in close proximity to Alternative 2, 2A, 2B or 2C highway alignments. No residences would be impacted and vehicular noise levels are anticipated to have negligible effects on wildlife due to the predicted volume of traffic.

Alternatives 3, 4B, and 4D – The traffic noise under Alternative 3, 4B, and 4D would be the same as discussed above for Alternatives 2 through 2C from Echo Cove to Sawmill Cove. The Alternative 3 highway segment on the west shore of Lynn Canal is not discussed here because the only future foreseeable actions that would generate new traffic noise are located in Berners Bay.

4.9.2.9 Wetlands

Alternatives 2 through 2C would result in filling approximately 100.4 to 118.6 acres of wetlands and other waters of the U.S. Alternative 3 would result in filling 47.3 acres of wetlands and other waters of the U.S. Alternatives 4B and 4D would fill 12.9 acres of wetlands and other waters of the U.S. The majority of the wetlands filled by any of the project alternatives would be palustrine forested wetlands. Specific breakdowns of wetland types by alternative and subregion are presented in Sections 4.3.13, 4.4.13, and 4.6.13. The maximum wetland loss associated with these alternatives is approximately 92.5 acres for Alternatives 2 and 2B. Indirect effects could occur due to introduction of invasive plant species from increased access and accidental spills from vehicles.

Past projects have resulted in the loss of 3.9 acres of palustrine emergent wetland in the east side of Lynn Canal and an unknown acreage of wetland forest (USFS, 2003, USFS, 1988a, and USFS, 1988b). The Kensington Gold Project would result in the loss of 92 acres of wetlands, primarily forest wetland. Development of the Cascade Point Road by Goldbelt would result in the loss of 2.5 acres of forest wetland and 0.2 acre of palustrine emergent wetland.

The loss of wetlands associated with the Cascade Point Road and Alternatives 2 through 2C, 3, 4B, and 4D would not be cumulative. The alignment of the road and the highway segment for these alternatives between Echo Cove and Sawmill Cove would be the same. If the Cascade Point Road is built first, DOT&PF would use that alignment and widen the road to meet the state's highway standards. This small additional impact in wetland areas would not result in a greater wetland impact than quantified for Alternatives 2 through 2C, 3, 4B, and 4D. If one of these alternatives is built first, Goldbelt could use the highway after constructing a short access road to Cascade Point through nonwetland areas.

Wetland Cumulative Effects – The maximum cumulative loss of approximately 188 acres of wetlands from the Kensington Gold Project, Alternatives 2, 2B, or 2C, and past activities would constitute approximately 1.7 percent of the total wetlands on the east side of Lynn Canal (approximately 11,259 acres) and 1.4 percent of the wetlands in the entire Lynn Canal region (approximately 13,710 acres). The affected wetlands are relatively abundant within the Lynn Canal region, and there are no known adverse effects on threatened, endangered, or sensitive species or habitats. The loss of these wetlands would not adversely affect the overall diversity of regional wetland habitats.

4.9.2.10 Marine Fish Habitat (Including Essential Fish Habitat)

Alternatives 2A, 3, 4B, and 4D – Alternatives 2A, 3, 4B, and 4D would fill approximately 1.9 acres of intertidal and subtidal habitat in Sawmill Cove. Alternative 2A would also fill 1.1 acres of intertidal and subtidal habitat in Slate Cove. Dredging would occur in 1.3 acres of subtidal habitat for the Sawmill Cove mooring basin. A potential for cumulative effects would only occur in Berners Bay because this is the only area where foreseeable future actions would also place fill in the marine environment. The Goldbelt Cascade Point marine facility would fill about 1.3 acres of beach/intertidal habitat and dredge approximately 1.4 to 1.6 acres of subtidal habitat. The Kensington Gold Project marine facility in Slate Cove would fill approximately 3.6 acres of upland/beach/intertidal habitat. If Alternative 2A, 3, 4B, or 4D was chosen as the project action and the Goldbelt Cascade Point terminal was constructed, there would be approximately 9.7 to 10.8 acres of marine habitat lost due to filling and dredging in the Berners Bay area. This loss would not appreciably alter fish or invertebrate populations in Berners Bay or Lynn Canal.

The Pacific herring population in Lynn Canal has been substantially reduced over the decades to the point that it is no longer a viable commercial fishery. Various hypotheses have been put forth as to why the stocks have declined, though none have been substantiated by scientific analysis. These hypotheses include one or some combination of the following factors: overfishing, increased predator populations, disease, habitat alteration/degradation, water pollution, and environmental changes such as unfavorable oceanographic conditions.

In a quantitative assessment of the frequency with which explanations have been attributed to herring stock collapses worldwide, Pearson et al. (1999) found that overfishing (74 percent of the cases) was the most frequently cited cause, followed by environmental change (50 percent of cases), changes in food supply (15 percent), predation (two percent), disease (two percent), and habitat modification (two percent). In most cases, these factors were seen to have acted in combination with other; single-factor causes other than overfishing (37 percent) or environmental change (13 percent) alone were rare.

Overfishing may have played a role in the initial decline of Lynn Canal herring stocks. As previously noted, stocks were harvested at a low rate (<1,000 tons) until stock declines led to a fishery closure in 1982. Harvest did occur in some seasons when minimum spawning biomass thresholds were not met, and the Lynn Canal stock may have been especially susceptible to brief periods of overfishing due to poorly understood factors, such as its limited migratory range.

The Goldbelt Cascade Point marine facility and the proposed DOT&PF Sawmill Cove Ferry Terminal would impact Pacific herring spawning habitat, and operations of these facilities would displace some Pacific herring eggs and larvae in the immediate vicinity of the facilities. The footprint of the Sawmill Cove Ferry Terminal impact is approximately 300 feet (0.06 mile) of shoreline at mean lower low water, which is equivalent to less than two percent of the alongshore herring spawning length (approximately three miles) observed in Berners Bay in 2003. The footprint of the Cascade Point marine facility as proposed in the Kensington Gold Project EIS would cover 400 feet of shoreline. Combined with the Alternatives 2A, 3, 4B, or 4D, the cumulative loss of herring spawning habitat in Berners Bay would be 4.4 percent.

It should be noted that DOT&PF has committed to investigating a joint use facility at Cascade Point if Goldbelt's marine facility appears imminent and the selected project action requires a ferry terminal in Berners Bay. This facility would reduce the potential cumulative impact to herring spawning habitat and essential fish habitat.

Alternatives 4A through 4D – Nearshore intertidal and shallow subtidal habitat in Auke Bay is used by juvenile salmon, particularly pink salmon, during their early marine life stages, as well as by prey species for fish stocks in Lynn Canal. Limited herring spawning also occurs in Auke Bay. In addition to these fish species, crabs could be present in nearshore areas of the bay. In late winter, adult red king crab return to nearshore areas; young-of-the-year red and blue king crab require nearshore shallow habitat with protective cover. Early juvenile bairdi Tanner crab also occupy shallow waters and mud habitat.

Alternatives 4A through 4D in combination with the foreseeable future construction of the Alaska Glacier Seafoods Plant would result in the loss of about 1.5 acres of nearshore intertidal and shallow subtidal habitat in Auke Bay. Other marine facilities have been constructed in Auke Bay including the existing Auke Bay ferry terminal, a boat launch ramp, several marinas including fueling facilities, a harbor master's office, associated parking, and residential and commercial wastewater discharge facilities. Although the acreage of impacted intertidal and subtidal habitat has not been computed, development occurs all along the waterfront of Auke Bay. A larger proportion of most of the facilities is on the surface of the water away from the nearshore habitat (such as the finger float system of a marina), and parts of the facilities occupy a smaller portion

of intertidal or subtidal habitat (such as a staging dock and access ramp). In such instances, the amount of the nearshore habitat impacted is not commensurate with the size of the entire development. Because the remaining Auke Bay nearshore intertidal and subtidal habitat and most of the Lynn Canal coastline provide suitable rearing habitat for juvenile salmon, prey species, and crabs, this loss would not measurably affect fish and invertebrate populations in Auke Bay or Lynn Canal.

4.9.2.11 Terrestrial Habitat

The maximum terrestrial habitat loss associated with the proposed project is approximately 630 acres under Alternatives 2 and 2C. Past impacts to terrestrial habitat have occurred due to timber harvests and mine developments. The Goldbelt Cascade Point Road would remove approximately 33 acres of terrestrial habitat, the Kensington Gold Project would impact an additional 95 acres, and the Otter Creek Hydroelectric Project on Kasidaya Creek would impact about six acres of terrestrial habitat. Together, these losses result in a maximum potential cumulative loss of approximately 764 acres of terrestrial habitat[46]. This cumulative loss represents about 0.6 percent of the estimated 117,000 acres of terrestrial habitat in the Lynn Canal region. This loss would not represent a substantial loss of terrestrial habitat and it would not adversely affect any rare or unique vegetation community types or any known rare or sensitive plant species.

4.9.2.12 Wildlife

Marine Mammals – Alternatives 2A, 3, 4B, and 4D would increase the marine traffic in Berners Bay with shuttle ferries. In addition, increased access would increase the recreational use of Berners Bay. Although no boat ramp facilities would be constructed at Sawmill or Slate coves, personal craft could be launched at these locations. Disturbance from increased recreational and commercial marine traffic and increased recreational uses of beaches may cause harbor seals to periodically leave some haulouts. The proposed Kensington Gold Project Berners Bay shuttle ferry could also disturb harbor seals. However, harbor seals use a variety of haulouts. There are alternative spots for them to rest if they are temporarily displaced from a particular location. Therefore, the cumulative increase in disturbance at haulouts is not likely to affect the survival or reproductive success of this species. Increased marine traffic would increase the risk of vessel collisions with minke whales and sea otters. This increased risk is not likely to affect populations of these species in Lynn Canal.

Marine Birds – Marine birds nest in wetlands and old-growth forest in Berners Bay. Alternative 2 through 2C, 3, 4B, and 4D highway maintenance activities and vehicle traffic are likely to inhibit marine birds from nesting, resting, or foraging near the highway. The Cascade Point Road and Kensington Gold Project facilities would have the potential to cause similar impacts. Nesting, resting, and foraging habitat is not scarce in the Berners Bay area. Therefore, the cumulative effect is not expected to have population-level effects on any marine bird species.

Terrestrial Mammals – As indicated above, the maximum terrestrial habitat loss associated with the proposed project is approximately 630 acres under Alternatives 2 and 2C. This loss represents about 0.6 percent of the estimated 117,000 acres of terrestrial habitat in the Lynn Canal region. The direct loss of habitat for terrestrial mammals from the proposed project would be minor compared with the overall available habitat.

[46] The loss of terrestrial habitat associated with the Cascade Point Road and any of the East Lynn Canal Highway alternatives would not be cumulative. The alignment of the road and an East Lynn Canal Highway would be similar.

A more important factor than direct habitat loss is the potential for the highway to fragment habitat for species sensitive to human presence. In Lynn Canal, brown bears move seasonally between higher elevation dens and lower elevation foraging habitat, and this species tends to avoid highway traffic. The highway could present a barrier to brown bear movement, resulting in the loss of important lower-elevation habitats such as salt marsh vegetation and concentrations of salmon at river mouths. For Alternatives 2 through 2C, the highway could reduce the habitat capability of the east side of Lynn Canal for the brown bear by 29 percent compared to present conditions. Alternative 3 would also present a similar barrier to brown bear movement on the west side of the canal. Because the highway for Alternatives 4B and 4D is relatively short (5.5 miles), habitat fragmentation for brown bears would be minor.

Of the foreseeable future projects in the region, only the Kensington Gold Project would contribute to cumulative impacts to brown bears. Depending on the alternative selected for this project, the Kensington Gold Project, including upgrading the Slate Cove to Jualin road, would result in the loss of 118 to 268 acres of habitat, half of which is upland habitat. This loss was projected to result in an impact to brown bears in the Supplemental EIS prepared for the project (USFS, 2004), but the level of impact was not quantified. The Kensington Gold Project would result in the direct loss of a relatively small amount of habitat concentrated at higher elevations than Alternatives 2 through 2C and would not cause substantial habitat fragmentation. The contribution of the Kensington Gold Project on cumulative effects to the brown bear population would be small in comparison to Alternatives 2 through 2C.

Terrestrial Birds – Terrestrial birds nest in wetlands and old-growth forest in Berners Bay. Alternative 2 through 2C, 3, 4B, and 4D highway construction would decrease available habitat. Construction and maintenance activities as well as vehicle traffic are likely to inhibit marine birds from nesting, resting, or foraging near the highway alignment. The Kensington Gold Project facilities would have the potential to cause similar impacts. Nesting, resting, and foraging habitat is not limited in the Berners Bay area. The cumulative loss of habitat would represent less than 1 percent of the amount available. Therefore, this cumulative effect would not have population-level effects on any terrestrial bird species.

Amphibians – As discussed in Section 4.9.2.9, past, present, and foreseeable future projects in combination with the proposed project would result in the loss of less than 1 percent of the wetland habitat in the Lynn Canal region. This cumulative loss of habitat would not have population-level effects on amphibian species.

4.9.2.13 Bald Eagles

Past, present, and reasonably foreseeable future projects in combination with the proposed project would result in the loss of a small amount of habitat, no loss of known nest trees for bald eagles, and no loss of food sources. In light of the ability for bald eagles to habituate to human presence, the cumulative impact of increased human presence in the region is not likely to have a population-level effect on bald eagles.

4.9.2.14 Threatened and Endangered Species

The humpback whale recovery plan prepared for NMFS identifies a number of factors that could affect the reproductive success and survival of whales (NMFS, 1991). These factors include incidental take in fishing gear, collisions with ships, disturbance and displacement from commercial and recreational marine vessel traffic, introduction of pollution and pathogens from runoff and waste disposal, disturbance and/or pollution from resource development, and effects on whale prey species from coastal development and fisheries. The factors that would be

associated with past, present, and future foreseeable projects in Lynn Canal are commercial and recreational marine vessel traffic and pollution from runoff and waste disposal.

Alternatives 2A, 3, 4B, and 4D would increase marine traffic in Berners Bay. This would be in addition to marine traffic created by the Kensington Gold Project. This increased traffic would increase the risk of collisions between marine vessels and humpback whales. Alternative 2A would add about 20 trips per day in the summer across Berners Bay. Alternative 4B would involve a high-speed ferry, which would further increase the risk of collisions with humpback whales (Laist et al., 2001). Considering the existing level of construction, commercial, and recreational activity in Southeast Alaska and the increasing population trend for this species, it appears that the cumulative activities in Lynn Canal would not be likely to hinder the overall recovery of the humpback whale population.

As indicated above in this chapter of the Supplemental Draft EIS, stormwater runoff from the highway is not expected to result in the exceedance of AWQS based on the results of stormwater runoff studies in the Anchorage area, where traffic volumes are orders of magnitude higher than projected levels for the proposed project. In addition, all wastewater discharges associated with the proposed project and foreseeable future projects would be required to meet NPDES discharge limitations. The proposed project in combination with foreseeable future projects would not measurably decrease water quality in Lynn Canal; therefore, no water quality impacts to marine mammals would likely occur.

Alternatives 2A, 3, 4B, and 4D, in combination with foreseeable future projects, including commercial fishing, recreational, and commercial marine traffic and development projects in the Berners Bay area, is likely to cause some short-term disturbance of foraging Steller sea lions. These activities may also contribute to periodic disturbance of Steller sea lions at haulouts in Berners Bay, but are not likely to cause long-term, chronic disturbance at the Gran Point or Met Point haulouts. Therefore, the cumulative effects of these projects are not likely to result in population-level effects to Steller sea lions in Lynn Canal.

See the *Indirect and Cumulative Impact Technical Report* (Appendix U) for further information on potential cumulative impacts of the proposed project.

4.10 The Relationship Between Local, Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The build alternatives would permanently convert a maximum of approximately 660 acres of natural habitat, principally old-growth forest, to transportation facilities. This overall loss of habitat represents less than one percent of the natural habitat that exists in the Lynn Canal region.

The increase in population and visitors associated with improved transportation facilities in Lynn Canal would result in increased pressure on fish and wildlife species, principally big game and furbearing species such as bears, moose, deer, mountain goats, martens, and river otters and game fish such as Pacific salmon, steelhead, and Dolly Varden, as a result of recreational hunting and fishing and collisions with vehicles. Project-related effects on populations of these species can be controlled through management plans implemented by ADF&G.

The long-term productivity of Lynn Canal region would be enhanced by a better transportation system to move goods, services, and people. Based on household surveys conducted in Juneau, Haines, and Skagway in 1994 and 2003 and the growth in traffic on transportation corridors adjacent to Lynn Canal, there is substantial latent travel demand in the Lynn Canal corridor that cannot be met by existing AMHS service. In addition to serving local needs,

tourist/recreation travel and intra-regional movement would be improved by the build alternatives. Depending on the alternative, these improvements would result in substantial economic benefits to Juneau, Haines, and Skagway. The magnitude of these benefits to each community would depend on the specific project alternative that was implemented.

The long-term benefit of improved access in Lynn Canal is recognized in the state and local comprehensive planning for the region. Improving surface transportation in the region is consistent with DNR's Juneau State Land Plan, the CBJ Comprehensive Plan, the ACMP, and district coastal management plans.

4.11 Irreversible and Irretrievable Commitments of Resources

Depending on the alternative selected, up to approximately 660 acres of land and intertidal and subtidal habitat would be committed to the proposed project. Construction of transportation facilities would result in the permanent commitment of energy, concrete, aggregate, asphalt, water, and other construction materials. Project construction costs ranging from $98 million to $294 million would be committed; these costs would be offset by savings in travel time and energy use and the economic stimulus of improved access to the communities of the Lynn Canal region.